**PROJECT MANUAL** 

For

## HAMTRAMCK PUBLIC SCHOOLS

## Hamtramck High School -Pool Filtration Upgrades

OWNER: HAMTRAMCK PUBLIC SCHOOLS 3201 Roosevelt Hamtramck, MI 48212



ARCHITECT: PARTNERS in Architecture, PLC 65 Market Street Mount Clemens, MI 48043 P. (586) 469.3600 F. (586) 469.3607

PARTNERS PROJECT # 15-163 MARCH 17, 2016 / BIDDING - CONSTRUCTION

DivisionSection Title	Pages
COVER	
	2
TABLE OF CONTENTS	Ζ
SERIES 0 - BIDDING REQUIREMENTS AND CONTRACT FORMS	
	1
ADVERTISEMENT FOR BIDS	1
A701 INSTRUCTIONS TO BIDDERS	6
001100 SUPPLEMENTARY INSTRUCTIONS TO BIDDERS	3
003000 BEOLIRED BID SUBMISSION MATERIALS	1
003100 BID FORM	2
FAMILIAL RELATIONSHIP DISCLOSURE STATEMENT	1
AFEIDAVIT OF COMPLIANCE - IRAN ECONOMIC SANCTIONS ACT	1
A201 GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION	40
008000 SUPPI EMENTARY CONDITIONS	20
DIVISION 1 - GENERAL REQUIREMENTS	
011000SUMMARY	
012300ALTERNATES	2
012500 CONTRACT MODIFICATION PROCEDURES	2
012900 PAYMENT PROCEDURES	
013100 PROJECT MANAGEMENT AND COORDINATION	4
013200 CONSTRUCTION PROGRESS DOCUMENTATION	4
013300 SUBMITTAL PROCEDURES	9
014000QUALITY REQUIREMENTS	6
014200 REFERENCES	12
015000 TEMPORARY FACILITIES AND CONTROLS	4
016000 PRODUCT REQUIREMENTS	5
017000 EXECUTION REQUIREMENTS	5
017700 CLOSEOUT PROCEDURES	5
017810PROJECT RECORD DOCUMENTS	3
017820OPERATION AND MAINTENANCE DATA	4
017900 DEMONSTRATION AND TRAINING	4
DIVISION 2 – EXISTING CONDITIONS	
024119SELECTIVE DEMOLITION	5
DIVISION 3 - CONCRETE	
033000 CAST-IN-PLACE CONCRETE	13
DIVISION 4 - MASONRY	10
042000UNIT MASONRY	10
DIVISION 5 - METALS	_
U55000METAL FABRICATIONS	
U55213PIPE AND TUBE RAILINGS	4
DIVISION 0 - WOOD, PLASTICS AND COMPOSITES	

DIVISION 7 – THERMAL AND MOISTURE PROTECTION	
076200SHEET METAL FLASHING AND TRIM	6
078413PENETRATION FIRESTOPPING	
079200JOINT SEALANTS	7
DIVISION 8 – OPENINGS	
081113HOLLOW METAL DOORS AND FRAMES	
087100DOOR HARDWARE	10
088000GLAZING	6
	З
099123 INTERIOR PAINTING	
DIVISION 10-12	
NOT APPLICABLE	
DIVISION 13 – SPECIAL CONSTRUCTION	
131500 SWIMMING POOLS	22
200010 BASIC MECHANICAL REQUIREMENTS	6
200020 ELECTRICAL REQUIREMENTS FOR MECHANICAL WORK	
DIVISION 22 – PLUMBING	
220553IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT	2
220719PLUMBING PIPING INSULATION	
221005PLUMBING PIPING	
221006PLUMBING PIPING SPECIAL HES	
225100SWIMMING POOL PLUMBING SYSTEMS	2
DIVISION 23 – HEATING VENTILATING AND AIR CONDITIONING	
230593 TESTING, ADJUSTING, AND BALANCING FOR HVAC	
230713DUCT INSULATION	5
230913INSTRUMENTATION AND CONTROL DEVICES FOR HVAC	6
232213STEAM AND CONDENSATE HEATING PIPING	6
232214STEAM AND CONDENSATE HEATING SPECIALTIES	6
233100 HVAC DUCTS AND CASINGS	13
233300AIR DUCT ACCESSORIES	2
233416CENTRIFUGAL HVAC FANS	3
233700 AIR OUTLETS AND INLETS	2
238101TERMINAL HEAT TRANSFER UNITS	
DIVISION 26 – ELECTRICAL	
260500BASIC ELECTRICAL REQUIREMENTS	6
260501MINOR ELECTRICAL DEMOLITION	
NOT APPLICABLE	

#### PROJECT IDENTIFICATION

PROJECT:	HAMTRAMCK PUBLIC SCHOOLS HAMTRAMCK HIGH SCHOOL – POOL FILTRATION UPGRADE	
	Location:	
	Hamtramck High School 11410 Charest Hamtramck, MI 48212	
OWNER:	HAMTRAMCK PUBLIC SCHOOLS 3201 Roosevelt Hamtramck, MI 48212	
ARCHITECT:	PARTNERS IN ARCHITECTURE, PLC 65 Market Street Mount Clemens, MI 48043 (586) 469.3600	
MECHANICAL & ELECTRICAL ENGINEER:	STRATEGIC ENERGY SOLUTIONS, INC. 4000 West Eleven Mile Road Berkley, MI 48072 (248) 399.1900	
POOL FILTRATION CONSULTANT:	AQUATIC SOURCE 3155 Ridgeway Court Commerce Twp. MI 48390 (248) 366. 0606	
BID DUE DATE:	<u>April 6, 2016; 2:00 p.m.</u>	

#### END OF SECTION

#### **Advertisement for Bid**

#### HAMTRAMCK PUBLIC SCHOOLS 3201 Roosevelt Hamtramck, MI 48212

#### BID TITLE: HAMTRAMCK HIGH SCHOOL – POOL FILTRATION SYSTEM UPGRADES

Hamtramck Public Schools will receive single prime sealed bids to furnish all labor and materials and perform all work necessary and incidental for the <u>Hamtramck High School – Pool filtration System Upgrades Project</u> in accordance with published instructions, specifications, drawings and other contract documents.

<u>There will be a Pre-Bid Meeting and Walkthrough</u>, for all contractors wishing to submit a bid, at Hamtramck High School, located at 11410 Charest, Hamtramck, MI 48212, on <u>Wednesday, March 30, 2016 at 3:30 p.m.</u>

Sealed bids must be received at the Hamtramck Public Schools Administration Building, located at 3201 Roosevelt, Hamtramck, MI 48212, no later than, <u>Wednesday, April 6, 2016 at 2:00pm.</u> Bids received after this date and time and bids received electronically or via fax will <u>not</u> be accepted or considered. <u>Bids will be publicly opened and read aloud at 2:05pm</u>.

Bidders <u>MUST</u> use the bid form(s) in the specification packages. <u>RETURN TWO COMPLETE COPIES OF EACH BID</u> <u>SUBMITTAL</u>. Bids shall be submitted in a sealed envelope, clearly labeled with the bid title, date and time due.

All bids shall be accompanied by a sworn and notarized statement disclosing any familial relationship(s) that exist between the owner(s) or any employee of the bidder and any member of the Board of Education of the School District or the Superintendent of the School District. The Board of Education shall not accept a bid that does not include a sworn and notarized familial relationship disclosure statement. All bids must also be submitted with a sworn and notarized Affidavit of Compliance regarding Michigan Public Act No. 517 of 2012 – Iran Economic Sanctions Act.

Submit with each bid, a certified check or acceptable bid bond payable to Hamtramck Public Schools, in an amount equal to five percent (5%) of the total bid.

Bids submitted shall fully comply in all respects to these instructions, published specifications, drawings, and other contract documents. <u>Bid price shall include all costs associated with this project</u>.

No bid may be withdrawn for a period of sixty (60) days after the date of the bid opening. The Board reserves the right to reject any or all bids received and to waive any formalities in regard thereto. In addition, the Board reserves the right to evaluate bids on any basis determined by the Board to be in the best interest of the Board and to consider alternate bids if the low bidder(s) do not meet the specifications or are otherwise determined to be unqualified.

The Architect will provide the documents to prospective bidders, electronically free of charge or in hard copy format at \$40.00 per set. Checks shall be made payable to: PARTNERS in Architecture, PLC. Bid documents will be available on or about March17, 2016. Interested contractors should request documents via email @ epacella@partnersinarch.com. Questions may be directed to PARTNERS in Architecture, PLC, 65 Market Street, Mt. Clemens, MI 48043 (Phone: 586-469-3600).

# MAIA® Document A701<sup>™</sup> – 1997

### Instructions to Bidders

#### for the following PROJECT:

(Name and location or address) HPS High School Pool Filtration Upgrades #15-163 Hamtramck High School 11410 Charest Hamtramck, MI 48212

#### THE OWNER:

(Name, legal status and address) Hamtramck Public Schools 3201 Roosevelt Hamtramck, MI 48212

#### THE ARCHITECT:

(Name, legal status and address) PARTNERS in Architecture, PLC 65 Market Street Mount Clemens, MI 48043

#### TABLE OF ARTICLES

- 1 DEFINITIONS
- 2 BIDDER'S REPRESENTATIONS
- 3 BIDDING DOCUMENTS
- 4 BIDDING PROCEDURES
- 5 CONSIDERATION OF BIDS
- 6 POST-BID INFORMATION
- 7 PERFORMANCE BOND AND PAYMENT BOND
- 8 FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR

#### 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.

1

#### 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.

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**§ 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.

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#### 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.

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**§ 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.

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**§ 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.

#### SECTION 001100 – SUPPLEMENTARY INSTRUCTIONS TO BIDDERS

The following supplements modify the "Instructions to Bidders", AIA document A701, 2007 Edition. Where a portion of the "Instructions to Bidders is modified or deleted by thee Supplementary Instructions, the unaltered portions of the Instructions to Bidders shall remain in effect.

- 1. ARTICLE 1: DEFINITIONS No modifications.
- 2. ARTICLE 2: BIDDERS REPRESENTATIONS
  - a. Add the following paragraph: "2.1.5 The Bidder understands that this project is a non-prevailing wage project."
- 3. ARTICLE 3: BIDDING DOCUMENTS
  - a. Paragraph 3.1 Copies: Make the following modifications:

Delete Paragraph 3.1.1 in its entirety and substitute the following:

- "3.1.1 Bidders may obtain up to two (2) complete set of bidding documents from the Architect at the cost as listed in the Advertisement for Bids. Additional sets are available at direct cost to the bidder."
- b. Paragraph 3.3 Substitutions: Add the following Subparagraph:
  - "3.3.5 Where the Contractor chooses to use an item approved by request but other than one shown on the details or specified, he shall be responsible for the coordination of any necessary changes in other work, and shall bear the cost of such changes."
- c. Paragraph 3.4 Addenda: Make the following modification:
  - "3.4.3 Delete "...no later than four days..." and replace with "...no later than two days..."
  - "3.4.4 Add the following: "Each bidder shall contact Architect's office for information regarding all addenda issued."
- 4. ARTICLE 4: BIDDING PROCEDURES
  - a. Paragraph 4.2 Bid Security: Make the following modifications:

Delete Paragraph 4.2.1 in its entirety and substitute the following:

"4.2.1 No bid will be considered, unless it is accompanied by a certified check or acceptable Bid Bond payable without condition to the Owner, in an amount equal to (5%) of the total bid. The certified check or Bid Bond which must accompany each bid is required as a guarantee that the bidder will enter into a contract with the Owner for the work described in the proposal and furnish a performance and payment bond and certificates of insurance as specified after notice by the Owner or Architect that contracts have been awarded to him and are ready for execution."

Add the following sentence to Subparagraph 4.2.3:

"The Bid Security of the three lowest bidders will be retained until the contract has been awarded and executed, but not longer than (75) days. The Bid Security of other bidders will be returned within a reasonable time after the opening of bids."

- b. Paragraph 4.4 Modification or Withdrawal of Bid: From Subparagraph 4.4.1 delete the words "...during the stipulated time period..." and substitute the words "...for a period of sixty (60) days...".
- c. Paragraph 4.3 Submission of Bids: Add the following:
  - "4.3.5 The Bidder shall submit with their bid the following information:
    - A sworn and notarized statement disclosing any familial relationship that exists between the Owner(s) or any employee of the Bidder and any member of the Hamtramck Public Schools Board of Education or the Superintendent of Schools. Use the form provided in the project manual."
    - A sworn and notarized Affidavit of Compliance regarding Michigan Public Act No. 517 of 2012 – Iran Economic Sanctions Act. Use the form provided in the project manual."
- 5. ARTICLE 5: CONSIDERATION OF BIDS
  - a. Delete Paragraph 5.3.1 in its entirety and substitute the following:
    - "5.3.1 It is the intent of the Owner to award a Contract to the Lowest Responsible 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."
- 6. ARTICLE 6: POST-BID INFORMATION
  - a. Paragraph 6.1 Delete in its entirety.
- 7. ARTICLE 7: PERFORMANCE BOND AND PAYMENT BOND

- a. Article 7:Delete the Article in its entirety. Refer to Section 008000 Supplementary Conditions, Paragraph 11.5 for bond requirements.
- 8. ARTICLE 8: FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR No modifications.

END OF SECTION 001100

#### SECTION 003000 - REQUIRED BID SUBMISSION MATERIALS

#### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Following this page is the Bid Form. Bidder must completely fill out the Bid Form and Submit (2) original copies, by the date and time specified.
- B. Following the Bid Form, is the "Familial Relationship Disclosure Statement", of which the bidder must submit a notarized copy with their bid.
- C. Following the Bid Form is the "Affidavit of Compliance Iran Economic Sanctions Act", of which the bidder must submit a notarized copy with their bid.
- D. Bidder must submit with the bid, "Bid Security" as described in specifications section 011000.

#### END OF SECTION 003000

#### **BID FORM**

BID PROPOSAL FOR:	Hamtramck Public Schools – Hamtramck High School – Pool Filtration Upgrades Project # 15-163
BID TO:	Hamtramck Public Schools Administration Building 3201 Roosevelt Hamtramck, MI 48212
BID DUE DATE:	APRIL 6, 2016 at 2:00pm

BIDDERS NAME: \_\_\_\_\_

We have examined the Contract Documents for the proposed Hamtramck Public Schools - Hamtramck Alternative High School – Pool Filtration Upgrades project as prepared by PARTNERS in Architecture, PLC.

In accordance therewith, the undersigned proposes to furnish all labor and materials for construction as set forth in the Contract Documents, including the following Addenda, if any (fill in the addenda number, thus confirming receipt):

Addendum Number \_\_\_\_\_ Addendum Number \_\_\_\_\_

Addendum Number \_\_\_\_\_ Addendum Number \_\_\_\_\_

- 1. Accompanying the proposal is a bid security for work required to be furnished by the Contract Documents, the same being subject to forfeiture in the event of default by the undersigned.
- 2. I agree to complete the Project, by the dates listed in Specification Section 011000 Summary; provided that a notice to proceed is issued within thirty (30) days.
- 3. I understand that the Owner reserves the right to reject any or all bids, and it is agreed that this bid may not be withdrawn for a period of sixty (60) days from the opening thereof.
- 5. Attached herewith are the documents requested in the Supplementary Instructions to Bidders, Specification Section 001100, paragraph 4.3.5.
  - A. **BASE BID:** (Insert a base bid amount in the blank provided).

#### B. ALTERNATES: Refer to section 012300 for a complete description:

- 1. Alternate No. 1: Provide chlorine generation unit.
- Base bid: Installation of a new calcium hypo-chlorite feeder, chemicals, piping and associated valves. Electrical requirements for this unit are a dedicated 110 volt, 20 amp single phase duplex outlet provided by Division 16 Contractor.

Add \$ \_\_\_\_\_

C. <u>SCHEDULE</u>: Fill in proposed construction duration to achieve substantial completion. Refer to Specification Section 011000 for schedule requirements.

#### **BIDDERS INFORMATION:**

Company Name:	
Contact Name:	
Signature:	Title
Email:	
Address:	
Phone Number:	_Fax Number:
Cell Phone Number:	
Date:	

END OF BID FORM

Hamtramck Public Schools				
	Hamtramck High School - Pool Filtration Upgrades Hamtramck Public Schools 3201 Roosevelt, Hamtramck, MI 48212			
		(313) 872-9270		
Company Name:				
According to Section employee of the bido	1267 of the Revised School Code the bid must be accompanied der and any member of the district's board or superintendent of the There are no familial relationships between the bidder, the ow Yes, there is a familial relationship between the bidder, the ow If so, please state the person(s) and the relationship:	d with a sworn and notarized statement disclosing any familial relationship between the owner or an e district. Iner or an employee of the bidder and any member of the district's board or superintendent Iner or an employee of the bidder and a member of the district's board or superintendent		
	Bidder, the Owner and/or Employee	District Board and/or Superintendent		
Subscribed and swo	rn this day of 2016			
In the County of	State of			
by				
Notary F	Public Signature			
My commission expi	res on:	Seal or stamp:		

#### AFFIDAVIT OF COMPLIANCE - IRAN ECONOMIC SANCTIONS ACT

#### Michigan Public Act No. 517 of 2012

The undersigned, the owner or authorized officer of the below-named contractor (the "Contractor"), pursuant to the compliance certification requirement provided in the Hamtramck Public Schools (the District") Request For Proposals For Hamtramck High School - Pool Filtration Upgrades (the "RFP), hereby certified, represents and warrants that the Contractor (including its officers, directors and employees) is not an "Iran linked business" within the meaning of the Iran Economic Sanctions Act, Michigan Public Act No. 517 of 2012 (the "Act"), and that in the event Contractor is awarded a contract as a result of the aforementioned RFP, the Contractor will not become an "Iran linked business" at any time during the course of performing any services under the contract.

The Contract further acknowledges that any person who is found to have submitted a false certification is responsible for a civil penalty of not more than \$250,000.00 or 2 times the amount of the contract or proposed contract for which the false certification was made, whichever is greater, the cost of the District's investigation, and reasonable attorney fees, in addition to the fine. Moreover, any person who submitted a false certification shall be ineligible to bid on a request for proposal for three (3) years from the date that it is determined that the person has submitted the false certification.

#### CONTRACTOR:

	Name of Contractor		
	Ву:		
	Its:		
	Date:		
STATE OF	)		
COUNTY OF	)ss. _)		
This instrument was acknowledged before me on the	day of	, 2016,	
oy	<u> </u>		
		Notary Public	
	County	County,	
	My Commission Expires:		
	Acting in the County of:		

MARCH 17, 2016 / BIDDING - CONSTRUCTION

# MAIA® Document A201<sup>™</sup> – 2007

### General Conditions of the Contract for Construction

#### for the following PROJECT:

(Name and location or address) HPS High School Pool Filtration Upgrades #15-163 Hamtramck High School 11410 Charest Hamtramck, MI 48212

#### THE OWNER:

(Name, legal status and address) Hamtramck Public Schools 3201 Roosevelt Hamtramck, MI 48212

#### THE ARCHITECT:

(Name, legal status and address) PARTNERS in Architecture, PLC 65 Market Street Mount Clemens, MI 48043

#### TABLE OF ARTICLES

- 1 GENERAL PROVISIONS
- 2 OWNER
- 3 CONTRACTOR
- 4 ARCHITECT
- 5 SUBCONTRACTORS
- 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS
- 7 CHANGES IN THE WORK
- 8 TIME
- 9 PAYMENTS AND COMPLETION
- 10 PROTECTION OF PERSONS AND PROPERTY
- 11 INSURANCE AND BONDS
- 12 UNCOVERING AND CORRECTION OF WORK
- 13 MISCELLANEOUS PROVISIONS
- 14 TERMINATION OR SUSPENSION OF THE CONTRACT
- 15 CLAIMS AND DISPUTES

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1

#### INDEX

(Topics and numbers in **bold** are section headings.)

#### Acceptance of Nonconforming Work

9.6.6, 9.9.3, 12.3 Acceptance of Work 9.6.6, 9.8.2, 9.9.3, 9.10.1, 9.10.3, 12.3 Access to Work 3.16, 6.2.1, 12.1 **Accident Prevention** 10 Acts and Omissions 3.2, 3.3.2, 3.12.8, 3.18, 4.2.3, 8.3.1, 9.5.1, 10.2.5, 10.2.8, 13.4.2, 13.7, 14.1, 15.2 Addenda 1.1.1, 3.11 Additional Costs, Claims for 3.7.4, 3.7.5, 6.1.1, 7.3.7.5, 10.3, 15.1.4 **Additional Inspections and Testing** 9.4.2, 9.8.3, 12.2.1, 13.5 Additional Insured 11.1.4 Additional Time, Claims for 3.2.4, 3.7.4, 3.7.5, 3.10.2, 8.3.2, 15.1.5 Administration of the Contract 3.1.3, 4.2, 9.4, 9.5 Advertisement or Invitation to Bid 1.1.1 Aesthetic Effect 4.2.13 Allowances 3.8, 7.3.8 All-risk Insurance 11.3.1, 11.3.1.1 **Applications for Payment** 4.2.5, 7.3.9, 9.2, 9.3, 9.4, 9.5.1, 9.6.3, 9.7, 9.10, 11.1.3 Approvals 2.1.1, 2.2.2, 2.4, 3.1.3, 3.10.2, 3.12.8, 3.12.9, 3.12.10, 4.2.7, 9.3.2, 13.5.1 Arbitration 8.3.1, 11.3.10, 13.1, 15.3.2, 15.4 ARCHITECT 4 Architect, Definition of 4.1.1 Architect, Extent of Authority 2.4, 3.12.7, 4.1, 4.2, 5.2, 6.3, 7.1.2, 7.3.7, 7.4, 9.2, 9.3.1, 9.4, 9.5, 9.6.3, 9.8, 9.10.1, 9.10.3, 12.1, 12.2.1, 13.5.1, 13.5.2, 14.2.2, 14.2.4, 15.1.3, 15.2.1 Architect, Limitations of Authority and Responsibility 2.1.1, 3.12.4, 3.12.8, 3.12.10, 4.1.2, 4.2.1, 4.2.2, 4.2.3, 4.2.6, 4.2.7, 4.2.10, 4.2.12, 4.2.13, 5.2.1, 7.4, 9.4.2, 9.5.3, 9.6.4, 15.1.3, 15.2

Architect's Additional Services and Expenses 2.4, 11.3.1.1, 12.2.1, 13.5.2, 13.5.3, 14.2.4 Architect's Administration of the Contract 3.1.3, 4.2, 3.7.4, 15.2, 9.4.1, 9.5 Architect's Approvals 2.4, 3.1.3, 3.5, 3.10.2, 4.2.7 Architect's Authority to Reject Work 3.5, 4.2.6, 12.1.2, 12.2.1 Architect's Copyright 1.1.7, 1.5 Architect's Decisions 3.7.4, 4.2.6, 4.2.7, 4.2.11, 4.2.12, 4.2.13, 4.2.14, 6.3, 7.3.7, 7.3.9, 8.1.3, 8.3.1, 9.2, 9.4.1, 9.5, 9.8.4, 9.9.1, 13.5.2, 15.2, 15.3 Architect's Inspections 3.7.4, 4.2.2, 4.2.9, 9.4.2, 9.8.3, 9.9.2, 9.10.1, 13.5 Architect's Instructions 3.2.4, 3.3.1, 4.2.6, 4.2.7, 13.5.2 Architect's Interpretations 4.2.11, 4.2.12 Architect's Project Representative 4.2.10 Architect's Relationship with Contractor 1.1.2, 1.5, 3.1.3, 3.2.2, 3.2.3, 3.2.4, 3.3.1, 3.4.2, 3.5, 3.7.4, 3.7.5, 3.9.2, 3.9.3, 3.10, 3.11, 3.12, 3.16, 3.18, 4.1.2, 4.1.3, 4.2, 5.2, 6.2.2, 7, 8.3.1, 9.2, 9.3, 9.4, 9.5, 9.7, 9.8, 9.9, 10.2.6, 10.3, 11.3.7, 12, 13.4.2, 13.5, 15.2 Architect's Relationship with Subcontractors 1.1.2, 4.2.3, 4.2.4, 4.2.6, 9.6.3, 9.6.4, 11.3.7 Architect's Representations 9.4.2, 9.5.1, 9.10.1 Architect's Site Visits 3.7.4, 4.2.2, 4.2.9, 9.4.2, 9.5.1, 9.9.2, 9.10.1, 13.5 Asbestos 10.3.1 Attorneys' Fees 3.18.1, 9.10.2, 10.3.3 Award of Separate Contracts 6.1.1.6.1.2 Award of Subcontracts and Other Contracts for **Portions of the Work** 5.2 **Basic Definitions** 1.1 **Bidding Requirements** 1.1.1, 5.2.1, 11.4.1 **Binding Dispute Resolution** 9.7, 11.3.9, 11.3.10, 13.1, 15.2.5, 15.2.6.1, 15.3.1, 15.3.2, 15.4.1 **Boiler and Machinery Insurance** 11.3.2 Bonds, Lien 7.3.7.4, 9.10.2, 9.10.3 **Bonds, Performance, and Payment** 7.3.7.4, 9.6.7, 9.10.3, 11.3.9, 11.4

2

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**Building Permit** 3.7.1 Capitalization 1.3 Certificate of Substantial Completion 9.8.3, 9.8.4, 9.8.5 **Certificates for Payment** 4.2.1, 4.2.5, 4.2.9, 9.3.3, **9.4**, 9.5, 9.6.1, 9.6.6, 9.7, 9.10.1, 9.10.3, 14.1.1.3, 14.2.4, 15.1.3 Certificates of Inspection, Testing or Approval 13.5.4 Certificates of Insurance 9.10.2, 11.1.3 **Change Orders** 1.1.1, 2.4, 3.4.2, 3.7.4, 3.8.2.3, 3.11, 3.12.8, 4.2.8, 5.2.3, 7.1.2, 7.1.3, **7.2**, 7.3.2, 7.3.6, 7.3.9, 7.3.10, 8.3.1, 9.3.1.1, 9.10.3, 10.3.2, 11.3.1.2, 11.3.4, 11.3.9, 12.1.2, 15.1.3 Change Orders, Definition of 7.2.1 **CHANGES IN THE WORK** 2.2.1, 3.11, 4.2.8, 7, 7.2.1, 7.3.1, 7.4, 8.3.1, 9.3.1.1, 11.3.9 Claims, Definition of 15.1.1 **CLAIMS AND DISPUTES** 3.2.4, 6.1.1, 6.3, 7.3.9, 9.3.3, 9.10.4, 10.3.3, 15, 15.4 Claims and Timely Assertion of Claims 15.4.1**Claims for Additional Cost** 3.2.4, 3.7.4, 6.1.1, 7.3.9, 10.3.2, 15.1.4 **Claims for Additional Time** 3.2.4, 3.7.4, 6.1.1, 8.3.2, 10.3.2, 15.1.5 Concealed or Unknown Conditions, Claims for 3.7.4 Claims for Damages 3.2.4, 3.18, 6.1.1, 8.3.3, 9.5.1, 9.6.7, 10.3.3, 11.1.1, 11.3.5, 11.3.7, 14.1.3, 14.2.4, 15.1.6 Claims Subject to Arbitration 15.3.1, 15.4.1 **Cleaning Up** 3.15, 6.3 Commencement of the Work, Conditions Relating to 2.2.1, 3.2.2, 3.4.1, 3.7.1, 3.10.1, 3.12.6, 5.2.1, 5.2.3, 6.2.2, 8.1.2, 8.2.2, 8.3.1, 11.1, 11.3.1, 11.3.6, 11.4.1, 15.1.4 Commencement of the Work, Definition of 8.1.2 **Communications Facilitating Contract** Administration 3.9.1, 4.2.4 Completion, Conditions Relating to 3.4.1, 3.11, 3.15, 4.2.2, 4.2.9, 8.2, 9.4.2, 9.8, 9.9.1, 9.10, 12.2, 13.7, 14.1.2 **COMPLETION, PAYMENTS AND** 9

Completion, Substantial 4.2.9, 8.1.1, 8.1.3, 8.2.3, 9.4.2, 9.8, 9.9.1, 9.10.3, 12.2, 13.7 Compliance with Laws 1.6, 3.2.3, 3.6, 3.7, 3.12.10, 3.13, 4.1.1, 9.6.4, 10.2.2, 11.1, 11.3, 13.1, 13.4, 13.5.1, 13.5.2, 13.6, 14.1.1, 14.2.1.3, 15.2.8, 15.4.2, 15.4.3 Concealed or Unknown Conditions 3.7.4, 4.2.8, 8.3.1, 10.3 Conditions of the Contract 1.1.1, 6.1.1, 6.1.4 Consent, Written 3.4.2, 3.7.4, 3.12.8, 3.14.2, 4.1.2, 9.3.2, 9.8.5, 9.9.1, 9.10.2, 9.10.3, 11.3.1, 13.2, 13.4.2, 15.4.4.2 **Consolidation or Joinder** 15.4.4 **CONSTRUCTION BY OWNER OR BY** SEPARATE CONTRACTORS 1.1.4.6 Construction Change Directive, Definition of 7.3.1 **Construction Change Directives** 1.1.1, 3.4.2, 3.12.8, 4.2.8, 7.1.1, 7.1.2, 7.1.3, 7.3, 9.3.1.1 Construction Schedules, Contractor's 3.10, 3.12.1, 3.12.2, 6.1.3, 15.1.5.2 **Contingent Assignment of Subcontracts** 5.4, 14.2.2.2 **Continuing Contract Performance** 15.1.3 Contract, Definition of 1.1.2 CONTRACT, TERMINATION OR SUSPENSION OF THE 5.4.1.1, 11.3.9, 14 Contract Administration 3.1.3, 4, 9.4, 9.5 Contract Award and Execution, Conditions Relating to 3.7.1, 3.10, 5.2, 6.1, 11.1.3, 11.3.6, 11.4.1 Contract Documents, Copies Furnished and Use of 1.5.2, 2.2.5, 5.3 Contract Documents, Definition of 1.1.1 **Contract Sum** 3.7.4, 3.8, 5.2.3, 7.2, 7.3, 7.4, **9.1**, 9.4.2, 9.5.1.4, 9.6.7, 9.7, 10.3.2, 11.3.1, 14.2.4, 14.3.2, 15.1.4, 15.2.5 Contract Sum, Definition of 9.1 Contract Time 3.7.4, 3.7.5, 3.10.2, 5.2.3, 7.2.1.3, 7.3.1, 7.3.5, 7.4, 8.1.1, 8.2.1, 8.3.1, 9.5.1, 9.7, 10.3.2, 12.1.1, 14.3.2, 15.1.5.1, 15.2.5 Contract Time, Definition of 8.1.1

Init.

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3

#### CONTRACTOR

3

Contractor, Definition of 3.1, 6.1.2 **Contractor's Construction Schedules** 3.10, 3.12.1, 3.12.2, 6.1.3, 15.1.5.2 Contractor's Employees 3.3.2, 3.4.3, 3.8.1, 3.9, 3.18.2, 4.2.3, 4.2.6, 10.2, 10.3, 11.1.1, 11.3.7, 14.1, 14.2.1.1 **Contractor's Liability Insurance** 11.1 Contractor's Relationship with Separate Contractors and Owner's Forces 3.12.5, 3.14.2, 4.2.4, 6, 11.3.7, 12.1.2, 12.2.4 Contractor's Relationship with Subcontractors 1.2.2, 3.3.2, 3.18.1, 3.18.2, 5, 9.6.2, 9.6.7, 9.10.2, 11.3.1.2, 11.3.7, 11.3.8 Contractor's Relationship with the Architect 1.1.2, 1.5, 3.1.3, 3.2.2, 3.2.3, 3.2.4, 3.3.1, 3.4.2, 3.5, 3.7.4, 3.10, 3.11, 3.12, 3.16, 3.18, 4.1.3, 4.2, 5.2, 6.2.2, 7, 8.3.1, 9.2, 9.3, 9.4, 9.5, 9.7, 9.8, 9.9, 10.2.6, 10.3, 11.3.7, 12, 13.5, 15.1.2, 15.2.1 Contractor's Representations 3.2.1, 3.2.2, 3.5, 3.12.6, 6.2.2, 8.2.1, 9.3.3, 9.8.2 Contractor's Responsibility for Those Performing the Work 3.3.2, 3.18, 5.3, 6.1.3, 6.2, 9.5.1, 10.2.8 Contractor's Review of Contract Documents 3.2 Contractor's Right to Stop the Work 9.7 Contractor's Right to Terminate the Contract 14.1, 15.1.6 Contractor's Submittals 3.10, 3.11, 3.12.4, 4.2.7, 5.2.1, 5.2.3, 9.2, 9.3, 9.8.2, 9.8.3, 9.9.1, 9.10.2, 9.10.3, 11.1.3, 11.4.2 Contractor's Superintendent 3.9. 10.2.6 Contractor's Supervision and Construction Procedures 1.2.2, 3.3, 3.4, 3.12.10, 4.2.2, 4.2.7, 6.1.3, 6.2.4, 7.1.3, 7.3.5, 7.3.7, 8.2, 10, 12, 14, 15.1.3 Contractual Liability Insurance 11.1.1.8, 11.2 Coordination and Correlation 1.2, 3.2.1, 3.3.1, 3.10, 3.12.6, 6.1.3, 6.2.1 Copies Furnished of Drawings and Specifications 1.5, 2.2.5, 3.11 Copyrights 1.5. 3.17 Correction of Work 2.3, 2.4, 3.7.3, 9.4.2, 9.8.2, 9.8.3, 9.9.1, 12.1.2, 12.2 **Correlation and Intent of the Contract Documents** 1.2 Cost. Definition of 7.3.7

Costs 2.4, 3.2.4, 3.7.3, 3.8.2, 3.15.2, 5.4.2, 6.1.1, 6.2.3, 7.3.3.3, 7.3.7, 7.3.8, 7.3.9, 9.10.2, 10.3.2, 10.3.6, 11.3, 12.1.2, 12.2.1, 12.2.4, 13.5, 14 **Cutting and Patching** 3.14, 6.2.5 Damage to Construction of Owner or Separate Contractors 3.14.2, 6.2.4, 10.2.1.2, 10.2.5, 10.4, 11.1.1, 11.3, 12.2.4 Damage to the Work 3.14.2, 9.9.1, 10.2.1.2, 10.2.5, 10.4, 11.3.1, 12.2.4 Damages, Claims for 3.2.4, 3.18, 6.1.1, 8.3.3, 9.5.1, 9.6.7, 10.3.3, 11.1.1, 11.3.5, 11.3.7, 14.1.3, 14.2.4, 15.1.6 Damages for Delay 6.1.1, 8.3.3, 9.5.1.6, 9.7, 10.3.2 Date of Commencement of the Work, Definition of 8.1.2 Date of Substantial Completion, Definition of 8.1.3 Day, Definition of 8.1.4 Decisions of the Architect 3.7.4, 4.2.6, 4.2.7, 4.2.11, 4.2.12, 4.2.13, 15.2, 6.3, 7.3.7, 7.3.9, 8.1.3, 8.3.1, 9.2, 9.4, 9.5.1, 9.8.4, 9.9.1, 13.5.2, 14.2.2, 14.2.4, 15.1, 15.2 **Decisions to Withhold Certification** 9.4.1, 9.5, 9.7, 14.1.1.3 Defective or Nonconforming Work, Acceptance, Rejection and Correction of 2.3, 2.4, 3.5, 4.2.6, 6.2.5, 9.5.1, 9.5.2, 9.6.6, 9.8.2, 9.9.3, 9.10.4, 12.2.1 Definitions 1.1, 2.1.1, 3.1.1, 3.5, 3.12.1, 3.12.2, 3.12.3, 4.1.1, 15.1.1, 5.1, 6.1.2, 7.2.1, 7.3.1, 8.1, 9.1, 9.8.1 **Delays and Extensions of Time** 3.2, 3.7.4, 5.2.3, 7.2.1, 7.3.1, 7.4, 8.3, 9.5.1, 9.7, 10.3.2, 10.4, 14.3.2, 15.1.5, 15.2.5 Disputes 6.3, 7.3.9, 15.1, 15.2 **Documents and Samples at the Site** 3.11 Drawings, Definition of 1.1.5 Drawings and Specifications, Use and Ownership of 3.11 Effective Date of Insurance 8.2.2. 11.1.2 **Emergencies** 10.4, 14.1.1.2, 15.1.4 Employees, Contractor's 3.3.2, 3.4.3, 3.8.1, 3.9, 3.18.2, 4.2.3, 4.2.6, 10.2, 10.3.3, 11.1.1, 11.3.7, 14.1, 14.2.1.1

Init. 1

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4

Equipment, Labor, Materials or 1.1.3, 1.1.6, 3.4, 3.5, 3.8.2, 3.8.3, 3.12, 3.13, 3.15.1, 4.2.6, 4.2.7, 5.2.1, 6.2.1, 7.3.7, 9.3.2, 9.3.3, 9.5.1.3, 9.10.2, 10.2.1, 10.2.4, 14.2.1.1, 14.2.1.2 Execution and Progress of the Work 1.1.3, 1.2.1, 1.2.2, 2.2.3, 2.2.5, 3.1, 3.3.1, 3.4.1, 3.5, 3.7.1, 3.10.1, 3.12, 3.14, 4.2, 6.2.2, 7.1.3, 7.3.5, 8.2, 9.5.1, 9.9.1, 10.2, 10.3, 12.2, 14.2, 14.3.1, 15.1.3 Extensions of Time 3.2.4, 3.7.4, 5.2.3, 7.2.1, 7.3, 7.4, 9.5.1, 9.7, 10.3.2, 10.4, 14.3, 15.1.5, 15.2.5 **Failure of Payment** 9.5.1.3, 9.7, 9.10.2, 13.6, 14.1.1.3, 14.2.1.2 Faulty Work (See Defective or Nonconforming Work) **Final Completion and Final Payment** 4.2.1, 4.2.9, 9.8.2, 9.10, 11.1.2, 11.1.3, 11.3.1, 11.3.5, 12.3, 14.2.4, 14.4.3 Financial Arrangements, Owner's 2.2.1, 13.2.2, 14.1.1.4 Fire and Extended Coverage Insurance 11.3.1.1 **GENERAL PROVISIONS** 1 **Governing Law** 13.1 Guarantees (See Warranty) **Hazardous Materials** 10.2.4. 10.3 Identification of Subcontractors and Suppliers 5.2.1 Indemnification 3.17, 3.18, 9.10.2, 10.3.3, 10.3.5, 10.3.6, 11.3.1.2, 11.3.7 Information and Services Required of the Owner 2.1.2, 2.2, 3.2.2, 3.12.4, 3.12.10, 6.1.3, 6.1.4, 6.2.5, 9.6.1, 9.6.4, 9.9.2, 9.10.3, 10.3.3, 11.2, 11.4, 13.5.1, 13.5.2, 14.1.1.4, 14.1.4, 15.1.3 **Initial Decision** 15.2 **Initial Decision Maker, Definition of** 1.1.8 Initial Decision Maker, Decisions 14.2.2, 14.2.4, 15.2.1, 15.2.2, 15.2.3, 15.2.4, 15.2.5 Initial Decision Maker, Extent of Authority 14.2.2, 14.2.4, 15.1.3, 15.2.1, 15.2.2, 15.2.3, 15.2.4, 15.2.5 Injury or Damage to Person or Property 10.2.8. 10.4 Inspections 3.1.3, 3.3.3, 3.7.1, 4.2.2, 4.2.6, 4.2.9, 9.4.2, 9.8.3, 9.9.2, 9.10.1, 12.2.1, 13.5 Instructions to Bidders 1.1.1 Instructions to the Contractor 3.2.4, 3.3.1, 3.8.1, 5.2.1, 7, 8.2.2, 12, 13.5.2

Instruments of Service, Definition of 1.1.7 Insurance 3.18.1, 6.1.1, 7.3.7, 9.3.2, 9.8.4, 9.9.1, 9.10.2, 11 **Insurance, Boiler and Machinery** 11.3.2 **Insurance, Contractor's Liability** 11.1 Insurance, Effective Date of 8.2.2. 11.1.2 Insurance, Loss of Use 11.3.3 **Insurance, Owner's Liability** 11.2 **Insurance, Property** 10.2.5, 11.3 Insurance, Stored Materials 9.3.2 **INSURANCE AND BONDS** 11 Insurance Companies, Consent to Partial Occupancy 9.9.1 Intent of the Contract Documents 1.2.1, 4.2.7, 4.2.12, 4.2.13, 7.4 Interest 13.6 Interpretation 1.2.3, 1.4, 4.1.1, 5.1, 6.1.2, 15.1.1 Interpretations, Written 4.2.11, 4.2.12, 15.1.4 Judgment on Final Award 15.4.2 Labor and Materials, Equipment 1.1.3, 1.1.6, **3.4**, 3.5, 3.8.2, 3.8.3, 3.12, 3.13, 3.15.1, 4.2.6, 4.2.7, 5.2.1, 6.2.1, 7.3.7, 9.3.2, 9.3.3, 9.5.1.3, 9.10.2, 10.2.1, 10.2.4, 14.2.1.1, 14.2.1.2 Labor Disputes 8.3.1 Laws and Regulations 1.5, 3.2.3, 3.6, 3.7, 3.12.10, 3.13, 4.1.1, 9.6.4, 9.9.1, 10.2.2, 11.1.1, 11.3, 13.1, 13.4, 13.5.1, 13.5.2, 13.6, 14, 15.2.8, 15.4 Liens 2.1.2, 9.3.3, 9.10.2, 9.10.4, 15.2.8 Limitations, Statutes of 12.2.5, 13.7, 15.4.1.1 Limitations of Liability 2.3, 3.2.2, 3.5, 3.12.10, 3.17, 3.18.1, 4.2.6, 4.2.7, 4.2.12, 6.2.2, 9.4.2, 9.6.4, 9.6.7, 10.2.5, 10.3.3, 11.1.2, 11.2, 11.3.7, 12.2.5, 13.4.2 Limitations of Time 2.1.2, 2.2, 2.4, 3.2.2, 3.10, 3.11, 3.12.5, 3.15.1, 4.2.7, 5.2, 5.3, 5.4.1, 6.2.4, 7.3, 7.4, 8.2, 9.2, 9.3.1, 9.3.3, 9.4.1, 9.5, 9.6, 9.7, 9.8, 9.9, 9.10, 11.1.3, 11.3.1.5, 11.3.6, 11.3.10, 12.2, 13.5, 13.7, 14, 15 Loss of Use Insurance 11.3.3

Init.

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5

Material Suppliers 1.5, 3.12.1, 4.2.4, 4.2.6, 5.2.1, 9.3, 9.4.2, 9.6, 9.10.5 Materials, Hazardous 10.2.4, 10.3 Materials, Labor, Equipment and 1.1.3, 1.1.6, 1.5.1, 3.4.1, 3.5, 3.8.2, 3.8.3, 3.12, 3.13, 3.15.1, 4.2.6, 4.2.7, 5.2.1, 6.2.1, 7.3.7, 9.3.2, 9.3.3, 9.5.1.3, 9.10.2, 10.2.1.2, 10.2.4, 14.2.1.1, 14.2.1.2 Means, Methods, Techniques, Sequences and Procedures of Construction 3.3.1, 3.12.10, 4.2.2, 4.2.7, 9.4.2 Mechanic's Lien 2.1.2, 15.2.8 Mediation 8.3.1, 10.3.5, 10.3.6, 15.2.1, 15.2.5, 15.2.6, **15.3**, 15.4.1 Minor Changes in the Work 1.1.1, 3.12.8, 4.2.8, 7.1, 7.4 MISCELLANEOUS PROVISIONS 13 Modifications, Definition of 1.1.1 Modifications to the Contract 1.1.1, 1.1.2, 3.11, 4.1.2, 4.2.1, 5.2.3, 7, 8.3.1, 9.7, 10.3.2, 11.3.1 **Mutual Responsibility** 6.2 Nonconforming Work, Acceptance of 9.6.6, 9.9.3, 12.3 Nonconforming Work, Rejection and Correction of 2.3, 2.4, 3.5, 4.2.6, 6.2.4, 9.5.1, 9.8.2, 9.9.3, 9.10.4, 12.2.1 Notice 2.2.1, 2.3, 2.4, 3.2.4, 3.3.1, 3.7.2, 3.12.9, 5.2.1, 9.7, 9.10, 10.2.2, 11.1.3, 12.2.2.1, 13.3, 13.5.1, 13.5.2, 14.1, 14.2, 15.2.8, 15.4.1 Notice, Written 2.3, 2.4, 3.3.1, 3.9.2, 3.12.9, 3.12.10, 5.2.1, 9.7, 9.10, 10.2.2, 10.3, 11.1.3, 11.3.6, 12.2.2.1, 13.3, 14, 15.2.8, 15.4.1 Notice of Claims 3.7.4, 10.2.8, 15.1.2, 15.4 Notice of Testing and Inspections 13.5.1, 13.5.2 Observations, Contractor's 3.2, 3.7.4 Occupancy 2.2.2, 9.6.6, 9.8, 11.3.1.5 Orders. Written 1.1.1, 2.3, 3.9.2, 7, 8.2.2, 11.3.9, 12.1, 12.2.2.1, 13.5.2, 14.3.1 **OWNER** 2 Owner, Definition of 2.1.1

**Owner, Information and Services Required of the** 2.1.2, **2.2**, 3.2.2, 3.12.10, 6.1.3, 6.1.4, 6.2.5, 9.3.2, 9.6.1, 9.6.4, 9.9.2, 9.10.3, 10.3.3, 11.2, 11.3, 13.5.1, 13.5.2, 14.1.1.4, 14.1.4, 15.1.3 Owner's Authority 1.5, 2.1.1, 2.3, 2.4, 3.4.2, 3.8.1, 3.12.10, 3.14.2, 4.1.2, 4.1.3, 4.2.4, 4.2.9, 5.2.1, 5.2.4, 5.4.1, 6.1, 6.3, 7.2.1, 7.3.1, 8.2.2, 8.3.1, 9.3.1, 9.3.2, 9.5.1, 9.6.4, 9.9.1, 9.10.2, 10.3.2, 11.1.3, 11.3.3, 11.3.10, 12.2.2, 12.3, 13.2.2, 14.3, 14.4, 15.2.7 **Owner's Financial Capability** 2.2.1, 13.2.2, 14.1.1.4 **Owner's Liability Insurance** 11.2 Owner's Relationship with Subcontractors 1.1.2, 5.2, 5.3, 5.4, 9.6.4, 9.10.2, 14.2.2 **Owner's Right to Carry Out the Work 2.4**, 14.2.2 **Owner's Right to Clean Up** 6.3 **Owner's Right to Perform Construction and to Award Separate Contracts** 6.1 **Owner's Right to Stop the Work** 2.3 Owner's Right to Suspend the Work 14.3 Owner's Right to Terminate the Contract 14.2**Ownership and Use of Drawings, Specifications** and Other Instruments of Service 1.1.1, 1.1.6, 1.1.7, 1.5, 2.2.5, 3.2.2, 3.11, 3.17, 4.2.12, 5.3 **Partial Occupancy or Use** 9.6.6, 9.9, 11.3.1.5 Patching, Cutting and 3.14, 6.2.5 Patents 3.17 **Payment, Applications for** 4.2.5, 7.3.9, 9.2, 9.3, 9.4, 9.5, 9.6.3, 9.7, 9.8.5, 9.10.1, 14.2.3, 14.2.4, 14.4.3 **Payment, Certificates for** 4.2.5, 4.2.9, 9.3.3, **9.4**, 9.5, 9.6.1, 9.6.6, 9.7, 9.10.1, 9.10.3, 13.7, 14.1.1.3, 14.2.4 Payment, Failure of 9.5.1.3, 9.7, 9.10.2, 13.6, 14.1.1.3, 14.2.1.2 Payment, Final 4.2.1, 4.2.9, 9.8.2, 9.10, 11.1.2, 11.1.3, 11.4.1, 12.3, 13.7, 14.2.4, 14.4.3 Payment Bond, Performance Bond and 7.3.7.4, 9.6.7, 9.10.3, 11.4 **Payments**, **Progress** 9.3, 9.6, 9.8.5, 9.10.3, 13.6, 14.2.3, 15.1.3 **PAYMENTS AND COMPLETION** 9

Init.

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6

Payments to Subcontractors 5.4.2, 9.5.1.3, 9.6.2, 9.6.3, 9.6.4, 9.6.7, 14.2.1.2 PCB 10.3.1 **Performance Bond and Payment Bond** 7.3.7.4, 9.6.7, 9.10.3, 11.4 Permits, Fees, Notices and Compliance with Laws 2.2.2, 3.7, 3.13, 7.3.7.4, 10.2.2 PERSONS AND PROPERTY, PROTECTION OF 10 Polychlorinated Biphenyl 10.3.1 Product Data, Definition of 3.12.2 **Product Data and Samples, Shop Drawings** 3.11, 3.12, 4.2.7 **Progress and Completion** 4.2.2, 8.2, 9.8, 9.9.1, 14.1.4, 15.1.3 **Progress Payments** 9.3, 9.6, 9.8.5, 9.10.3, 13.6, 14.2.3, 15.1.3 Project, Definition of 1.1.4 **Project Representatives** 4.2.10 **Property Insurance** 10.2.5, 11.3 PROTECTION OF PERSONS AND PROPERTY 10 **Regulations and Laws** 1.5, 3.2.3, 3.6, 3.7, 3.12.10, 3.13, 4.1.1, 9.6.4, 9.9.1, 10.2.2, 11.1, 11.4, 13.1, 13.4, 13.5.1, 13.5.2, 13.6, 14, 15.2.8, 15.4 Rejection of Work 3.5, 4.2.6, 12.2.1 Releases and Waivers of Liens 9.10.2 Representations 3.2.1, 3.5, 3.12.6, 6.2.2, 8.2.1, 9.3.3, 9.4.2, 9.5.1, 9.8.2, 9.10.1 Representatives 2.1.1, 3.1.1, 3.9, 4.1.1, 4.2.1, 4.2.2, 4.2.10, 5.1.1, 5.1.2, 13.2.1 Responsibility for Those Performing the Work 3.3.2, 3.18, 4.2.3, 5.3, 6.1.3, 6.2, 6.3, 9.5.1, 10 Retainage 9.3.1, 9.6.2, 9.8.5, 9.9.1, 9.10.2, 9.10.3 **Review of Contract Documents and Field Conditions by Contractor 3.2**, 3.12.7, 6.1.3 Review of Contractor's Submittals by Owner and Architect 3.10.1, 3.10.2, 3.11, 3.12, 4.2, 5.2, 6.1.3, 9.2, 9.8.2 Review of Shop Drawings, Product Data and Samples by Contractor 3.12

**Rights and Remedies** 1.1.2, 2.3, 2.4, 3.5, 3.7.4, 3.15.2, 4.2.6, 5.3, 5.4, 6.1, 6.3, 7.3.1, 8.3, 9.5.1, 9.7, 10.2.5, 10.3, 12.2.2, 12.2.4, 13.4, 14, 15.4 **Royalties, Patents and Copyrights** 3.17 Rules and Notices for Arbitration 15.4.1Safety of Persons and Property 10.2. 10.4 **Safety Precautions and Programs** 3.3.1, 4.2.2, 4.2.7, 5.3, 10.1, 10.2, 10.4 Samples, Definition of 3.12.3 Samples, Shop Drawings, Product Data and 3.11, 3.12, 4.2.7 Samples at the Site, Documents and 3.11 **Schedule of Values 9.2**. 9.3.1 Schedules, Construction 3.10, 3.12.1, 3.12.2, 6.1.3, 15.1.5.2 Separate Contracts and Contractors 1.1.4, 3.12.5, 3.14.2, 4.2.4, 4.2.7, 6, 8.3.1, 12.1.2 Shop Drawings, Definition of 3.12.1 Shop Drawings, Product Data and Samples 3.11, 3.12, 4.2.7 Site, Use of 3.13, 6.1.1, 6.2.1 Site Inspections 3.2.2, 3.3.3, 3.7.1, 3.7.4, 4.2, 9.4.2, 9.10.1, 13.5 Site Visits, Architect's 3.7.4, 4.2.2, 4.2.9, 9.4.2, 9.5.1, 9.9.2, 9.10.1, 13.5 Special Inspections and Testing 4.2.6, 12.2.1, 13.5 Specifications, Definition of 1.1.6 **Specifications** 1.1.1, 1.1.6, 1.2.2, 1.5, 3.11, 3.12.10, 3.17, 4.2.14 Statute of Limitations 13.7, 15.4.1.1 Stopping the Work 2.3, 9.7, 10.3, 14.1 Stored Materials 6.2.1, 9.3.2, 10.2.1.2, 10.2.4 Subcontractor, Definition of 5.1.1 **SUBCONTRACTORS** 5 Subcontractors, Work by 1.2.2, 3.3.2, 3.12.1, 4.2.3, 5.2.3, 5.3, 5.4, 9.3.1.2, 9.6.7 **Subcontractual Relations** 5.3, 5.4, 9.3.1.2, 9.6, 9.10, 10.2.1, 14.1, 14.2.1

Init.

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7

**Submittals** 3.10, 3.11, 3.12, 4.2.7, 5.2.1, 5.2.3, 7.3.7, 9.2, 9.3, 9.8, 9.9.1, 9.10.2, 9.10.3, 11.1.3 Submittal Schedule 3.10.2, 3.12.5, 4.2.7 Subrogation, Waivers of 6.1.1, 11.3.7 **Substantial Completion** 4.2.9, 8.1.1, 8.1.3, 8.2.3, 9.4.2, 9.8, 9.9.1, 9.10.3, 12.2.13.7 Substantial Completion, Definition of 9.8.1 Substitution of Subcontractors 5.2.3, 5.2.4 Substitution of Architect 4.1.3 Substitutions of Materials 3.4.2, 3.5, 7.3.8 Sub-subcontractor, Definition of 5.1.2 Subsurface Conditions 3.7.4 Successors and Assigns 13.2 Superintendent 3.9, 10.2.6 **Supervision and Construction Procedures** 1.2.2, 3.3, 3.4, 3.12.10, 4.2.2, 4.2.7, 6.1.3, 6.2.4, 7.1.3, 7.3.7, 8.2, 8.3.1, 9.4.2, 10, 12, 14, 15.1.3 Surety 5.4.1.2, 9.8.5, 9.10.2, 9.10.3, 14.2.2, 15.2.7 Surety, Consent of 9.10.2, 9.10.3 Surveys 2.2.3 Suspension by the Owner for Convenience 14.3 Suspension of the Work 5.4.2. 14.3 Suspension or Termination of the Contract 5.4.1.1.14 Taxes 3.6, 3.8.2.1, 7.3.7.4 **Termination by the Contractor** 14.1, 15.1.6 **Termination by the Owner for Cause** 5.4.1.1, 14.2, 15.1.6 **Termination by the Owner for Convenience** 14.4 Termination of the Architect 4.1.3 Termination of the Contractor 14.2.2 TERMINATION OR SUSPENSION OF THE CONTRACT 14

**Tests and Inspections** 3.1.3, 3.3.3, 4.2.2, 4.2.6, 4.2.9, 9.4.2, 9.8.3, 9.9.2, 9.10.1, 10.3.2, 11.4.1, 12.2.1, 13.5 TIME 8 Time, Delays and Extensions of 3.2.4, 3.7.4, 5.2.3, 7.2.1, 7.3.1, 7.4, **8.3**, 9.5.1, 9.7, 10.3.2, 10.4, 14.3.2, 15.1.5, 15.2.5 **Time Limits** 2.1.2, 2.2, 2.4, 3.2.2, 3.10, 3.11, 3.12.5, 3.15.1, 4.2, 5.2, 5.3, 5.4, 6.2.4, 7.3, 7.4, 8.2, 9.2, 9.3.1, 9.3.3, 9.4.1, 9.5, 9.6, 9.7, 9.8, 9.9, 9.10, 11.1.3, 12.2, 13.5, 13.7, 14, 15.1.2, 15.4 **Time Limits on Claims** 3.7.4, 10.2.8, 13.7, 15.1.2 Title to Work 9.3.2, 9.3.3 **Transmission of Data in Digital Form** 1.6 UNCOVERING AND CORRECTION OF WORK 12 **Uncovering of Work** 12.1 Unforeseen Conditions, Concealed or Unknown 3.7.4, 8.3.1, 10.3 Unit Prices 7.3.3.2, 7.3.4 Use of Documents 1.1.1, 1.5, 2.2.5, 3.12.6, 5.3 Use of Site 3.13, 6.1.1, 6.2.1 Values, Schedule of 9.2, 9.3.1 Waiver of Claims by the Architect 13.4.2 Waiver of Claims by the Contractor 9.10.5, 13.4.2, 15.1.6 Waiver of Claims by the Owner 9.9.3, 9.10.3, 9.10.4, 12.2.2.1, 13.4.2, 14.2.4, 15.1.6 Waiver of Consequential Damages 14.2.4, 15.1.6 Waiver of Liens 9.10.2, 9.10.4 Waivers of Subrogation 6.1.1, **11.3.7** Warranty 3.5, 4.2.9, 9.3.3, 9.8.4, 9.9.1, 9.10.4, 12.2.2, 13.7 Weather Delays 15.1.5.2 Work, Definition of 1.1.3 Written Consent 1.5.2, 3.4.2, 3.7.4, 3.12.8, 3.14.2, 4.1.2, 9.3.2, 9.8.5, 9.9.1, 9.10.2, 9.10.3, 11.4.1, 13.2, 13.4.2, 15.4.4.2 Written Interpretations 4.2.11, 4.2.12

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8
Written Notice 2.3, 2.4, 3.3.1, 3.9, 3.12.9, 3.12.10, 5.2.1, 8.2.2, 9.7, 9.10, 10.2.2, 10.3, 11.1.3, 12.2.2, 12.2.4, **13.3**, 14, 15.4.1 Written Orders 1.1.1, 2.3, 3.9, 7, 8.2.2, 12.1, 12.2, 13.5.2, 14.3.1, 15.1.2



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9

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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.

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**§ 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.

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12

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#### § 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 instruction 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 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

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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

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

#### § 3.8 ALLOWANCES

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

§ 3.8.2 Unless otherwise provided in the Contract Documents,

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

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

#### § 3.9 SUPERINTENDENT

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

**§ 3.9.2** The Contractor, as soon as practicable after award of the Contract, shall 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

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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.

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#### § 3.18 INDEMNIFICATION

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

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

### ARTICLE 4 ARCHITECT

#### § 4.1 GENERAL

**§ 4.1.1** The 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.

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### § 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, 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.

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**§ 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 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

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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

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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
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.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.

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#### 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;

25

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- .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;
- .6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
- .7 repeated failure to carry out the Work in accordance with the Contract Documents.

**§ 9.5.2** When 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

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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 shut-down, 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.

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#### § 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 Sub-subcontractors; and
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.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

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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;
- .3 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;
- .6 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

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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 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 negligent acts or omissions.

#### § 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 Sub-subcontractors 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.

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**§ 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 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, sub-subcontractors, 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's consultants, separate contractors described in Article 6, if any, and the subcontractors, sub-subcontractors, 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.

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**§ 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 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

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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.

**§ 12.2.2.** 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.

**§ 12.2.3** 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.

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**§ 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;

35

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- .2 An act of government, such as a declaration of national emergency that requires all Work to be stopped;
- .3 Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or
- .4 The Owner has failed to furnish to the Contractor 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;
- .2 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
- .3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

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

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

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#### § 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; and
- .3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

**§ 14.4.3** In case of such termination for the Owner's convenience, the 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.

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**§ 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.

#### § 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

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

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.6 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.

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**§ 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.

**§ 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

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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 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.

## SECTION 008000 - SUPPLEMENTARY CONDITIONS

The following supplements modify, change, delete from or add to the "General Conditions of the Contract for Construction", AIA Document A201/2007 Edition. Where any Article of the General Conditions is modified or any Paragraph, Subparagraph or Clause thereof is modified or deleted by these supplements, the unaltered provisions of that Article, Paragraph, Subparagraph or Clause shall remain in effect.

- 15 MODIFICATIONS TO THE GENERAL CONDITIONS:
- .1 Modification of Article 1 General Provisions
- .1.1 Modification 1.1 Basic Definitions
- .1.6 Ownership and Use of Architect's Drawings, Specifications and Other Instruments of Service.
- .2 Modification of Article 2 Owner
- .2.1 Modification 2.1 General
- .2.2 Modification 2.2 Information and Services Required of the Owner
- .2.3 Modification 2.3 Owners Right to Stop Work
- .2.4 Modification 2.4 Owner's Right to Carry Out the Work
- .3 Modification of Article 3 Contractor
- .3.2 Modification 3.2 Review of Contract Documents and Field Conditions by Contractor
- .3.3 Modification 3.3 Supervision and Construction Procedures
- .3.4 Modification 3.4 Labor and Materials
- .3.5 Modification 3.5 Warranty
- .3.7 Modification 3.7 Permits, Fees and Notices
- .3.8 Modification 3.8 Allowances
- .3.9 Modification 3.9 Superintendent
- .3.10 Modification 3.10 Contractor's Construction Schedules
- .3.11 Modification 3.11 Documents and Samples at the Site
- .3.12 Modification 3.12 Shop Drawings, Product Data, and Samples
- .3.14 Modification 3.14 Cutting and Patching of Work
- .3.15 Modification 3.15 Cleaning Up
- .3.17 Modification 3.17 Royalties, Patents and Copyrights
- .4 Modification of Article 4 Administration of the Contract
- .4.1 Modification 4.1 Architect
- .4.2 Modification 4.2 Architect's Administration of the Contract
- .4.3 Modification 4.3 Claims and Disputes
- .4.4 Modification 4.4 Resolution of Claims and Disputes
- .4.5 Modification 4.5 Arbitration
- .5 Modification of Article 5 Subcontractors
- .5.2 Modification 5.2 Awards of Subcontracts and Other Contracts
- .5.3 Modification 5.3 Subcontractual Relations
- .7 Modification of Article 7 Changes in the Work
- .7.1 Modification 7.1 General
- .7.5 Changes in Contract Sum
- .8 Modification of Article 8 Time
- .8.1 Modification 8.1 Definitions
- .8.2 Modification 8.2 Progress and Completion
- .9 Modification of Article 9 Payments and Completion
- .9.2 Modification 9.2 Schedule of Values

PARTNERS 15-163

SUPPLEMENTARY CONDITIONS

# 008000 - 2

- .9.3 Modification 9.3 Application for Payments
- .9.4 Modification 9.4 Certificates for Payment
- .9.6 Modification 9.6 Progress Payments
- .9.8 Modification 9.8 Substantial Completion
- .9.10 Modification 9.10 Final Completion and Final Payment
- .10 Modification of Article 10 Protection of Persons and Property
- .10.1 Modification 10.1 Safety Precautions and Programs
- .10.2 Modification 10.2 Safety to Persons and Property
- .10.3 Emergencies
- .10.6 Addition of Paragraph 10.6 Construction Safety
- .11 Modification of Article 11 Insurance and Bonds
- .11.1 Modification 11.1 Contractor's Liability Insurance
- .11.2 Modification 11.2 Owner's Liability Insurance
- .11.4 Modification of 11.4 Property Insurance
- .11.5 Modification 11.5 Performance Bond and Payment Bond
- .13 Modification of Article 13 Miscellaneous Provisions
- .13.1 Modification 13.1 Governing Law
- .13.2 Modification 13.2 Successors and Assigns
- .13.5 Modification 13.5 Tests and Inspections
- .13.7 Modification 13.7 Commencement of Statutory Limitation Period
- .13.8 Addition of Paragraph 13.8 Owner Audit
- .14 Modification of Article 14 Termination of the Contract
- .14.2 Modification 14.2 Termination by the Owner for Cause
- .14.3 Modification 14.3 Termination by the Contractor
- .16 Addition of Article 16 Additional Conditions
- .16.1 Addition of Paragraph 16.1 Advertising and Publicity
- .16.2 Addition of Paragraph 16.2 Non-Discriminatory Employment Practices
- .16.3 Addition of Paragraph 16.13 Sample Forms

# SUPPLEMENTARY CONDITIONS

# ARTICLE 15 MODIFICATIONS TO THE GENERAL CONDITIONS

- 15.1 Modification of ARTICLE 1 GENERAL PROVISIONS
- 15.1.1 Modification of Paragraph 1.1 BASIC DEFINITIONS
- 15.1.1.1 Delete the word "not" in the seventh line and add to the end of Subparagraph 1.1.1:

Contract Documents also include bidding documents including without limitation the advertisement or invitation to bid, the instruction to bidders, the bid proposal form, the Contractor's bid and addenda or portions thereof relating to any bidding documents.

15.1.1.3 Add to Subparagraph 1.1.3:

The definition of 'Work' shall also include labor, materials, equipment and services provided or to be provided by subcontractors, sub-subcontractors, material suppliers or any other entity for

whom the Contractor is responsible under or pursuant to the Contract Documents.

- 15.1.3 Modification to Paragraph 1.6 OWNERSHIP AND USE OF ARCHITECT'S DRAWINGS, SPECIFICATIONS AND OTHER INSTRUMENTS OF SERVICE:
- 15.1.3.1 Add to the beginning of Subparagraph 1.6.1:

Subject to the provisions of Article 6 of the Owner/Architect Agreement for the Project between Owner and Partners in Architecture, PLC.

- 15.2 Modification of ARTICLE 2 OWNER
- 15.2.1 Modification of Paragraph 2.1 GENERAL
- 15.2.1.1 Delete Subparagraph 2.1.1 in its entirety and substitute:
  - 2.1.1 As used herein and elsewhere in the Contract Documents, the term "Owner" shall mean corporation for whom the Work is being executed. Except as otherwise specifically provided, all matters pertaining to the Work required under this Contract will be handled for and on behalf of the Owner by the Owner's Project Engineer or such other representatives thereof that may from time to time be designated by the Owner.
- 15.2.1.3 Add Subparagraph 2.1.3:
  - 2.1.3 As used herein and elsewhere in the Contract Documents, the term 'Owner's Project Engineer' shall mean the Owner's Representative at the Site. Its authority consists of reporting and recording the progress of the Work and interpreting and approving in writing any Changes in the Work in case of emergency where a delay might seriously hinder the progress of the Work. Assisted by Architect he shall make known the Owner's requirements for such exigencies as may arise.
- 15.2.2 Modification of Paragraph 2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER
- 15.2.2.2 Add to Subparagraph 2.2.2:

However, Contractor shall notify Owner of any errors, problems or inaccuracies which it becomes aware of in the course of its use of such surveys.

15.2.2.3 Add to Subparagraph 2.2.3:

All permits and approvals not specifically identified in the Contract Documents as the responsibility of Owner shall be the responsibility of the Contractor.

- 15.2.2.5 Delete Subparagraph 2.2.5 in its entirety and substitute:
  - 2.2.5 Copies Furnished:
    - .1 The Contractor will be furnished, without charge a maximum of ten sets of Drawings and Specifications, including copies of addenda. If additional copies are desired by

Contractor for use and convenience in expediting the Work, said copies will be furnished on request, for the actual cost of reproducing and mailing.

- .2 All instruments, Change Orders, Field Directives, and other like correspondence pertaining to the Work will be provided to the Contractor in the form of one (1) signed copy by the Owner.
- .3 Change Proposal Documents, including revised drawings will be provided in the form of four (4) prints and one (1) reproducible transparency along with four (4) copies of the Change Description.
- 15.2.3 Modification of Paragraph 2.3 OWNERS RIGHT TO STOP WORK
- 15.2.3.1 Delete the word "persistently" in the second line and add to the end of Subparagraph 2.3.1:

This right shall be in addition to and not in restriction or derogation of the Owner's rights under Article 14 hereof. The Owner's right to stop the Work shall not relieve the Contractor of any of his responsibilities and obligations under or pursuant to the Contract Documents.

- 15.2.4 Modification of Paragraph 2.4 OWNER'S RIGHT TO CARRY OUT THE WORK
- 15.2.4.1 Add Subparagraph 2.4.2:
  - 2.4.2 The Contractor agrees that the Owner, by mutual agreement with the Contractor, shall have the right to place and install equipment and machinery during the progress of the Work before the completion of the various parts of the Work; and further agrees that such placing and installation of equipment shall not in any way effect the completion of the Work or any portion thereof, nor signify the Owner's acceptance of the Work or any portion thereof. Should the Owner place or install such equipment and machinery with its own forces, then it shall be responsible for any damage to Work of the Contractor caused by the Owner's work or workers. Should the Owner have such placement or installation performed by another contractor, then the Owner shall require said contractor to be responsible for all such damage caused by its work, its workmen, or its subcontractor.
- 15.3 Modification of ARTICLE 3 CONTRACTOR
- 15.3.2 Modification of Paragraph 3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR
- 15.3.3 Modification of Paragraph 3.3 SUPERVISION AND CONSTRUCTION PROCEDURES
- 15.3.4 Modification of Paragraph 3.4 LABOR AND MATERIALS
- 15.3.4 Add Subparagraphs 3.4.3, 3.4.4, 3.4.5 and 3.4.6:
  - 3.4.3 Materials shall conform to manufacturer's standards in effect at the date of issuance of the proposed Contract Documents and shall be installed in strict accordance with manufacturer's directions.
- 3.4.4 Where the Contract Documents require the Work, or any part of same, to be above the standards required by applicable laws, ordinances, rules and regulations and other statutory provisions pertaining to the Work, or above the quality of normal construction or trade standards, such Work shall be performed and completed by the Contractor in accordance with the Contract Documents.
- 3.4.5 Immediately after the issuance of a Letter of Intent or the award of the Contract for the Work to the Contractor, and prior to the first Request for Payment, The Contractor shall submit to the Architect a schedule indicating the name of manufacturers of all material and equipment which it and its Subcontractors propose for use in the Work. No material or equipment shall be ordered until acceptance of the manufacturer is received from the Architect.
- 3.4.6 Identifying Markings: Where the manufacturer's name, patent numbers, Underwriter's labels, model numbers or similar identifying marks are required, locate such markings as inconspicuously as possible. In no case will such marks be acceptable as part of basic design.
- 15.3.5 Modification of Paragraph 3.5 WARRANTY
- 15.3.5.1 Add Subparagraph 3.5.1:
  - 3.5.1 The warranty contained herein and in the Contract Documents shall not be limited by the provisions of Paragraph 12.2 hereunder.
- 15.3.5.2 Add Subparagraph 3.5.2:
  - 3.5.2 The Contractor shall:
    - .1 Warrant that all materials and workmanship of all of the Work of the Contract will be serviceable, satisfactory, and will perform dependably, without excessive or unusual maintenance or care, the functions for which it was designed and free of defects in materials or workmanship for a period of at least two (2) years, and for such longer periods and special requirements as may be specified for individual types of materials, equipment, or Work, under individual Sections of the Specifications. Such warranty is in addition to and independent of any warranty or guarantee of any Subcontractor, Supplier or Manufacturer.
    - .2 Submit the above warranty, and all warranties required by the Contract Documents to be delivered by Subcontractors, executed by the Contractor in written form and deliver all to the Owner as a condition precedent to Final Payment.
    - .3 Commence any work required hereunder within seven (7) working days after receipt of written notice to do so by the Owner. If The Contractor shall fail or neglect to do so or to complete the fulfillment of its obligations hereunder within thirty (30) days of receipt of said notice or such longer period as may be authorized by the Owner, the Owner shall have the right to perform all or any part of the Work or employ another person to do all or part of such Work and charge the expense thereof to the Contractor.

- .4 Warranties shall be assignable and enforceable by all future Owners of the project.
- 15.3.5.3 Refer to Section 01740 of Division 1 WARRANTIES AND CONTINUING SERVICES.
- 15.3.7 Modification of Paragraph 3.7 PERMITS, FEES AND NOTICES
- 15.3.7.1 Add to the end of Paragraph 3.7.1:

or which are required for the completion of the Project.

- 15.3.7.5 Add Subparagraphs 3.7.5, 3.7.6, 3.7.7 and 3.7.8:
  - 3.7.5 The Contractor shall obtain a Certificate of Occupancy as required for partial and complete occupancy by the Owner. The Contractor shall pay all fees necessary to secure said Certificates and shall deliver said Certificate to the Architect or Owner.
  - 3.7.6 The Contractor shall furnish to the local authorities all necessary bonds or cash deposits required as a pledge and security for the protection or maintenance of any public property or as otherwise stipulated.
  - 3.7.7 Contractor shall be responsible for all approvals and permits not specifically enumerated as the Owner's responsibility in paragraph 2.2.3 hereof or in the Contract Documents.
  - 3.7.8 A photocopy of the building permit shall be delivered to the Architect and Owner as soon as it is obtained.
- 15.3.9 Modification of Paragraph 3.9 SUPERINTENDENT
- 15.3.9 Add Subparagraphs 3.9.2, 3.9.3 and 3.9.4:
  - 3.9.2 The Contractor's Superintendent or his duly authorized representative, shall remain in attendance at the Site and shall be present at all times when work of any kind is being done, including work done at other than normal working hours.
  - 3.9.3 The Contractor's Superintendent shall not be removed except for valid cause acceptable to the Architect and the Owner in which case another Superintendent acceptable to them shall be provided.
  - 3.9.4 Any employee of the Contractor whom the Architect or Owner considers detrimental to the proper carrying out of the Work is to be removed promptly on the request of the Architect or Owner.
- 15.3.10 Modification of Paragraph 3.10 CONTRACTOR'S CONSTRUCTION SCHEDULES
- 15.3.10 Refer to Section 01310 SCHEDULING AND PROGRESS
- 15.3.11 Modification of Paragraph 3.11 DOCUMENTS AND SAMPLES AT THE SITE

- 15.3.11 Refer to Specifications Section 01720 PROJECT RECORD DOCUMENTS. References t Paragraph 3.11 elsewhere in the Contract Documents shall refer also to said section.
- 15.3.12 Modification of Paragraph 3.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES
- 15.3.17 Modification of Paragraph 3.17 ROYALTIES AND PATENTS
- 15.3.17 Add Subparagraphs 3.17.2 and 3.17.3:
  - 3.17.2 Use of Printed Materials: Contractors and suppliers shall agree that the Owner may, without cost, duplicate, publish, use, dispose of, and disclose in any manner and for any periods whatsoever, and have others so do, all Subject Data (whether or not copyrighted) which may be submitted or delivered to the Owner for use in the course of, or under, any Work performed for the Owner, or which may relate to said Work. By "Subject Data" is meant all writings (including, without limitation, instructions manuals, operating manuals, maintenance manuals and specifications), sound recordings, pictorial reproductions, drawings, prints, photographs and graphical representations, and works of a nature similar to any of the foregoing. In the event any such Subject Data shall be covered by copyright, Contractors and suppliers shall agree to grant to the Owner or obtain for the Owner the copyrighted material, a royalty-free, non-exclusive and irrevocable license, including a right to sublicense thereunder.
  - 3.17.3 Any provision or provisions of these General Conditions or of the Contract to the contrary notwithstanding, the Owner shall have the right at any time to modify, remove, obliterate, or ignore any marking not authorized by the terms of the Contract on any piece of Subject Data furnished or delivered under the Contract.
- 15.4 Modification to ARTICLE 4 ADMINISTRATION OF THE CONTRACT
- 15.4.1 Modification to Paragraph 4.1 ARCHITECT:
- 15.4.1.1 Delete Subparagraph 4.1.1 in its entirety and substitute:
  - 4.1.1 Architect As used herein and elsewhere in the Contract Documents, the term "Architect" shall mean PARTNERS in Architecture, PLC, 65 Market Street, Mount Clemens, MI 48043, acting individually or through any agents, consultants, or representatives duly authorized to act in its behalf, subject to the provisions of the Owner/Architect Agreement for the Project between Owner and PARTNERS in Arcitecture, PLC ("Architect").
- 15.4.1.4 Add the following in the beginning of Subparagraph 4.1.4:

Only in the event that Owner agrees in writing to elect arbitration

- 15.4.2 Modification to Paragraph 4.2 ARCHITECT'S ADMINISTRATION OF THE CONTRACT:
- 15.4.2.3 Add the following to Subparagraph 4.2.3:

PARTNERS 15-163 SUPPLEMENTARY CONDITIONS 008000 - 8

"Architect shall promptly notify Owner of any acts or omissions of Contractor deviating from the Construction Documents, and of any means, methods, techniques, sequences, procedures, or safety precautions not in conformity with generally accepted construction procedures which come to the attention of Architect."

- 15.4.2.5 Delete Subparagraph 4.2.5 in its entirety and substitute:
  - 4.2.5 Based on the Owner's observations and evaluations of the Contractor's Applications for Payment, with the comment and recommendation of Architect, the Owner will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.
- 15.4.2.6 Add after the first and third time the word "Architect" appears in Subparagraph 4.2.6:

with the consent of Owner.

15.4.2.7 Add to Subparagraph 4.2.7:

Notwithstanding the foregoing to the contrary, the Architect's review and approval of Shop Drawings shall be to address: (a) compliance with applicable laws, ordinances, and codes; and (b) that the Work, when completed, will comply with the requirements of the Contract Documents. The Architect shall determine those items to be submitted by the Contract Documents to assure compliance with the Contract Documents and requirements.

15.4.2.10 Add to Subparagraph 4.2.10:

Owner reserves the right to appoint a representative empowered to act for Owner to supersede the Architect's responsibility to the extent set forth in a written notice to Architect. Architect shall not exercise any of its prerogatives or duties in such manner as to increase the cost to Owner of constructing the Project without Owner's prior written approval.

15.4.2.12 Add at the end of Subparagraph 4.2.12:

and in the absence of negligence.

- 15.4.2.14 Add Subparagraph 4.2.14:
  - 4.2.14 All communications shall be in the form of written documents. Verbal responses, instructions, approvals or permissions shall have no validity until supported by such documentation. Written response will be provided promptly, however, it may vary substantially from the verbal communication.
- 15.4.2.13 Add after the word "decisions" in Subparagraph 4.2.13:

with the advise and consent of Owner,

- 15.4.3 Modifications to ARTICLE 4.3 CLAIMS AND DISPUTES
- 15.4.3.2 Add to Subparagraph 4.3.2:

Notwithstanding the foregoing to the contrary, Owner may elect to arbitrate or litigate a Claim at any time in the event that, in the sole Opinion of Owner

(1) the Claim arises out of an error or omission of Architect; (2) Architect is unable to make an impartial decision; or (3) the Claim is such that time or factual circumstances require adjudication through arbitration or litigation.

- 15.4.3.5 Delete Subparagraph 4.3.5.
- 15.4.3.6 Delete the words beginning on line 3 of Subparagraph 4.3.6:

(3) a written order for a minor change in the Work issued by the Architect,

- 15.4.4 Modification to Paragraph 4.4 RESOLUTION OF CLAIMS AND DISPUTES
- 15.4.4.4 Add to Subparagraph 4.4.4:

Notwithstanding the foregoing to the contrary, Owner may elect to arbitrate or litigate a Claim at any time in the event that, in the sole Opinion of Owner (1) the Claim arises out of an error or omission of Architect; (2) Architect is unable to make an impartial decision; or (3) the Claim is such that time or factual circumstances require adjudication through arbitration or litigation.

- 15.4.6 Modification to Paragraph 4.6 ARBITRATION
- 15.4.6.1 Add to the beginning of the first two sentences of paragraph 4.5.1:

Only in the event that Owner agrees in writing to elect arbitration,

- 15.4.6.5 Add the following Subparagraph:
  - 4.6.5 Any and all arbitration arising out of or relating to this Agreement shall include, by consolidation, joinder or joint filing, any additional person or entity not a part to the Owner/Contractor Agreement to the extent necessary to the final resolution of the matter in controversy.
- 15.5 Modifications of ARTICLE 5 SUBCONTRACTORS
- 15.5.2 Modification of Paragraph 5.2 AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK
- 15.5.2.1 Add to Subparagraph 5.2.1:

The list of proposed subcontractors shall be submitted within 24 hours of bid opening by the low bidder(s), which list shall upon acceptance by the Owner be incorporated into the Contract.

- 15.5.2.5 Add Subparagraph 5.2.5:
  - 5.2.5 The Contractor may utilize the services of only those subcontractors who have not ever

been disqualified under applicable laws and regulations from participating in construction projects.

#### 15.5.3 Modification to Paragraph 5.3 SUBCONTRACTUAL RELATIONS

15.5.3 Add Subparagraphs 5.3.2 and 5.3.3:

- 5.3.2 Any part of the work performed for the Contractor by a subcontractor shall be pursuant to a written subcontract between the Contractor and such subcontractor, which shall be prepared on a master form of subcontract which the Contractor has, prior to the execution of any such subcontract, submitted to the Owner to ensure that each such said contract contains provisions that:
  - .1 Require that such portion of the Work be performed in accordance with the requirements of the Contract Documents;
  - .2 Require timely submission of subcontractor payment in order of applications to enable the Contractor to apply for payment in accordance with the provisions of the Contract Documents;
  - .3 Recognize the rights of the Owner pursuant to the contingent assignment of subcontracts under subparagraph 5.4.1 and require the subcontractor, in the event that the Owner has terminated the Owner/Contractor Agreement, to complete the unperformed obligations under such subcontract in the manner in which he had been bound to the Contractor; and
  - .4 Require the subcontractor to carry and maintain insurance in accordance with the requirements of the Contract Documents.
- 5.3.3 Contractor shall furnish Owner a copy of each subcontract within ten days after it is executed.

### 15.7 Modifications to ARTICLE 7 CHANGES IN THE WORK

- 15.7.1 Modification to Paragraph 7.1 GENERAL
- 15.7.1 Add Subparagraphs 7.1.5, 7.1.6 and 7.1.7:
  - 7.1.5 Proposal Request is a Change Proposal: A document issued by the Architect and signed by the Contractor, containing a price quotation for Changes in the Work as described by a written "Change Description" and supplemented when necessary by revised drawings all attached thereto.
  - 7.1.6 The value of all Changes in the Work shall be computed on the basis of cost of labor and materials as described as "Fixed Cost" herein, unless directed by the Owner to be "Unit Prices", or other computation.

- 7.1.7 Contractor shall make no claims for extra cost on account of delay in completion of the Work caused by any Changes in the Work except as expressly provided in the executed Change Order authorizing said Change.
- 7.5 Changes in Contract Sum:

For any adjustments to the Contract Sum based on other than the unit prices method, the Contractor agrees to charge and accept payment for his overhead, bonds, insurance, field supervision, profit and all other general conditions items / related miscellaneous costs at the following percentages of the cost attributable to the change in the Work:

- .1 Ten percent (10%) for Work (labor and materials) by the Contractor not involving subcontractors;
- .2 Five percent (5%) for Work (labor and materials) by subcontractors;
- .3 When both additions and credits are involved in any change, the allowable markup shall be figured on the basis of the net increase, if any;
- .4 For additional Work ordered as described above which will be executed by Subcontractors of the Contractor, it is agreed Subcontractors will be permitted to charge ten percent (10%) for work not involving sub-contractors and five percent (5%) for Work by sub-subcontractors, To the net subcontract amount to Contractor may add five percent (5%).
- 7.5.2 A detailed breakdown of material (quantity and type) and an hourly breakdown of labor must be submitted with each request for additional compensation.
- 15.8 Modifications to ARTICLE 8 TIME
- 15.8.1 Modification to Paragraph 8.1 DEFINITIONS
- 15.8.1.4 Delete Subparagraph 8.1.4 in its entirety and substitute:
  - 8.1.4 Day: As used herein and elsewhere in the Contract Documents, the term "day" shall mean a calendar day of 24 hours beginning at 12:00 midnight. The term "working day" shall mean any calendar day except Saturdays, Sundays and Legal Holidays at the place of construction.
- 15.8.1.5 Add Subparagraphs 8.1.5 and 8.1.6:
  - 8.1.5 Date of Final Completion: As used herein and elsewhere in the Contract Documents, the term "Date of Final Completion" shall mean the date of the Final Certificate of Payment as described in 9.10.2.
  - 8.1.6 Delays: As used herein and elsewhere in the Contract Documents, the term "Delays" shall mean hindrances or delays whether avoidable or unavoidable.
- 15.8.2 Modification to Paragraph 8.2 PROGRESS AND COMPLETION

15.8.2.1 Add to paragraph 8.2.1:

and that Contractor is capable of properly completing the Work within the contract time.

- 15.9 Modifications to ARTICLE 9 PAYMENTS AND COMPLETION
- 15.9.2 Modifications to Paragraph 9.2 SCHEDULE OF VALUES
- 15.9.2.1 Add to Subparagraph 9.2.1:
  - 9.2.1 The schedule of values shall only be used after approval by Owner.
- 15.9.2.2 Add Subparagraph 9.2.2:
  - 9.2.2 Initial Sworn Statements. Prior to commencement of the Work, the Contractor shall deliver to the Owner, a contract or sworn statement, duly executed and acknowledged and in form satisfactory to the Owner, listing all subcontracts and the amount of each such subcontract, together with a similar sworn statement from each subcontractor and, where appropriate, from sub-subcontractors.
- 15.9.3 Modification of Paragraph 9.3 APPLICATIONS FOR PAYMENT
- Add to Subparagraph 9.3.4:
  - 9.3.4 Each application for payment shall be accompanied by the following, all in form and substance satisfactory to the Owner:
    - .1 A duly executed and acknowledged sworn statement showing all subcontractors with whom the Contractor has entered into subcontracts, the amount of each such subcontract, the amount requested for any subcontractor in the requested progress payment and the amount to be paid to the Contractor from such progress payment, together with similar sworn statements from all subcontractors and, where appropriate, from sub-subcontractors; and
    - .2 Duly executed Waivers of Mechanic's and Material Liens establishing payment or satisfaction of all such obligations.
    - .3 All Invoices to be submitted to the Owner or their representative.

15.9.4 Modification to Paragraph 9.4 CERTIFICATES FOR PAYMENT

- 15.9.4 Add Subparagraph 9.4.3:
  - 9.4.3 If so directed by the Owner the Contractor shall, within fifteen (15) days from the date of Owner's remittance, submit partial waivers of lien signed by each Subcontractor designated by the Owner, in a form acceptable to the Owner, for the full amount of the sum included for said Subcontractor, in the Owner's remittance for the previous month. Failure to submit partial waivers of lien shall justify the withholding of future payments by

the Owner until said delinquent waivers are received by the Owner.

- 15.9.4.4 Add Subparagraph 9.4.4:
  - 9.4.4 The Owner agrees to make payments to the Contractor on account of the Contract provided in the Agreement.
    - .1 Following Substantial Completion: Following the date of Substantial Completion, the Contractor may request the Architect to inspect the project and deliver to Contractor a list of work necessary to Final Completion. Promptly following certification by the Architect to the Owner that the work on such list has been satisfactorily completed, the Owner will pay to Contractor such additional sum as may be necessary to bring the total payments to Contractor to 98% of the total Contract Sum, adjusted as provided in the Contract Documents.
- 15.9.4.5 Add Subparagraph 9.4.3:
  - 9.4.3 Notwithstanding the foregoing contained in subparagraph 15.9.4.4, all progress payments and retainage shall be made in accordance with the provisions of M.C.L. 125.1561 et. seq., which document may be examined at the office of the Architect.
- 15.9.6 Modification to Paragraph 9.6 PROGRESS PAYMENTS
- 15.9.6.1 Add to Subparagraph 9.6.1:
  - 9.6.1 Payments shall be made at the sole discretion of Owner with the advice and comment from Architect.
- 15.9.8 Modification to Paragraph 9.8 SUBSTANTIAL COMPLETION
- 15.9.8.2 Add to Subparagraph 9.8.2:
  - 9.8.2 Warranties required by the Contract Documents shall commence on the date of Final Completion.
- 15.9.10 Modification to Paragraph 9.10 FINAL COMPLETION AND FINAL PAYMENT
- 15.9.10.3 Delete the last sentence of Subparagraph 9.10.3.
- 15.10 Modification of ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY
- 15.10.1 Modification of Paragraph 10.1 SAFETY PRECAUTIONS AND PROGRAMS
- 15.10.1.4 Add Subparagraph 10.1.2 in its entirety and substitute:
  - 10.1.2 The Contractor shall continuously maintain adequate protection of all Work from damage and shall protect the Owner's property from injury or loss arising in connection with the Contract. It shall make good any such damage, injury or loss, except such as may be caused by agents or employees of the Owner. It shall adequately protect adjacent

property as provided by law and the Contract Documents.

- 15.10.2 Modification of ARTICLE 10.2 SAFETY OF PERSONS AND PROPERTY
- 15.10.2 Add Subparagraph 10.2.8:
  - 10.2.8 "The Contractor shall promptly report in writing to the Owner all accidents arising out of or in connection with the Work which cause death, personal injury or property damage, giving full details and statements of any witnesses. In addition, if death or serious personal injuries or serious damages are caused, the accident shall be reported immediately by telephone or messenger to the Owner."
- 15.10.3 Modification of Paragraph 10.6 EMERGENCIES
- 15.10.2.1 Add subparagraph 10.2.1.4 and 10.2.1.5
  - .4 The property of the owner or other separate contractor.
  - .5 Prior to any excavation, the Contractor shall telephone MISS DIG for the location of underground pipeline and cable facilities, and shall also notify representatives of other utilities located in the vicinity of the Work.
- 15.10.2.3 Delete subparagraph 10.2.3 and add 10.2.3
  - 10.2.3 The Contractor shall erect and maintain, as required by law, existing conditions and the progress of the Work, all safeguards for the safety and protection of persons and property, including but not limited to, the posting of danger signs and other warnings against hazards, promulgate safety regulations and notify owners and users of adjacent utilities of potentially dangerous conditions.
- 15.11 Modification of ARTICLE 11 INSURANCE AND BONDS
- 15.11.1 Delete Article 11 in its entirety and substitute:
  - 11.1 CONTRACTOR'S LIABILITY INSURANCE
  - 11.1.1 The Contractor shall not commence Work under the Contract until it has obtained all insurance required by the Contract Documents and such insurance has been approved by the Owner; nor shall the Contractor allow any subcontractor to commence work on its subcontract until all similar insurance required of the subcontractor has been so obtained and approved. Unless otherwise provided in the Contract Documents, the Contractor shall provide insurance as follows:
    - .1 Liability and Property Damage Insurance The Contractor shall take out and maintain during the life of the Contract such Liability and Property Damage Insurance (construed as including Contractor's Contingent or Protective Insurance to protect the Contractor from damage claims arising from operations under the Contract) as shall protect it and the Owner from claims for damages for personal injury, including accidental death, as well as from claims for property damages, which may arise from operations under the

Contract, whether such operations be by itself or by any subcontractor or by anyone directly or indirectly employed by either of them.

Contractor will maintain the following insurance: Broad Form Comprehensive General Liability, (including Operations and Premises Liability, Independent Contractors Protective Liability (maintained in effect for a period of three years after the date of final payment), Personal Injury Liability, Broad Form Property Damage Liability endorsement, Explosion, Collapse and Underground Liability endorsement, Blanket Contractual Liability Insurance) Comprehensive Auto Liability, and Workers' Compensation coverage, all of which shall be written on an occurrence basis for not less than the following limits of liability, or any limits required by law whichever is greater.

- a. Workmen's Compensation-Statutory/Employers-Liability \$500,000
- b. Comprehensive General Liability-Per Person (Occurrence) Aggregate

Bodily & Personal Injury \$1,000,000/\$2,000,000 Property Damage \$1,000,000/\$2,000,000 Aggregate

c. Automobile Liability-per Person (Occurrence) Aggregate

Bodily Injury \$1,000,000 Property Damage \$1,000,000/\$2,000,000

- .2 All Certificates of Insurance and duplicate policies of an outsider, vendor or contractor, shall contain the following clauses:
  - (1) Any coverage afforded the Owner shall apply as primary and not excess to any insurance issued in the name of the Owner.
  - (2) The insurance company(s) issuing the policy or policies shall have no recourse against the Owner for payment of any premiums or for assessments under any form of policy.
  - (3) The term 'insured' is used severally, not collectively, but the inclusion in this policy of more than one insured shall not operate to increase the limit of the Owner's liability.
- .3 All certificates are to provide 30 days notice of material change or cancellation. Certificates of insurance must be provided no less than ten (10) working days before commencement of work to the Owner's Risk Management Department. Insurance carriers are subject to the approval of the Owner. Coverages and limits are also subject to the approval of the Owner as to conformity with Contract requirements.
- .4 In the event that claims in excess of the insured amounts provided are filed by reason of any operations under the services provided by the Contractor, the amount of excess of such claims, or any portion thereof, may be withheld from payment due until such time as the Contractor shall furnish such additional security covering such claims as may be determined by the Owner.

- .5 Coverage under Property Damage shall include specifically the Explosion, Collapse and Underground Hazards, which covers damage to property arising directly or indirectly from explosion, damage or structural injury to buildings or adjacent structures arising from operations under this Contract, including excavation or tunneling and damage sustained by wires, conduits, mains, sewers and the like, occasioned by the Contractor's subsurface operations.
- 11.1.2 The Contractor shall require subcontractors, if any, not protected under the Contractor's insurance policies, to take out and maintain insurance of such nature in adequate amounts.
- 11.1.3 All insurance shall be carried with insurance companies authorized to do business in the State of Michigan.
- 11.1.4 Add the following Subparagraph 11.1.4:
  - 11.1.4 The Contractor and all subcontractors, to which portions of the work under this Contract are assigned, shall during the continuance of work under this Contract, including extra work in connection therewith, maintain the following insurance coverages:
    - .1 Workmen's Compensation and Employer's Liability Insurance in amounts sufficient, in the opinion of the Contractor and the Architect, to protect the Owner, the Architect, the Contractor and the Subcontractors from any liability for bodily injury, sickness or disease (including death resulting at any time therefrom) of any of their employees, including any liability or damage which may arise by virtue of any statute or law in force or which may hereafter be enacted.

### 11.2 OWNER'S LIABILITY INSURANCE

11.2.1 The Owner shall be responsible for and at its option may maintain such insurance as will protect it from its contingent liability to others for damages because of bodily injury, including death, which may arise from operations under this Contract, and any other liability for damages which the Contractor is required to insure under any provision of this Contract. This insurance is not for the benefit of the Contractor.

### 11.4 PROPERTY INSURANCE

11.4.1 The Owner shall secure and maintain installation - builders risk insurance for all of the work to be performed on the facility site, against direct physical loss or damage to the work. The policy shall insure the interest of the Owner, the contractor and all subcontractors as their interest may appear at the time of loss or damage to the facility.

The policy shall be written on a 100% replacement cost basis and shall insure against all risks of direct physical loss or damage to all materials, supplies, machinery, equipment, scaffolding, temporary structures and other property of a similar nature, all of which are to be used in or incidental to the erection of the building. The insurance required hereunder is not intended to cover the tools, equipment and other such personal property of Contractor or subcontractors. The risk of loss as to all such personal property shall be borne by the Contractor and subcontractors. Contractor and its subcontractors waive all rights against Owner for damage or

loss of such personal property. The Contractor shall require similar waivers in writing from its subcontractors prior to their commencing operations.

- 11.4.3 The following Subrogation Clause shall appear in all Fire and Extended Coverage Insurance Policies:
  - .1 Subrogation Clause: It is hereby stipulated that this insurance shall not be invalidated should the insured waive in writing prior to a loss any or all right or recovery against any party for loss occurring to the property described herein. Owner, Contractor and subcontractor shall, prior to commencement of construction, obtain in writing mutual waivers of subrogation from their respective property insurers, covering loss or damage to construction machinery, tools, equipment, supplies, temporary construction buildings or other buildings used in connection with the Project."
- 11.4.4 The insured loss, if any, is to be adjusted with and payable to the Owner, except where payment of all or a proportion of the insurance is to be made to a mortgagee as his interest may appear. Contractor shall submit to Owner for prior approval, any documents concerning insurance premiums required under the Contract Documents to be paid by Contractor on behalf of the Owner. Owner shall be entitled to receive dividends, interest, price reductions, rebates and the like received from insurance companies by Contractor. Reimbursement to Owner for said item is to be made whether related to separate insurance premium return or proportional return for several policies and whether or not made in subsequent years.
- 11.5.1 The Contractor shall finish bonds as described below, covering the faithful performance of the Contract and the payments of all obligations arising thereunder. The Contract will not be signed until the Owner has received the proper bond specified under this Article, issued by a bonding company licensed to do business in the State where construction will take place, and on the current list of Company's Holding Certificates of Authority as acceptable Sureties on Federal Bonds and as acceptable reinsuring companies as published in Circular 570 (Amended) by the Audit Staff Bureau of Accounts, U.S. Treasury Department. All bonds signed by an agent must be accompanied by a certificate copy of the authority to act.
- 11.5.1.1 Furnish both AIA A312 Performance Bond and AIA A312 Payment Bond in the amount of 100% of the Contract Price.
- 11.5.1.2 The performance Bond and Payment Bond shall be submitted in the exact form specified in Section 11.5.1.1 above, and with the certificates specified in Section 11.5.1.3, below, and no other modifications addendum whatsoever shall be allowed.
- 11.5.1.3 Duly executed, notarized and updated Acknowledgements of both the Principal and Surety and the Surety's Power of Attorney must be attached to each of the two required bonds.
- 11.5.1.4 Bond amounts shall not exceed the single bond limit for the Contractor's bonding company as set forth in the Federal Register current as of the bid date.
- 11.5.1.4.1 Upon receipt of Notice to Award, contractor is to submit Bonds to the Architect, prior to signing of the contract.
- 15.13 Modifications to ARTICLE 13 MISCELLANEOUS PROVISIONS

PARTNERS 15-163 SUPPLEMENTARY CONDITIONS 008000 - 18

15.13.′	1	Modification to Paragraph 13.1 GOVERNING LAW
15.13.1	1.1	Add to subparagraph 13.1.1
		The Work shall comply with all applicable laws, statutes, ordinances, codes, rules, regulations or orders during its performance and at completion.
15.13.2	2	Modification to Paragraph 13.2 SUCCESSORS AND ASSIGNS
15.13.2	2.1	Add to subparagraph 13.2.1
		Contractor shall not assign this Contract in whole or in part without the written consent of Owner.
15.13.5		Modification for Paragraph 13.5 TESTS AND INSPECTIONS
15.13.	5	Refer to Division 1 for additional testing requirements.
15.13.7		Modification to Paragraph 13.7 COMMENCEMENT OF STATUTORY LIMITATION PERIOD
15.13.7		Delete Subparagraph 13.7.1 in its entirety substitute:
	13.7.1	The commencement of the statutory limitation period shall be governed by Michigan law.
15.13.8		Add Paragraph 13.8 OWNER AUDIT
	13.8	Owner Audit:
	13.8.1	The Contractor shall maintain all pertinent accounting records of his costs and those of his Subcontractors on a generally recognized accounting basis, including all supporting vouchers, canceled checks, purchase orders, time records and similar data as required

- .1 Changes in the Work.
- .2 Suspension of Operations.
- .3 Termination of the Contract.
- .4 Wherever Contractor's costs and expenses are subject to audit by the Contract Documents.
- 13.8.2 Said accounting records shall be subject to audit by the Owner, and said records shall be available to Owner or his authorized representative at mutually convenient times.
- 15.14 Modification of ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

to substantiate an expenditure, on the following:

## 15.14.2 Modification to Paragraph 14.2 TERMINATION BY THE OWNER FOR CAUSE

- 15.14.2.1 Delete Subparagraph 14.2.1 in its entirety and substitute:
  - 14.2.1 If the Contractor shall institute proceedings or consent to proceedings requesting relief or arrangement under the Federal Bankruptcy Act or any similar or applicable federal or state law, or if a petition under any federal or state bankruptcy or insolvency law is filed against the Contractor and such petition is not dismissed within sixty (60) days from the date of said filing, or if the Contractor admits in writing his inability to pay his debts generally as they become due, or if he makes a general assignment for the benefit of his creditors, or if a receiver, liquidator, trustee or assignee is appointed on account of his bankruptcy or insolvency; or if a receiver of all or any substantial portion of the Contractor's properties is appointed; or if the Contractor abandons the Work; or if he fails, except in cases for which extension of time is provided, to prosecute promptly and diligently the Work or to supply enough properly skilled workmen or proper materials for the work; or if he submits an Application for Payment, sworn statement, waiver of lien, affidavit or document of any nature whatsoever which is intentionally falsified; or if he fails to make prompt payment to Subcontractors or for materials or labor or otherwise breaches his obligations under any subcontract with a Subcontractor; or if a mechanic's or materialman's lien or notice of lien is filed against any part of the Work or the site of the Project and not promptly bonded or insured over by the Contractor in a manner satisfactory to the Owner; or if the Contractor disregards any laws, statutes, ordinances, rules, regulations or orders of any governmental body or public or guasi-public authority having jurisdiction of the Work or the site of the Project; or if he otherwise violates any provision of the Contract Documents; then the Owner, without prejudice to any right or remedy available to the Owner under the Contract Documents or at law or in equity, may, after giving the Contractor and the surety under the Performance Bond and Payment Bond described in paragraph 11.4, seven (7) days' written notice, terminate the employment of the Contractor. In case of such termination, the Contractor shall not be entitled to receive any further payment for Work performed by the Contractor through The Owner's right to terminate the Owner-Contractor the date of termination. Agreement pursuant to this Subparagraph 14.2.1 shall be in addition to and not in limitation of any rights or remedies existing hereunder or pursuant hereto or at law or in equity.
- 15.14.3 Modification to Subparagraph 14.1.3
  - 15.14.1.3 Add to the end of Subparagraph 14.1.3:

to the extent earned as of the date of termination.

# ARTICLE 16 ADDITIONAL CONDITIONS

#### PARTNERS 15-163 SUPPLEMENTARY CONDITIONS 008000 - 20

## 16.1 ADVERTISING AND PUBLICITY

16.1.1 The Contractor, Subcontractor, and Material Suppliers shall not, without first obtaining the written consent of the Owner, in any manner publish the fact that they have contracted to furnish, or have furnished the Owner all or portions of the Work, or use the name of the Owner or the Architect in advertising or other publications.

### 16.2 NON-DISCRIMINATORY EMPLOYMENT PRACTICES

- 16.2.1 In connection with the performance of Work under this Contract, the Contractor agrees not to discriminate against any employee or applicant for employment because of sex, race, religion, color or national origin. The aforesaid provision shall include, but not be limited to the following: recruitment or recruitment advertising; employment, upgrading, demotion or transfer; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship.
- 16.2.2 All employment practices used by the Contractor shall be in accordance with the provisions of State of Michigan Act No. 251, Public Acts of 1955, as amended, which may be in effect prior to receiving of bids for this project and shall comply with all Federal (Compliance Responsibility for Equal Opportunity, Chapter 60, 60-1, 44 No. 1-7) and State (Standards and Procedures for Executive Directive 1975-6, Section II-c and V-A & B) and related Federal and State laws and regulations.

## 16.13 SAMPLE FORMS

- 16.13.1 The following are a few standard forms described or referred to herein and which will be used for administration of the contract.
  - .1 Architect's Supplemental Instructions
  - .2 Construction Change Directive
  - .3 Proposal Request
  - .4 Change Order
- 16.13.2 Copies will be furnished upon request.

## SECTION 011000 - SUMMARY

### PART 1 - GENERAL

### 1.1 SUMMARY

- A. This Section includes the following:
  - 1. Work covered by the Contract Documents.
  - Schedule.
  - 3. Sche 4.
  - 5. Use of premises.
  - 6.
  - 7. Owner's occupancy requirements.
  - 8.
  - 9. Specification formats and conventions.

## 1.2 WORK COVERED BY CONTRACT DOCUMENTS

- A. Project Identification: Hamtramck Public Schools Hamtramck High School Pool Filtration Upgrades
- B. Project Location:
  - 1. Hamtramck High School
  - 2. 11410 Charest
  - 3. Hamtramck, MI 48212
- C. Owner: Hamtramck Public Schools, 3201 Roosevelt, Hamtramck, MI 48212
  - 1. Owner's Representative: Wayne Satterfield, Director of Buildings and Grounds (313) 585-3708.
- D. Architect: PARTNERS in Architecture, PLC, 65 Market Street, Mount Clemens, Michigan 48043. Phone: (586) 469-3600; Fax: (586) 469-3607
- E. The Work includes (but not limited to) the following:
  - 1. Removal of existing pool filtration equipment and controls except for the existing serge tank, installation of a new pool filtration system and associated piping, removal and replacement of the existing interior water service piping and meter assembly, removal and replacement of the existing pool heater and pumps, installation of new pool filter / storage room exhaust system including wall louver installation, interior filter and storage room refurbishing including door replacement and stair replacement, associated mechanical and electrical system upgrades as indicated in construction documents.

PARTNERS 15-163 SUMMARY 01100 - 2

## 1.3 WORK UNDER OTHER CONTRACTS

A. General: Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract. Coordinate the Work of this Contract with work performed under separate contracts.

### 1.4 SCHEDULE

- A. The projected schedule milestones are as follows:
  - 1. The project is scheduled to be awarded at the April 13, 2016 Board of Education Meeting.
  - 2. Notice of award will be issued via "Letter of Intent" on April 15, 2016.
  - 3. Shop drawing submittals and other required contract submittals shall begin immediately following notice of award and be completed no later than May 6 2016.
  - 4. Construction may begin as soon as possible, however the removal of pool or heater system shall not commence until all equipment necessary to complete the new installation is received and the work schedule is coordinated to minimize the pool operation down time and be coordinated with the owners pool use schedule.
  - 5. This project is to be completed as soon as possible but must be coordinated around the School's Operations and occupancy schedule.
  - 6. Project is to achieve final completion no later than August 27, 2016.

## 1.5 WORK HOURS

- A. Buildings are typically available to accommodate work hours between: 7:00am 7:00pm; Monday Friday.
- B. Extended work hours beyond those specified above and weekend hours may potentially be arranged with the District if needed (pending District's approval).

### 1.6 USE OF PREMISES

- A. General: Contractor shall have limited use of premises for construction operations. Comply with schedule and work hours as designated above. Coordinate specifics with Owner.
- B. Use of Site: Limit use of premises to work in areas designated. Do not disturb portions of Project site beyond areas in which the Work is indicated. Work areas shall be cleaned each day and ready for use and occupancy the following day.
  - 1. Limits: Confine constructions operations to work areas within the building. Other areas inside or outside the building may be available for use, but must be approved by the District.
  - 2. Owner Occupancy: Building may be occupied during construction.
  - 3. Driveways and Entrances: Keep driveways, loading areas and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.

# 1.7 OWNER'S OCCUPANCY REQUIREMENTS

- A. Full Owner Occupancy: Owner will occupy site and existing building 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, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, 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.
  - 3. Removal and replacement of the domestic water service replacement is to be coordinated to minimize down time and to be scheduled with the owner for weekend shutdown and testing.

### 1.8 SPECIFICATION FORMATS AND CONVENTIONS

- A. Specification Format: The Specifications are organized into Divisions and Sections using the 33-division format and CSI/CSC's "MasterFormat" numbering system.
  - 1. Division 1: Sections in Division 1 govern the execution of the Work of all Sections in the Specifications.
- B. 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. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.
  - 2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.
    - a. 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.

#### SECTION 012300 - ALTERNATES

#### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section includes administrative and procedural requirements for alternates.

#### 1.2 DEFINITIONS

- A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be added to or deducted from the base bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
  - 1. 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 alternate into the Work. No other adjustments are made to the Contract Sum.

### 1.3 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. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated revisions to alternates.
- C. Execute accepted alternates under the same conditions as other work of the Contract.
- D. Schedule: A schedule of alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)

### PART 3 - EXECUTION

- 3.1 SCHEDULE OF ALTERNATES
  - A. Alternate No. 1: PROVIDE CHLORINE GENERATION UNIT

- 1. Base Bid: Assumes the installation of a new calcium hypo-chlorite feeder, chemicals, piping and associated valves. Electrical requirements for this unit are a dedicated 110 volt, 20 amp single phase duplex outlet provided by Division 16 Contractor.
- 2. Alternate: Provide additional cost to install a ChlorKing NexGen pH neutral chlorine generator and all components required for a complete installation. Inclue automatic TDS controller option as outlined in specification section 131500 POOL FILTRATION SYSTEM.

# SECTION 012500 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

### 1.1 SUMMARY

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

#### 1.2 MINOR CHANGES IN THE WORK

A. Architect will issue supplemental instructions authorizing Minor Changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710, "Architect's Supplemental Instructions."

# 1.3 PROPOSAL REQUESTS

- A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
  - 1. Proposal Requests issued by Architect are for information only. Do not consider them instructions either to stop work in progress or to execute the proposed change.
  - 2. Within 7 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.
- B. Contractor-Initiated Proposals: If latent or unforeseen conditions require modifications to the Contract, Contractor may propose changes 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.
  - 3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
  - 4. Include costs of labor and supervision directly attributable to the change.
  - 5. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

## PARTNERS 15-163 CONTRACT MODIFICATION PROCEDURES 012500 - 2

- 6. Comply with requirements in Division 1 Section "Product Requirements" if the proposed change requires substitution of one product or system for product or system specified.
- C. Proposal Request Form: Use AIA Document G709 for Proposal Requests.

## 1.4 CHANGE ORDER PROCEDURES

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

### 1.5 CONSTRUCTION CHANGE DIRECTIVE

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

### SECTION 012900 - PAYMENT PROCEDURES

PART 1 - GENERAL

### 1.1 SUMMARY

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

### 1.2 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Construction Schedule.
  - 1. Correlate line items in the Schedule of Values with other required administrative forms and schedules, including Application for Payment forms with Continuation Sheets, Submittals Schedule and 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 the 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. Submit draft of AIA Document G703 Continuation Sheets .
  - 3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide several line items for principal subcontract amounts, where appropriate. Include separate line items under required principal subcontracts for operation and maintenance manuals, punch list activities, Project Record Documents, and demonstration and training in the amount of 5 percent of the Contract Sum.
  - 4. Round amounts to nearest whole dollar; total shall equal 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.
  - 6. Provide separate line items in the Schedule of Values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
  - 7. Allowances: Provide a separate line item in the Schedule of Values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.

- 8. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
  - a. Temporary facilities and other major cost items that are not direct cost of actual work-inplace may be shown either as separate line items in the Schedule of Values or distributed as general overhead expense, at Contractor's option.
- 9. Schedule Updating: Update and resubmit the Schedule of Values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

### 1.3 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.
  - 1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.
- B. Payment Application Times: Progress payments shall be submitted to Architect by the last day of the month. The period covered by each Application for Payment is one month, ending on the last day of the month.
- C. Payment Application Forms: Use AIA Document G702/CMa and AIA Document G703 Continuation Sheets 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 of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
- E. Transmittal: Submit 4 signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt within 24 hours. Each 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.
- F. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from every entity who is lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment.
  - 1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
  - 2. When an application shows completion of an item, submit final or full waivers.
  - 3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
  - 4. Waiver Forms: Submit waivers of lien on forms, executed in a manner acceptable to Owner.

- G. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
  - 1. List of subcontractors and construction testing firms.
  - 2. Schedule of Values.
  - 3. Contractor's Construction Schedule (preliminary if not final).
  - 4. Schedule of unit prices.
  - 5. Submittals Schedule (preliminary if not final).
  - 6. List of Contractor's staff assignments.
  - 7. List of Contractor's principal consultants.
  - 8. Copies of building permits.
  - 9. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
  - 10. Initial progress report.
  - 11. Report of preconstruction conference.
  - 12. Certificates of insurance and insurance policies.
- H. Application for Payment at Substantial Completion: After issuing 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.
- I. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
  - 1. Evidence of completion of Project closeout requirements.
  - 2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
  - 3. Updated final statement, accounting for final changes to the Contract Sum.
  - 4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
  - 5. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
  - 6. AIA Document G707, "Consent of Surety to Final Payment."
  - 7. Evidence that claims have been settled.
  - 8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

### SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

### 1.1 SUMMARY

- A. This Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
  - 1. Project meetings.
  - 2. Requests for Interpretation (RFIs).
- B. See Division 1 Section "Execution Requirements" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.

#### 1.2 DEFINITIONS

A. RFI: Request from Contractor seeking interpretation or clarification of the Contract Documents.

#### 1.3 COORDINATION

- 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 with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
  - 3. Make adequate provisions to accommodate items scheduled for later installation.
  - 4. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair of all components, including mechanical and electrical.
- 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 and activities of other contractors 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.

## PARTNERS 15-163 PROJECT MANAGEMENT AND COORDINATION 013100 - 2

- 3. Installation and removal of temporary facilities and controls.
- 4. Delivery and processing of submittals.
- 5. Progress meetings.
- 6. Project closeout activities.
- 7. Startup and adjustment of systems.
- 8. Project closeout activities.

### 1.4 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.
  - 2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
  - 3. Minutes: Record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within five days of the meeting.
- B. Preconstruction Conference: Schedule 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. Hold the conference at Project site or another convenient location. Conduct the meeting to review responsibilities and personnel assignments.
  - 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. All 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. Tentative construction schedule.
    - b. Critical work sequencing and long-lead items.
    - c. Designation of key personnel and their duties.
    - d. Procedures for processing field decisions and Change Orders.
    - e. Procedures for RFIs.
    - f. Procedures for processing Applications for Payment.
    - g. Distribution of the Contract Documents.
    - h. Use of the premises.
    - i. Work restrictions.
    - j. Construction waste management and recycling.
    - k. Parking availability.
    - I. Office, work, and storage areas.
    - m. Security.
    - n. Progress cleaning.
    - o. Working hours.
  - 3. Minutes: Record and distribute meeting minutes.
- C. Progress Meetings: Conduct progress meetings at weekly intervals. Coordinate dates of meetings with preparation of payment requests.

- 1. 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 conference shall be familiar with Project and authorized to conclude matters relating to the Work.
- 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.
- 3. Minutes: Record the meeting minutes.
- 4. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present.
  - 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.

# 1.5 REQUESTS FOR INTERPRETATION (RFIs)

- A. Procedure: Immediately on discovery of the need for interpretation of the Contract Documents, and if not possible to request interpretation at Project meeting, prepare and submit an RFI in the form specified.
  - 1. RFIs shall originate with Contractor. RFIs submitted by entities other than Contractor will be returned with no response.
  - 2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing interpretation and the following:
  - 1. Project name.
  - 2. Date.
  - 3. Name of Contractor.
  - 4. Name of Architect and Construction Manager.
  - 5. RFI number, numbered sequentially.
  - 6. Specification Section number and title and related paragraphs, as appropriate.
  - 7. Drawing number and detail references, as appropriate.
  - 8. Field dimensions and conditions, as appropriate.
  - 9. Contractor's suggested solution(s). If Contractor's solution(s) impact the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
  - 10. Contractor's signature.
  - 11. Attachments: Include drawings, descriptions, measurements, photos, Product Data, Shop Drawings, and other information necessary to fully describe items needing interpretation.

## PARTNERS 15-163 PROJECT MANAGEMENT AND COORDINATION 013100 - 4

- C. Hard-Copy RFIs: Construction Manager to provide form.
  - 1. Identify each page of attachments with the RFI number and sequential page number.
- D. Architect's Action: Architect will review each RFI, determine action required, and return it. Allow seven working days for Architect's response for each RFI. RFIs received after 1:00 p.m. will be considered as received the following working day.
  - 1. The following RFIs will be returned without action:
    - a. Requests for approval of submittals.
    - b. Requests for approval of substitutions.
    - c. Requests for coordination information already indicated in the Contract Documents.
    - d. Requests for adjustments in the Contract Time or the Contract Sum.
    - e. Requests for interpretation of Architect's actions on submittals.
    - f. Incomplete RFIs or RFIs with numerous errors.
  - 2. Architect's action may include a request for additional information, in which case Architect's time for response will start again.
  - 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 Division 1 Section "Contract Modifications."
    - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 7 days of receipt of the RFI response.
- E. 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.
- F. 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 Construction Manager.
  - 3. Name and address of Architect.
  - 4. RFI number including RFIs that were dropped and not submitted.
  - 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.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

### SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

### 1.1 SUMMARY

- A. This 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. Field condition reports.
- B. See Division 1 Section "Payment Procedures" for submitting the Schedule of Values.

### 1.2 DEFINITIONS

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
  - 1. Critical activities are activities on the critical path. They must start and finish on the planned early start and finish times.
  - 2. Predecessor Activity: An activity that precedes another activity in the network.
  - 3. Successor Activity: An activity that follows another activity in the network.
- B. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.
- C. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.
- D. Float: The measure of leeway in starting and completing an activity.
- E. Fragnet: A partial or fragmentary network that breaks down activities into smaller activities for greater detail.
- F. Major Area: A story of construction, a separate building, or a similar significant construction element.

### 1.3 SUBMITTALS

- A. Submittals Schedule: Submit three copies of schedule. Arrange the following information in a tabular format:
  - 1. Scheduled date for first submittal.
  - 2. Specification Section number and title.

PARTNERS 15-163 CONSTRUCTION PROGRESS DOCUMENTATION 013200 - 2

- 3. Submittal category (action or informational).
- 4. Name of subcontractor.
- 5. Description of the Work covered.
- 6. Scheduled date for Architect's final release or approval.
- B. Contractor's Construction Schedule: Submit two opaque copies of initial schedule, large enough to show entire schedule for entire construction period.
- C. Daily Construction Reports: Submit two copies at bi-weekly intervals.
- D. Field Condition Reports: Submit two copies at time of discovery of differing conditions.

## 1.4 COORDINATION

- A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.
- B. Coordinate Contractor's Construction Schedule with the Schedule of Values, list of subcontracts, Submittals Schedule, progress reports, payment requests, and other required schedules and reports.
  - 1. Secure time commitments for performing critical elements of the Work from parties involved.
  - 2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

# PART 2 - PRODUCTS

## 2.1 SCHEDULE, GENERAL

- A. Time Frame: Extend schedule from date established for commencement of the Work to date of Final Completion.
  - 1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- B. Activities: Treat each story or separate area as a separate numbered activity for each principal element of the Work. Comply with the following:
  - 1. Activity Duration: Define activities so no activity is longer than 30 days, unless specifically allowed by Architect.
  - 2. Submittal Review Time: Include review and resubmittal times indicated in Division 1 Section "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with Submittals Schedule.
  - 3. 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.
- C. 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.

PARTNERS 15-163 CONSTRUCTION PROGRESS DOCUMENTATION 013200 - 3

- 1. Phasing: Arrange list of activities on schedule by phase.
- 2. Work under More Than One Contract: Include a separate activity for each contract.
- 3. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
- 4. 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. Use of premises restrictions.
  - e. Seasonal variations.
  - f. Environmental control.
- 5. Work Stages: Indicate important stages of construction for each major portion of the Work.
- D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and Final Completion and all Building, Mechanical, Electrical, Fire Safety, Health Department and Local Municipality inspections (rough and final).
- E. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using fragnets to demonstrate the effect of the proposed change on the overall project schedule.

## 2.2 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. Equipment at Project site.
  - 3. Material deliveries.
  - 4. High and low temperatures and general weather conditions.
  - 5. Accidents.
  - 6. Stoppages, delays, shortages, and losses.
  - 7. Meter readings and similar recordings.
  - 8. Orders and requests of authorities having jurisdiction.
  - 9. Services connected and disconnected.
  - 10. Equipment or system tests and startups.
- B. Field Condition Reports: Immediately on discovery of a difference between field conditions and the Contract Documents, prepare and submit a detailed report. Submit with a request for interpretation (RFI). Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

# 3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. 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 Actual Completion percentage for each activity.
- B. 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.
- C. Two (2) Week Look-Ahead Schedule: Generate (2) Week Look-Ahead Schedule for review at each construction meeting. Update weekly.
### SECTION 013300 - SUBMITTAL PROCEDURES

### PART 1 - GENERAL

### 1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.
- B. See Division 1 Section "Construction Progress Documentation" for submitting schedules and reports, including Contractor's Construction Schedule.
- C. See Division 1 Section "Quality Requirements" for submitting test and inspection reports and for mockup requirements.
- D. See Division 1 Section "Closeout Procedures" for submitting warranties.
- E. See Division 1 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
- F. See Division 1 Section "Operation and Maintenance Data" for submitting operation and maintenance manuals.
- G. See Division 1 Section "Demonstration and Training" for submitting videotapes of demonstration of equipment and training of Owner's personnel.

### 1.2 DEFINITIONS

- A. Action Submittals: Written and graphic information that requires Architect's responsive action.
- B. Informational Submittals: Written information that does not require Architect's responsive action. Submittals may be rejected for not complying with requirements.

## 1.3 SUBMITTAL PROCEDURES

- A. 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. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
    - a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

### PARTNERS 15-163 SUBMITTAL PROCEDURES 013300 - 2

- B. Submittals Schedule: Comply with requirements in Division 1 Section "Construction Progress Documentation" for list of submittals and time requirements for scheduled performance of related construction activities.
- C. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
  - 1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
  - 2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
  - 3. Resubmittal Review: Allow 15 days for review of each resubmittal.
- D. Identification: Place a permanent label or title block on each submittal for identification.
  - 1. Indicate name of firm or entity that prepared each submittal on label or title block.
  - 2. Provide a space approximately 6 by 8 inches (150 by 200 mm) on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
  - 3. Include the following information on label for processing and recording action taken:
    - a. Project name.
    - b. Date.
    - c. Name and address of Architect.
    - d. Name and address of Contractor.
    - e. Name and address of subcontractor.
    - f. Name and address of supplier.
    - g. Name of manufacturer.
    - h. Submittal number or other unique identifier, including revision identifier.
      - 1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 06100.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 06100.01.A).
    - i. Number and title of appropriate Specification Section.
    - j. Drawing number and detail references, as appropriate.
    - k. Location(s) where product is to be installed, as appropriate.
    - I. Other necessary identification.
- E. Deviations: Highlight, encircle, or otherwise specifically identify deviations from the Contract Documents on submittals.
- F. Additional Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.
  - 1. Additional copies submitted for maintenance manuals will not be marked with action taken and will be returned.

- G. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will discard submittals received from sources other than Contractor.
  - 1. Transmittal Form: Use sample form at end of section. An electronic copy will be provided if requested.
- H. 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 "No Comments Noted or Comments Noted".
- I. 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.
- J. Use for Construction: Use only final submittals with mark indicating "No Comments Noted or Comments Noted" taken by Architect.

# 1.4 CONTRACTOR'S USE OF ARCHITECT'S CAD FILES

- A. General: At Contractor's written request, copies of Architect's CAD files will be provided to Contractor for Contractor's use in connection with Project, subject to the following conditions:
  - 1. Signing of a CAD Documents Transfer Agreement.
  - 2. Payment of handling fee of \$350.00 plus \$100.00 per drawing, payable to Architect.

# PART 2 - PRODUCTS

# 2.1 ACTION SUBMITTALS

- A. General: Prepare and submit Action Submittals required by individual Specification Sections.
- B. 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 printed data are not suitable 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 written recommendations.
    - b. Manufacturer's product specifications.
    - c. Manufacturer's installation instructions.
    - d. Manufacturer's catalog cuts.
    - e. Wiring diagrams showing factory-installed wiring.
    - f. Printed performance curves.

- g. Operational range diagrams.
- h. Compliance with specified referenced standards.
- i. Testing by recognized testing agency.
- 4. Number of Copies: Submit five copies of Product Data, unless otherwise indicated. Architect will return two copies. Mark up and retain one returned copy as a Project Record Document.
- C. 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:
    - a. Dimensions.
    - b. Identification of products.
    - c. Fabrication and installation drawings.
    - d. Roughing-in and setting diagrams.
    - e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
    - f. Shopwork manufacturing instructions.
    - g. Templates and patterns.
    - h. Schedules.
    - i. Notation of coordination requirements.
    - j. Notation of dimensions established by field measurement.
    - k. Relationship to adjoining construction clearly indicated.
    - I. Seal and signature of professional engineer if specified.
    - m. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.
  - 2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches (215 by 280 mm) but no larger than 30 by 40 inches (750 by 1000 mm).
  - 3. Number of Copies: Submit three opaque (bond) and two reproducible copies of each submittal. Architect will return one reproducible copy.
- D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
  - 1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
  - 2. Identification: Attach label on unexposed side of Samples that includes the following:
    - a. Generic description of Sample.
    - b. Product name and name of manufacturer.
    - c. Sample source.
    - d. Number and title of appropriate Specification Section.
  - 3. 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.
  - 4. 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 three full sets of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return two submittals with options selected.
- 5. 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.
  - a. Number of Samples: Submit three sets of Samples. Architect will retain one Sample set; remainder will be returned.
- E. Product Schedule or List: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location.
  - 1. Number of Copies: Submit five copies of product schedule or list, unless otherwise indicated. Architect will return two copies.
- F. Submittals Schedule: Comply with requirements specified in Division 1 Section "Construction Progress Documentation."
- G. Application for Payment: Comply with requirements specified in Division 1 Section "Payment Procedures."
- H. Schedule of Values: Comply with requirements specified in Division 1 Section "Payment Procedures."

## 2.2 INFORMATIONAL SUBMITTALS

- A. General: Prepare and submit Informational Submittals required by other Specification Sections.
  - 1. Number of Copies: Submit two copies of each submittal, unless otherwise indicated. Architect will not return copies.
  - 2. Certificates and Certifications: Provide a notarized 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.
  - 3. Test and Inspection Reports: Comply with requirements specified in Division 1 Section "Quality Requirements."
- B. Coordination Drawings: Comply with requirements specified in Division 1 Section "Project Management and Coordination."
- C. Contractor's Construction Schedule: Comply with requirements specified in Division 1 Section "Construction Progress Documentation."
- D. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

- E. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.
- F. Installer Certificates: Prepare 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.
- G. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- H. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- I. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- J. Material Test Reports: Prepare 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.
- K. Product Test Reports: Prepare written reports indicating 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.
- L. Research/Evaluation Reports: Prepare written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project.
- M. Preconstruction Test Reports: Prepare 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.
- N. Compatibility Test Reports: Prepare 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.
- O. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, 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.
- P. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements specified in Division 1 Section "Operation and Maintenance Data."
- Q. Design Data: Prepare written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

- R. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer.
- S. Manufacturer's Field Reports: Prepare written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable:
  - 1. Statement on condition of substrates and their acceptability for installation of product.
  - 2. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
  - 3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
- T. Insurance Certificates and Bonds: Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.
- U. Material Safety Data Sheets (MSDSs): Submit information directly to Contractor; do not submit to Architect.
  - 1. Architect will not review submittals that include MSDSs and will return them for resubmittal.

## PART 3 - EXECUTION

## 3.1 CONTRACTOR'S REVIEW

- A. 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. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, 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.

## 3.2 ARCHITECT'S ACTION

- A. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action. If the Contractor reviews and approves the submittal and the Architect finds the submittal to be unsatisfactory, the additional review time required of the Architect will be charged to the Owner, at the current hourly rates, which will ultimately be deducted from the total contract amount, via Change Order.
- B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:
  - 1. No comments noted
  - 2. Comments Noted

PARTNERS 15-163 SUBMITTAL PROCEDURES 013300 - 8

- 3. Revise and send record copies
- 4. Resubmit information
- 5. Rejected
- C. 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.
- D. Partial submittals are not acceptable, will be considered nonresponsive, and will be returned without review.
- E. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

### END OF SECTION 013300

PARTNERS in Architecture, PLC SHOP DRAWING & SAMPLES TRANSMITTAL													
CONTRACTOR / CONST. MGR.						PROJECT NAME:			DATE SUBMITTAL #: SUBMITTED: RESUBMIT#:				
SUB-CONRTACTOR / SUPPLIER				CITY:			TO: A	M	С				
						PROJECT #:			s	<u> </u>			
SPEC SECTION #	SPEC Subsection	No. Prints	No. Sepia	No. Cat.	No. Samp.	SUB-CONTRACTOR / MANUF. / SUPPLIER	DWG. NO.	DRAWING / (List each di	ITEM DESCRIPTION rawing number per line.)	A/E A0 ACTION CODE	CTION REVIEW DATE	TO CO DATE RETURN	NTR. NUMBER COPIES
The undersign	ed certifies that	the abov	ve submit	ted item	s have bee	en reviewed in detail and are corre	ct and in st	rict conformance with	the contract documents ex	ecpt as otherw	ise noted.		
Review of item	ns submitted do	es not rel	lieve cont	ractor fr	om compl	ying with all requirements of the co	ontract docu	iments.		REVIEW	COMPLET	ED AS INC	DICATED:
CONTRAC	TORS COM	MENTS	:					ROUTING INFOR	RMATION-PIA USE ONLY		`ommont		
								PARTNERS REC'D					
SIGNATURE					OUT TO CONS.		CN: Comments Noted						
ARCH / ENG. COMMENTS:					REC'D FROM CONS	S.	RR: Revise and Send Record Copy						
								RET. TO CONTR		RI: Resul	bmit Infori	mation	
					-					XX: Reje	cted, Non	-Complian	ice
SIGNATURE													

### SECTION 014000 - QUALITY REQUIREMENTS

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
  - 1. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
  - 2. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Contractor, Owner, or authorities having jurisdiction are not limited by provisions of this Section.
- C. See all Sections for specific test and inspection requirements.

### 1.2 DEFINITIONS

- A. 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.
- B. 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. Services do not include contract enforcement activities performed by Architect.
- C. Mockups: Full-size, physical assemblies that are constructed on-site. Mockups are used to verify selections made under sample submittals, to demonstrate aesthetic effects and, where indicated, qualities of materials and execution, and to review construction, coordination, testing, or operation; they are not Samples. Approved mockups establish the standard by which the Work will be judged.
- D. Laboratory Mockups: Full-size, physical assemblies that are constructed at testing facility to verify performance characteristics.
- E. Preconstruction Testing: Tests and inspections that are performed specifically for the Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.
- F. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with industry standards.

PARTNERS 15-163 QUALITY REQUIREMENTS 014000 - 2

- G. Source Quality-Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.
- H. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- I. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- J. 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, and similar operations.
  - 1. Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to tradespeople of the corresponding generic name.
- K. Experienced: When used with an entity, "experienced" means having successfully completed a minimum of five previous projects similar in size and scope to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

## 1.3 CONFLICTING REQUIREMENTS

- A. General: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different to Architect for a decision 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.

### 1.4 SUBMITTALS

- A. Qualification Data: 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.
- B. Reports: Prepare and submit certified written reports that include the following:
  - 1. Date of issue.
  - 2. Project title and number.
  - 3. Name, address, and telephone number 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 inspecting.
- 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.
- C. Permits, Licenses, and Certificates: For Owner's records, 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.

#### 1.5 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this Article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- C. 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.
- D. 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.
- 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 to those indicated for this Project in material, design, and extent.
- F. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 548; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.
  - 1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
  - 2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
- G. 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.

### PARTNERS 15-163 QUALITY REQUIREMENTS 014000 - 4

- H. 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 in location and of 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. Demonstrate the proposed range of aesthetic effects and workmanship.
  - 4. Obtain Architect's approval of mockups before starting work, fabrication, or construction.
  - 5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
  - 6. Demolish and remove mockups when directed, unless otherwise indicated.
- I. Laboratory Mockups: Comply with requirements of preconstruction testing and those specified in individual Sections in Divisions 2 through 16.

## 1.6 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 inspecting they are engaged to perform.
  - 2. 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. Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. 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.
  - 1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
    - a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
  - 2. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
  - 3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
  - 4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
  - 5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. 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 Division 1 Section "Submittal Procedures."

- D. 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.
- E. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
  - 1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
  - 2. Determine the location 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 any duties of Contractor.
- F. Associated Services: Cooperate with agencies performing required tests, inspections, and similar qualitycontrol 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 inspecting. Assist agency in obtaining samples.
  - 4. Facilities for storage and field curing of test samples.
  - 5. Preliminary design mix proposed for use for material mixes that require control by testing agency.
  - 6. Security and protection for samples and for testing and inspecting equipment at Project site.
- G. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
  - 1. Schedule times for tests, inspections, obtaining samples, and similar activities.

# 1.7 SPECIAL TESTS AND INSPECTIONS

- A. Special Tests and Inspections: Conducted by a qualified testing agency as required by authorities having jurisdiction, as indicated in individual Specification Sections, 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.

PARTNERS 15-163 QUALITY REQUIREMENTS 014000 - 6

- 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 REPAIR AND PROTECTION

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

### END OF SECTION 014000

#### **SECTION 014200 - REFERENCES**

PART 1 - GENERAL

### 1.1 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."
- D. "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": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
- 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.
- J. "Contractor": The term "contractor" is used loosely throughout the project manual and thus can be defined as the "construction manger", "trade contractor" or both.

### 1.2 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.

- 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.
- D. Abbreviations and Acronyms for Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the organizations responsible for the standards and regulations in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.
- ADAAG Americans with Disabilities Act (ADA) Architectural Barriers Act (ABA)
- CFR Code of Federal Regulations
- DOD Department of Defense Military Specifications and Standards
- DSCC Defense Supply Center Columbus (See FS)
- FED-STD Federal Standard (See FS)
- FS Federal Specification
- FTMS Federal Test Method Standard (See FS)

## 1.3 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 in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.
- AA Aluminum Association, Inc. (The)
- AAADM American Association of Automatic Door Manufacturers
- AABC Associated Air Balance Council
- AAMA American Architectural Manufacturers Association
- AASHTO American Association of State Highway and Transportation Officials
- AATCC American Association of Textile Chemists and Colorists (The)
- ABAA Air Barrier Association of America
- ABMA American Bearing Manufacturers Association

- ACI ACI International (American Concrete Institute)
- ACPA American Concrete Pipe Association
- AEIC Association of Edison Illuminating Companies, Inc. (The)
- AF&PA American Forest & Paper Association
- AGA American Gas Association
- AGC Associated General Contractors of America (The)
- AHA American Hardboard Association (Now part of CPA)
- AHAM Association of Home Appliance Manufacturers
- AI Asphalt Institute
- AIA American Institute of Architects (The)
- AISC American Institute of Steel Construction
- AISI American Iron and Steel Institute
- AITC American Institute of Timber Construction
- ALCA Associated Landscape Contractors of America (Now PLANET - Professional Landcare Network)
- ALSC American Lumber Standard Committee, Incorporated
- AMCA Air Movement and Control Association International, Inc.
- ANSI American National Standards Institute
- AOSA Association of Official Seed Analysts, Inc.
- APA APA The Engineered Wood Association
- APA Architectural Precast Association
- API American Petroleum Institute
- ARI Air-Conditioning & Refrigeration Institute
- ARMA Asphalt Roofing Manufacturers Association
- ASCE American Society of Civil Engineers
- ASHRAE American Society of Heating, Refrigerating and Air-Conditioning Engineers

ASME	ASME International
ASSE	American Society of Sanitary Engineering
ASTM	ASTM International (American Society for Testing and Materials International)
AWCI	AWCI International (Association of the Wall and Ceiling Industry International)
AWCMA	American Window Covering Manufacturers Association (Now WCSC)
AWI	Architectural Woodwork Institute
AWPA	American Wood-Preservers' Association
AWS	American Welding Society
AWWA	American Water Works Association
BHMA	Builders Hardware Manufacturers Association
BIA	Brick Industry Association (The)
BICSI	BICSI
BIFMA	BIFMA International (Business and Institutional Furniture Manufacturer's Association International)
BISSC	Baking Industry Sanitation Standards Committee
CCC	Carpet Cushion Council
CDA	Copper Development Association
CEA	Canadian Electricity Association
CFFA	Chemical Fabrics & Film Association, Inc.
CGA	Compressed Gas Association
CIMA	Cellulose Insulation Manufacturers Association
CISCA	Ceilings & Interior Systems Construction Association
CISPI	Cast Iron Soil Pipe Institute
CLFMI	Chain Link Fence Manufacturers Institute
CPA	Composite Panel Association

- CPPA Corrugated Polyethylene Pipe Association
- CRI Carpet & Rug Institute (The)
- CRSI Concrete Reinforcing Steel Institute
- CSA CSA International (Formerly: IAS International Approval Services)
- CSI Cast Stone Institute
- CSI Construction Specifications Institute (The)
- CSSB Cedar Shake & Shingle Bureau
- CTI Cooling Technology Institute (Formerly: Cooling Tower Institute)
- DHI Door and Hardware Institute
- EIA Electronic Industries Alliance
- EIMA EIFS Industry Members Association
- EJCDC Engineers Joint Contract Documents Committee
- EJMA Expansion Joint Manufacturers Association, Inc.
- ESD ESD Association
- FIBA Federation Internationale de Basketball Amateur (The International Basketball Federation)
- FIVB Federation Internationale de Volleyball (The International Volleyball Federation)
- FMG FM Global (Formerly: FM Factory Mutual System)
- FMRC Factory Mutual Research (Now FMG)
- FRSA Florida Roofing, Sheet Metal & Air Conditioning Contractors Association, Inc.
- FSA Fluid Sealing Association
- FSC Forest Stewardship Council
- GA Gypsum Association
- GANA Glass Association of North America
- GRI (Now GSI)

4200 - 6 GS	Green Seal
GSI	Geosynthetic Institute
н	Hydraulic Institute
н	Hydronics Institute
HMMA	Hollow Metal Manufacturers Association (Part of NAAMM)
HPVA	Hardwood Plywood & Veneer Association
HPW	H. P. White Laboratory, Inc.
IAS	International Approval Services (Now CSA International)
IBF	International Badminton Federation
ICEA	Insulated Cable Engineers Association, Inc.
ICRI	International Concrete Repair Institute, Inc.
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers, Inc. (The)
IESNA	Illuminating Engineering Society of North America
IEST	Institute of Environmental Sciences and Technology
IGCC	Insulating Glass Certification Council
IGMA	Insulating Glass Manufacturers Alliance
ILI	Indiana Limestone Institute of America, Inc.
ISO	International Organization for Standardization
ISSFA	International Solid Surface Fabricators Association
ITS	Intertek
ITU	International Telecommunication Union
KCMA	Kitchen Cabinet Manufacturers Association
LMA	Laminating Materials Association (Now part of CPA)
LPI	Lightning Protection Institute
MBMA	Metal Building Manufacturers Association

MFMA	Maple Flooring Manufacturers Association, Inc.
MFMA	Metal Framing Manufacturers Association
MH	Material Handling (Now MHIA)
MHIA	Material Handling Industry of America
MIA	Marble Institute of America
MPI	Master Painters Institute
MSS	Manufacturers Standardization Society of The Valve and Fittings Industry Inc.
NAAMM	National Association of Architectural Metal Manufacturers
NACE	NACE International (National Association of Corrosion Engineers International)
NADCA	National Air Duct Cleaners Association
NAGWS	National Association for Girls and Women in Sport
NAIMA	North American Insulation Manufacturers Association
NBGQA	National Building Granite Quarries Association, Inc.
NCAA	National Collegiate Athletic Association (The)
NCMA	National Concrete Masonry Association
NCPI	National Clay Pipe Institute
NCTA	National Cable & Telecommunications Association
NEBB	National Environmental Balancing Bureau
NECA	National Electrical Contractors Association
NeLMA	Northeastern Lumber Manufacturers' Association
NEMA	National Electrical Manufacturers Association
NETA	InterNational Electrical Testing Association
NFHS	National Federation of State High School Associations
NFPA	NFPA (National Fire Protection Association)
NFRC	National Fenestration Rating Council

NGA	National Glass Association
NHLA	National Hardwood Lumber Association
NLGA	National Lumber Grades Authority
NOFMA	NOFMA: The Wood Flooring Manufacturers Association (Formerly: National Oak Flooring Manufacturers Association)
NRCA	National Roofing Contractors Association
NRMCA	National Ready Mixed Concrete Association
NSF	NSF International (National Sanitation Foundation International)
NSSGA	National Stone, Sand & Gravel Association
NTMA	National Terrazzo & Mosaic Association, Inc. (The)
NTRMA	National Tile Roofing Manufacturers Association (Now TRI)
NWWDA	National Wood Window and Door Association (Now WDMA)
OPL	Omega Point Laboratories, Inc. (Acquired by ITS - Intertek)
PCI	Precast/Prestressed Concrete Institute
PDCA	Painting & Decorating Contractors of America
PDI	Plumbing & Drainage Institute
PGI	PVC Geomembrane Institute
PLANET	Professional Landcare Network (Formerly: ACLA - Associated Landscape Contractors of America)
PTI	Post-Tensioning Institute
RCSC	Research Council on Structural Connections
RFCI	Resilient Floor Covering Institute
RIS	Redwood Inspection Service
RTI	(Formerly: NTRMA - National Tile Roofing Manufacturers Association) (Now TRI)
SAE	SAE International
SDI	Steel Deck Institute

SDI	Steel Door Institute
SEFA	Scientific Equipment and Furniture Association
SGCC	Safety Glazing Certification Council
SIA	Security Industry Association
SIGMA	Sealed Insulating Glass Manufacturers Association (Now IGMA)
SJI	Steel Joist Institute
SMA	Screen Manufacturers Association
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association
SMPTE	Society of Motion Picture and Television Engineers
SPFA	Spray Polyurethane Foam Alliance (Formerly: SPI/SPFD - The Society of the Plastics Industry, Inc.; Spray Polyurethane Foam Division)
SPIB	Southern Pine Inspection Bureau (The)
SPRI	Single Ply Roofing Industry
SSINA	Specialty Steel Industry of North America
SSPC	SSPC: The Society for Protective Coatings
STI	Steel Tank Institute
SWI	Steel Window Institute
SWRI	Sealant, Waterproofing, & Restoration Institute
TCA	Tile Council of America, Inc.
TIA/EIA	Telecommunications Industry Association/Electronic Industries Alliance
TMS	The Masonry Society
TPI	Truss Plate Institute, Inc.
TPI	Turfgrass Producers International
TRI	Tile Roofing Institute (Formerly: RTI - Roof Tile Institute)
UL	Underwriters Laboratories Inc.

## PARTNERS 15-163 REFERENCES

01	4200 - 10 UNI	Uni-Bell PVC Pipe Association
	USAV	USA Volleyball
	USGBC	U.S. Green Building Council
	USITT	United States Institute for Theatre Technology, Inc.
	WASTEC	Waste Equipment Technology Association
	WCLIB	West Coast Lumber Inspection Bureau
	WCMA	Window Covering Manufacturers Association (Now WCSC)
	WCSC	Window Covering Safety Council (Formerly: WCMA - Window Covering Manufacturers Association)
	WDMA	Window & Door Manufacturers Association (Formerly: NWWDA - National Wood Window and Door Association)
	WI	Woodwork Institute (Formerly: WIC - Woodwork Institute of California)
	WIC	Woodwork Institute of California (Now WI)
	WMMPA	Wood Moulding & Millwork Producers Association
	WSRCA	Western States Roofing Contractors Association
	WWPA	Western Wood Products Association

- 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. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.
- BOCA BOCA International, Inc. (See ICC)
- IAPMO International Association of Plumbing and Mechanical Officials
- ICBO International Conference of Building Officials (See ICC)
- ICC International Code Council
- NFPA National Fire Protection Association
- 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. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.
- CE Army Corps of Engineers

- CPSC Consumer Product Safety Commission
- DOC Department of Commerce
- DOD Department of Defense
- DOE Department of Energy
- EPA Environmental Protection Agency
- FAA Federal Aviation Administration
- FCC Federal Communications Commission
- FDA Food and Drug Administration
- GSA General Services Administration
- HUD Department of Housing and Urban Development
- LBL Lawrence Berkeley National Laboratory
- NCHRP National Cooperative Highway Research Program (See TRB)
- NIST National Institute of Standards and Technology
- OSHA Occupational Safety & Health Administration
- PBS Public Building Service (See GSA)
- PHS Office of Public Health and Science
- RUS Rural Utilities Service (See USDA)
- SD State Department
- TRB Transportation Research Board
- USDA Department of Agriculture
- USPS Postal Service
- D. State 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. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.
- MBC Michigan Building Code 2009
- MDOT Michigan Department of Transportation

DLEG Michigan Department of Labor and Economic Growth

BCCFS Michigan Bureau of Construction Codes and Fire Safety

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 014200

## SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

## 1.1 SUMMARY

- A. This Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
- B. See Division 1 Section "Execution Requirements" for progress cleaning requirements.

## 1.2 DEFINITIONS

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

### 1.3 USE CHARGES

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

## 1.4 QUALITY ASSURANCE

- A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

## 1.5 PROJECT CONDITIONS

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

## 2.1 MATERIALS

- A. Lumber and Plywood: Comply with requirements in Division 6 Section "Miscellaneous Carpentry."
- B. Gypsum Board: Minimum 1/2 inch (12.7 mm) thick by 48 inches (1219 mm) wide by maximum available lengths; regular-type panels with tapered edges. Comply with ASTM C 36/C 36M.
- C. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.

### 2.2 TEMPORARY FACILITIES

A. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.

### 2.3 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 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
  - 1. Locate facilities to limit site disturbance as specified in Division 1 Section "Summary."
- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

#### 3.2 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.
  - 1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Water Service: Use of Owner's existing water service facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.

- C. Toilets: Use of Owner's existing toilet facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.
- D. Electric Power Service: Use of Owner's existing electric power service will be permitted, as long as equipment is maintained in a condition acceptable to Owner.
- E. Telephone Service: Provide field superintendent with cellular telephone.

# 3.3 SUPPORT FACILITIES INSTALLATION

- A. General: Comply with the following:
  - 1. Maintain support facilities until near Substantial Completion. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.
- B. Traffic Controls: Comply with requirements of authorities having jurisdiction.
  - 1. Protect existing site improvements to remain including curbs, pavement, and utilities.
  - 2. Maintain access for fire-fighting equipment and access to fire hydrants.
- C. Parking: Use designated areas of Owner's existing parking areas for construction personnel.
- D. Project Identification and Temporary Signs: Provide Project identification and other signs. Install signs where indicated to inform public and individuals seeking entrance to Project. Unauthorized signs are not permitted.
  - 1. Provide temporary, directional signs for construction personnel and visitors.
  - 2. Maintain and touchup signs so they are legible at all times.
- E. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with Division 1 Section "Execution Requirements" for progress cleaning requirements.
- F. 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.

## 3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
- B. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

## PARTNERS 15-163 TEMPORARY FACILITIES AND CONTROLS 015000 - 4

- C. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
  - 1. Where heating or cooling is needed and permanent enclosure is not complete, insulate temporary enclosures.
- D. 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.
  - 1. Prohibit smoking in construction areas.
  - 2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
  - 3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

## 3.5 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal.
  - 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
  - 1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
  - 2. At Substantial Completion, clean and renovate permanent facilities used during construction period. Comply with final cleaning requirements specified in Division 1 Section "Closeout Procedures."

## END OF SECTION 015000

### SECTION 016000 - PRODUCT REQUIREMENTS

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. This 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; product substitutions; and comparable products.
- B. See Division 1 Section "Closeout Procedures" for submitting warranties for Contract closeout.
- C. See Divisions 2 through 33 Sections for specific requirements for warranties on products and installations specified to be warranted.

### 1.2 DEFINITIONS

- A. Products: Items purchased 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.
  - New Products: Items that have not previously been incorporated into another project or facility, except that products consisting of recycled-content materials are allowed, unless explicitly stated otherwise. Products salvaged or recycled from other projects are not considered new products.
  - 3. Comparable Product: Product that is demonstrated and approved through submittal process, or where indicated as a product substitution, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- B. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
- C. Basis-of-Design Product Specification: Where a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other named manufacturers.

#### 1.3 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.

PARTNERS 15-163 PRODUCT REQUIREMENTS 016000 - 2

- 1. Substitution Request Form: Use CSI Form 13.1A.
- 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
  - a. Statement indicating why specified material or product cannot be provided.
  - b. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
  - c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
  - d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
  - e. Samples, where applicable or requested.
  - f. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
  - g. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
  - h. Research/evaluation reports evidencing compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.
  - i. Detailed comparison of Contractor's Construction Schedule using proposed substitution 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 lack of availability or delays in delivery.
  - j. Cost information, including a proposal of change, if any, in the Contract Sum.
  - k. Contractor's certification that proposed substitution complies with requirements in the Contract Documents and is appropriate for applications indicated.
  - I. 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 7 (seven) days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 (fifteen) days of receipt of request, or 7 (seven) days of receipt of additional information or documentation, whichever is later.
  - a. Form of Acceptance: Change Order.
  - b. Use product specified if Architect cannot make a decision on use of a proposed substitution within time allocated.
- B. Basis-of-Design Product Specification Submittal: Comply with requirements in Division 1 Section "Submittal Procedures." Show compliance with requirements.

## 1.4 QUALITY ASSURANCE

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

## 1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. 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 ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
- C. Storage:
  - 1. Store products to allow for inspection and measurement of quantity or counting of units.
  - 2. Store materials in a manner that will not endanger Project structure.
  - 3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
  - 4. Store cementitious products and materials on elevated platforms.
  - 5. Store 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.

## 1.6 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: Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
  - 2. Special Warranty: Written warranty required by or incorporated into the Contract Documents, either to extend time limit provided by manufacturer's warranty or to provide more rights for Owner.
- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution. Submit a draft for approval before final 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 appropriate form properly executed.
  - 3. Refer to Divisions 2 through 33 Sections for specific content requirements and particular requirements for submitting special warranties.

PARTNERS 15-163 PRODUCT REQUIREMENTS 016000 - 4

C. Submittal Time: Comply with requirements in Division 1 Section "Closeout Procedures."

PART 2 - PRODUCTS

## 2.1 PRODUCT SELECTION PROCEDURES

- A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, that 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.
  - 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 not in conflict with requirements of the Contract Documents.
  - 4. Where products are accompanied by the term "as selected," Architect will make selection.
  - 5. Where products are accompanied by the term "match sample," sample to be matched is Architect's.
  - 6. Descriptive, performance, and reference standard requirements in the Specifications establish "salient characteristics" of products.
- B. Product Selection Procedures:
  - 1. Product: Where Specifications name a single product and manufacturer, provide the named product that complies with requirements.
  - 2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements.
  - 3. Products: Where Specifications include a list of names of both products and manufacturers, provide one of the products listed that complies with requirements.
  - 4. Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements.
  - 5. Basis-of-Design Product: Where Specifications name a product and include a list of manufacturers, provide the specified 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 provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product by the other named manufacturers.
  - 6. Visual Matching Specification: Where Specifications require matching an established Sample, select a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.
    - a. If no product available within specified category matches and complies with other specified requirements, comply with provisions in Part 2 "Product Substitutions" Article for proposal of product.
  - 7. Visual Selection Specification: Where Specifications include the phrase "as selected from manufacturer's colors, patterns, textures" or a similar phrase, select a product that complies with other specified requirements.
- a. Standard Range: Where Specifications include the phrase "standard range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, density, or texture from manufacturer's product line that does not include premium items.
- b. Full Range: Where Specifications include the phrase "full range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

## 2.2 PRODUCT SUBSTITUTIONS

- A. Timing: Architect will consider requests for substitution if received within (30) thirty days after the Notice of Award. Requests received after that time may be considered or rejected at discretion of Architect.
- B. 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:
  - 1. 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.
  - 2. Requested substitution does not require extensive revisions to the Contract Documents.
  - 3. Requested substitution is consistent with the Contract Documents and will produce indicated results.
  - 4. Substitution request is fully documented and properly submitted.
  - 5. Requested substitution will not adversely affect Contractor's Construction Schedule.
  - 6. Requested substitution has received necessary approvals of authorities having jurisdiction.
  - 7. Requested substitution is compatible with other portions of the Work.
  - 8. Requested substitution has been coordinated with other portions of the Work.
  - 9. Requested substitution provides specified warranty.

PART 3 - EXECUTION (Not Used)

## **SECTION 017000 - EXECUTION REQUIREMENTS**

PART 1 - GENERAL

## 1.1 SUMMARY

- A. This Section includes general procedural requirements governing execution of the Work including, but not limited to, the following:
  - 1. Construction layout.
  - 2. General installation of products.
  - 3. Progress cleaning.
  - 4. Starting and adjusting.
  - 5. Protection of installed construction.
  - 6. Correction of the Work.
- B. See Division 1 Section "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.
- PART 2 PRODUCTS (Not Used)
- PART 3 EXECUTION

#### 3.1 EXAMINATION

- A. Existing Conditions: The existence and location of site improvements, utilities, and other construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of mechanical and electrical systems and other construction affecting the Work.
  - 1. Before construction, verify the location and points of connection of utility services.
- B. Existing Utilities: 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 and other construction affecting the Work.
  - 1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; and underground electrical services.
  - 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- C. Acceptance of Conditions: 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. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

PARTNERS 15-163 EXECUTION REQUIREMENTS 017000 - 2

- 2. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
- 3. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
- 4. 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, submit a request for information to Architect. Include a detailed description of problem encountered, together with recommendations for changing the Contract Documents. Use Architect's form.

## 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. If discrepancies are discovered, notify Architect promptly.
- B. General: Engage a land surveyor to lay out the Work using 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 dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
  - 3. Inform installers of lines and levels to which they must comply.
  - 4. Check the location, level and plumb, of every major element as the Work progresses.
  - 5. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
  - 6. 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 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

- A. 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.
- 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. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- F. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- G. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the Work.
  - 1. 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.
  - 3. 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.
- H. 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.
- I. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

#### 3.5 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. 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 materials more than 7 days during normal weather or 3 days if the temperature is expected to rise above 80 deg F (27 deg C).
  - 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
- 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: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.
- 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 assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

## 3.6 STARTING AND ADJUSTING

A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

- B. Adjust operating components for proper operation without binding. Adjust equipment for proper operation.
- 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: If a factory-authorized service representative is required to inspect fieldassembled components and equipment installation, comply with qualification requirements in Division 1 Section "Quality Requirements."

## 3.7 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. Comply with manufacturer's written instructions for temperature and relative humidity.

## 3.8 CORRECTION OF THE WORK

- A. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Comply with requirements in Division 1 Section "Cutting and Patching."
  - 1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.
- B. Restore permanent facilities used during construction to their specified condition.
- C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.
- D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.
- E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

#### SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
  - 1. Inspection procedures.
  - 2. Warranties.
  - 3. Final cleaning.
- B. See Division 1 Section "Payment Procedures" for requirements for Applications for Payment for Substantial and Final Completion.
- C. See Division 1 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
- D. See Division 1 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
- E. See Division 1 Section "Demonstration and Training" for requirements for instructing Owner's personnel.
- F. See Divisions 2 through 33 Sections for specific closeout and special cleaning requirements for the Work in those Sections.

## 1.2 SUBSTANTIAL COMPLETION

- A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.
  - 1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
  - 2. Advise Owner of pending insurance changeover requirements.
  - 3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
  - 4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
  - 5. Prepare and submit Project Record Documents, operation and maintenance manuals, Final Completion construction photographs, damage or settlement surveys, property surveys, and similar final record information.
  - 6. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
  - 7. Complete startup testing of systems.
  - 8. Submit test/adjust/balance records.

PARTNERS 15-163 CLOSEOUT PROCEDURES 017700 - 2

- 9. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
- 10. Advise Owner of changeover in heat and other utilities.
- 11. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
- 12. Complete final cleaning requirements, including touchup painting.
- 13. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
- B. Inspection: Submit a written request for inspection for Substantial Completion. 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. All items on the list must be completed within sixty (60) calendar days of issuance. Within ten (10) days of receipt of Architect's list of items, Contractor will submit a schedule to complete these items.
  - 1. Reinspection: 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.

## 1.3 FINAL COMPLETION

- A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:
  - 1. Submit a final Application for Payment according to Division 1 Section "Payment Procedures."
  - Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
  - 3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
  - 4. Submit pest-control final inspection report and warranty.
  - 5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training videotapes.
- B. Inspection: Submit a written request for final inspection for acceptance. 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. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
  - 2. All costs incurred by the Architect or the Architect's Consultants to close out the project (after 60 calendar days have passed from issuance of punch list items), will be charged to the Owner at the current hourly rates and thus deducted from the final contract amount, via Change Order.

## 1.4 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Preparation: Submit three copies 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.

## 1.5 WARRANTIES

- A. Submittal Time: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.
- B. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.
  - 1. Bind warranties and bonds in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch (215-by-280-mm) paper.
  - 2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
  - 3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
- C. 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.

## PART 3 - EXECUTION

## 3.1 FINAL CLEANING

- A. General: Provide 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 portion of Project:

PARTNERS 15-163 CLOSEOUT PROCEDURES 017700 - 4

- 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 neither planted nor 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. Sweep concrete floors broom clean in unoccupied spaces.
- i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
- j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
- k. Remove labels that are not permanent.
- I. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
  - 1) Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.
- m. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
- n. Replace parts subject to unusual operating conditions.
- o. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
- p. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
- q. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
- r. Leave Project clean and ready for occupancy.
- C. Pest Control: Engage an experienced, licensed exterminator to make a final inspection and rid Project of rodents, insects, and other pests. Prepare a report.
- D. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

E. If the Owner or Architect determines that the cleaning is not sufficient, the Owner or Architect will request that the cleaning be redone; or at the Owner's option, the Owner will hire a professional cleaning company to perform the said work, and thus deduct the cost from the final Pay Application.

#### SECTION 017810 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for Project Record Documents, including the following:
  - 1. Record Drawings.
  - 2. Record Specifications.
  - 3. Record Product Data.
- B. See Division 1 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
- C. See Divisions 2 through 33 Sections for specific requirements for Project Record Documents of the Work in those Sections.

## 1.2 SUBMITTALS

- A. Record Drawings: Comply with the following:
  - 1. Number of Copies: Submit copies of Record Drawings as follows:
    - a. Initial Submittal: Submit two (2) set(s) of corrected Record Transparencies and one set(s) of marked-up Record Prints. Architect will initial and date each transparency and mark whether general scope of changes, additional information recorded, and quality of drafting are acceptable. Architect will return transparencies and prints for organizing into sets, printing, binding, and final submittal.
    - b. Final Submittal: Submit three (3) sets of marked-up Record Prints, and the following:
      - 1) Record Transparencies: One set.
      - 2) Record CAD Drawing Files and Plots: One set.
      - 3) Copies printed from Record CAD Drawing Plots: Three. Print each Drawing, whether or not changes and additional information were recorded.
- B. Record Specifications: Submit two (2) copies of Project's Specifications, including addenda and contract modifications.
- C. Record Product Data: Submit one (1) copy of each Product Data submittal.

#### 2.1 RECORD DRAWINGS

- A. Record Prints: Maintain one set of blue- or black-line white prints of the Contract Drawings and Shop Drawings.
  - 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 prepare the marked-up Record Prints.
    - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
    - b. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.
  - 2. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, show cross-reference on the Contract Drawings.
  - 3. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
  - 4. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
  - 1. Record Prints: Organize Record Prints and newly prepared Record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.

## 2.2 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. Note related Change Orders, Record Product Data, and Record Drawings where applicable.

## 2.3 RECORD PRODUCT DATA

A. 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.

# 2.4 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.

# PART 3 - EXECUTION

## 3.1 RECORDING AND MAINTENANCE

- A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and modifications to Project Record Documents as they occur; do not wait until the end of Project.
- B. Maintenance of Record Documents and Samples: Store Record Documents and Samples 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.

## SECTION 017820 - OPERATION AND MAINTENANCE DATA

# PART 1 - GENERAL

## 1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
  - 1. Operation manuals for systems, subsystems, and equipment.
  - 2. Maintenance manuals for the care and maintenance of products, materials, and finishes, systems and equipment.
- B. See Divisions 2 through 33 Sections for specific operation and maintenance manual requirements for the Work in those Sections.

#### 1.2 SUBMITTALS

- A. Manual: Submit two copies of each manual in final form at least 15 days before final inspection. Architect will return copy with comments within 15 days after final inspection.
  - 1. Correct or modify each manual to comply with Architect's comments. Submit 3 copies of each corrected manual within 15 days of receipt of Architect's comments.

## PART 2 - PRODUCTS

## 2.1 MANUALS, GENERAL

- A. Organization: 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 a title page, table of contents, and manual contents.
- B. Title Page: Enclose title page in transparent plastic sleeve. 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, address, and telephone number of Contractor.
  - 6. Name and address of Architect.
  - 7. 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.

# PARTNERS 15-163 OPERATION AND MAINTENANCE DATA 017820 - 2

- 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. Binders: Heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch (215-by-280-mm) paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
    - a. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.
  - 2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section. 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.
  - 3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software diskettes for computerized electronic equipment.
  - 4. 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.

# 2.2 OPERATION MANUALS

- A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and equipment descriptions, operating standards, operating procedures, operating logs, wiring and control diagrams, and license requirements.
- B. Descriptions: Include the following:
  - 1. Product name and model number.
  - 2. Manufacturer's name.
  - 3. Equipment identification with serial number of each component.
  - 4. Equipment function.
  - 5. Operating characteristics.
  - 6. Limiting conditions.
  - 7. Performance curves.
  - 8. Engineering data and tests.
  - 9. Complete nomenclature and number of replacement parts.

## 2.3 PRODUCT MAINTENANCE MANUAL

- A. 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.
- B. 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.
- C. Product Information: Include the following, as applicable:
  - 1. Product name and model number.
  - 2. Manufacturer's name.
  - 3. Color, pattern, and texture.
  - 4. Material and chemical composition.
  - 5. Reordering information for specially manufactured products.
- D. Maintenance Procedures: Include manufacturer's written recommendations and inspection procedures, types of cleaning agents, methods of cleaning, schedule for cleaning and maintenance, and repair instructions.
- E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

#### 2.4 SYSTEMS AND EQUIPMENT MAINTENANCE MANUAL

- A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.
- B. Source Information: List each system, subsystem, and piece of equipment 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.
- C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including maintenance instructions, drawings and diagrams for maintenance, nomenclature of parts and components, and recommended spare parts for each component part or piece of equipment:
- D. Maintenance Procedures: Include test and inspection instructions, troubleshooting guide, disassembly instructions, and adjusting instructions, and demonstration and training videotape if available, that detail essential maintenance procedures:

# PARTNERS 15-163 OPERATION AND MAINTENANCE DATA 017820 - 4

- E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
- F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
- G. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

PART 3 - EXECUTION

- 3.1 MANUAL PREPARATION
  - 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. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
  - C. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
  - D. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in Record Drawings to ensure correct illustration of completed installation.
    - 1. Do not use original Project Record Documents as part of operation and maintenance manuals.
  - E. Comply with Division 1 Section "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

## **OSECTION 017900 - DEMONSTRATION AND TRAINING**

## PART 1 - GENERAL

## 1.1 SUMMARY

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

## 1.2 INFORMATIONAL SUBMITTALS

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

## 1.3 CLOSEOUT SUBMITTALS

- A. Demonstration and Training Video Recordings: Submit two copies within seven days of end of each training module.
  - 1. At completion of training, submit complete training manual(s) for Owner's use prepared and bound in format matching operation and maintenance manuals and in PDF electronic file format on compact disc.

## 1.4 QUALITY ASSURANCE

- A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.
- B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 014000 "Quality Requirements," experienced in operation and maintenance procedures and training.
- C. Preinstruction Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to demonstration and training.

# PARTNERS 15-163 DEMONSTRATION AND TRAINING 017900 - 2

## 1.5 COORDINATION

- A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.
- B. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

# PART 2 - PRODUCTS

## 2.1 INSTRUCTION PROGRAM

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

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

#### 3.1 PREPARATION

A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 017823 "Operation and Maintenance Data."

## 3.2 INSTRUCTION

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

## 3.3 DEMONSTRATION AND TRAINING VIDEO RECORDINGS

- A. General: Engage a qualified commercial videographer to record demonstration and training video recordings. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.
  - 1. At beginning of each training module, record each chart containing learning objective and lesson outline.
- B. Video Recording Format: Provide high-quality color video recordings with menu navigation in format acceptable to Architect.
- C. Narration: Describe scenes on video recording by dubbing audio narration off-site after video recording is recorded. Include description of items being viewed.
- D. Preproduced Video Recordings: Provide video recordings used as a component of training modules in same format as recordings of live training.

#### SECTION 024119 - SELECTIVE DEMOLITION

## PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Demolition and removal of selected portions of building or structure.
  - 2. Demolition and removal of selected pool filter system equipment.
  - 3. Demolition and removal of select mechanical system.

#### 1.2 DEFINITIONS

- A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.
- B. Remove and Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner.
- C. Remove and Reinstall: Detach items from existing construction, prepare for reuse, and reinstall where indicated.
- D. Existing to Remain: Existing items of construction that are not to be permanently removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

#### 1.3 PREINSTALLATION MEETINGS

A. Predemolition Conference: Conduct conference at Project site.

#### 1.4 INFORMATIONAL SUBMITTALS

A. Predemolition Photographs: Submit before Work begins.

#### 1.5 FIELD CONDITIONS

- A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
- B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

PARTNERS 15-163 SELECTIVE DEMOLITION 024119-2

- D. Hazardous Materials: Hazardous materials are present in buildings and structures to be selectively demolished. A report on the presence of hazardous materials is on file for review and use. Examine report to become aware of locations where hazardous materials are present.
  - 1. Hazardous material remediation is specified elsewhere in the Contract Documents.
  - 2. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.
- E. Storage or sale of removed items or materials on-site is not permitted.
- F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
  - 1. Maintain fire-protection facilities in service during selective demolition operations.

## 1.6 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties.

# PART 2 - PRODUCTS

## 2.1 PEFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective 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. Verify that utilities have been disconnected and capped before starting selective demolition operations.
- B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- C. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.
- D. Perform, Engage a professional engineer to perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective building demolition operations.

E. Survey of Existing Conditions: Record existing conditions by use of measured drawings and preconstruction photographs.

#### 3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.
  - 1. Comply with requirements for existing services/systems interruptions specified in Section 011000 "Summary."
- B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.
  - 1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
  - 2. Arrange to shut off indicated utilities with utility companies.
  - 3. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
  - 4. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated to be removed.
    - a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
    - b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
    - c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
    - d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
    - e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
    - f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
    - g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material.
- C. Refrigerant: Remove refrigerant from mechanical equipment to be selectively demolished according to 40 CFR 82 and regulations of authorities having jurisdiction.

#### 3.3 PREPARATION

- A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
  - 1. Comply with requirements for access and protection specified in Section 015000 "Temporary Facilities and Controls."

- B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
- C. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

## 3.4 SELECTIVE DEMOLITION, GENERAL

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
  - 1. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
  - 2. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
  - 3. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.
  - 4. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
  - 5. Dispose of demolished items and materials promptly.
- B. Removed and Salvaged Items:
  - 1. Clean salvaged items.
  - 2. Pack or crate items after cleaning. Identify contents of containers.
  - 3. Store items in a secure area until delivery to Owner.
  - 4. Transport items to Owner's storage area designated by Owner.
  - 5. Protect items from damage during transport and storage.
- C. Removed and Reinstalled Items:
  - 1. Clean and repair items to functional condition adequate for intended reuse.
  - 2. Pack or crate items after cleaning and repairing. Identify contents of containers.
  - 3. Protect items from damage during transport and storage.
  - 4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
- D. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

# 3.5 DISPOSAL OF DEMOLISHED MATERIALS

- A. General: Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.
  - 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.
  - 3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
  - 4. Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."
- B. Burning: Do not burn demolished materials.
- C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

# 3.6 CLEANING

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

## 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 1 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

A. This Section specifies cast-in place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:
1. Slabs-on-grade.

## 1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

#### 1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
  - 1. Indicate amounts of mixing water to be withheld for later addition at Project site.
- C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.
- D. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:
  - 1. Aggregates. Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.
- E. Material Certificates: For each of the following, signed by manufacturers:
  - 1. Cementitious materials.
  - 2. Admixtures.

PARTNERS 15-163 CAST IN PLACE CONCRETE 033000 -2

- 3. Curing compounds.
- 4. Floor and slab treatments.
- 5. Bonding agents.
- 6. Adhesives.
- 7. Vapor retarders.
- 8. Repair materials.
- F. Floor surface flatness and levelness measurements to determine compliance with specified tolerances.
- G. Field quality-control test and inspection reports.
- H. Minutes of preinstallation conference.
- 1.5 QUALITY ASSURANCE
  - A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.
  - B. 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.
    - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
  - C. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from one source, and obtain admixtures through one source from a single manufacturer.
  - D. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
    - 1. ACI 301, "Specification for Structural Concrete,"
    - 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.
  - F. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."
    - 1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
      - a. Contractor's superintendent.
      - b. Ready-mix concrete manufacturer.
      - c. Concrete subcontractor.
      - d. Architect and Engineer.
      - e. Owner's Testing Agency.

2. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints forms and form removal limitations, vapor-retarder installation, anchor rod and anchorage device installation tolerances, floor and slab flatness and levelness measurement, concrete repair procedures, and concrete protection.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

#### 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.

#### 2.2 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.
- B. Steel Bar Mats: ASTM A 184/A 184M, fabricated from ASTM A 615/A 615M, Grade 60 (Grade 420), deformed bars, assembled with clips.
- C. Plain-Steel Wire: ASTM A 82, as drawn.
- D. Deformed-Steel Wire: ASTM A 496.
- E. Plain-Steel Welded Wire Reinforcement: ASTM A 185, plain, fabricated from as-drawn steel wire into flat sheets.
- F. Deformed-Steel Welded Wire Reinforcement: ASTM A 497, flat sheet.

#### 2.3 REINFORCEMENT ACCESSORIES

- A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
  - 1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.

## 2.4 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project unless noted otherwise:
  - 1. Portland Cement: ASTM C 150, Type I gray or supplement with the following:
    - a. Fly Ash: ASTM C 618, Class C or F (in footing mix only, mix 25% of cement content.).
    - b. Ground Granulated Blast-Furnace Slag: (in footing mix only, max 25% of Cement content).ASTM C 989, Grade 100 or 120.
- B. Normal-Weight Aggregates: ASTM C 33, Class 3M coarse aggregate or better, graded. Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.
  - 1. Maximum Coarse-Aggregate Size: 1 inch (25 mm) nominal.
  - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. Water: ASTM C 94/C 94M and potable.

# 2.5 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.

## 2.6 VAPOR RETARDERS

- A. Plastic Vapor Retarder: ASTM E 1745, Class A, not less than 15 mils thick. Include manufacturer's recommended adhesive or pressure-sensitive tape.
  - 1. Products:
    - a. Fortifiber Corporation; Moistop Ultra 15.
    - b. Raven Industries Inc.; Vapor Block 15.
    - c. Reef Industries, Inc.; Griffolyn type 185.
    - d. Stego Industries, LLC; Stego Wrap, 15 mils.
- B. Granular Fill: Clean mixture of crushed stone, crushed gravel, and manufactured or natural sand; ASTM D 448, Size 10, with 100 percent passing a 3/8-inch (9.5-mm) sieve, 10 to 30 percent passing a
No. 100 (0.15-mm) sieve, and at least 5 percent passing No. 200 (0.075-mm) sieve; complying with deleterious substance limits of ASTM C 33 for fine aggregates.

## 2.7 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
  - 1. Products:
    - a. Axim Concrete Technologies; Cimfilm.
    - b. Conspec Marketing & Manufacturing Co., Inc., a Dayton Superior Company; Aquafilm.
    - c. Dayton Superior Corporation; Sure Film.
    - d. Euclid Chemical Company (The); Eucobar.
    - e. L&M Construction Chemicals, Inc.; E-Con.
    - f. Meadows, W. R., Inc.; Sealtight Evapre.
    - g. Sika Corporation, Inc.; SikaFilm.
    - h. Symons Corporation, a Dayton Superior Company; Finishing Aid.
- B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) when dry.
- C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- D. Water: Potable.
- E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, 18 to 25 percent solids, nondissipating, certified by curing compound manufacturer to not interfere with bonding of floor covering.
  - 1. Products:
    - a. Conspec Marketing & Manufacturing Co., Inc., a Dayton Superior Company; High Seal.
    - b. Dayton Superior Corporation; Safe Cure and Seal (J-19).
    - c. Euclid Chemical Company (The); Diamond Clear VOX.
    - d. L&M Construction Chemicals, Inc.; Dress & Seal WB.
    - e. MBT Protection and Repair, Div. of ChemRex; MasterKure-N-Seal VOC.
    - f. Meadows, W. R., Inc.; Vocomp-20.
    - g. Sonneborn, Div. of ChemRex; Kure-N-Seal.
    - h. Symons Corporation, a Dayton Superior Company; Cure & Seal 18 Percent E.

### 2.8 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.
- B. 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 suit requirements, and as follows:

1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

### 2.9 REPAIR MATERIALS

- A. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch (3.2 mm) and that can be feathered at edges to match adjacent floor elevations.
  - 1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
  - 2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
  - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3.2 to 6 mm) or coarse sand as recommended by topping manufacturer.
  - 4. Compressive Strength: Not less than 5000 psi (34.5 MPa) at 28 days when tested according to ASTM C 109/C 109M.

## 2.10 CONCRETE MIXTURES, GENERAL

- 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, according to ACI 301.
  - 1. Use a qualified independent 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: 25 percent.
- C. Limit water-soluble, chloride-ion content in hardened concrete to 0.06 percent by weight of cement.
- D. Admixtures: Use admixtures according to manufacturer's written instructions.
  - 1. Use water-reducing or high-range water-reducing 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 and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.

### 2.11 CONCRETE MIXTURES FOR BUILDING ELEMENTS

- A. Slabs-on-Grade: Proportion normal-weight concrete mixture as follows:
  - 1. Minimum Compressive Strength: 4000 psi (24.1 MPa) at 28 days.
  - 2. Maximum Water-Cementitious Materials Ratio: 0.50.
  - 3. Slump Limit: 4 inches (100 mm), plus or minus 1 inch (25 mm).

- 4. Air Content: Do not allow air content of troweled finished floors to exceed 3 percent.
- 2.12 FABRICATING REINFORCEMENT
  - A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

### 2.13 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.
  - When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

## PART 3 - EXECUTION

### 3.1 VAPOR RETARDERS

- A. Plastic Vapor Retarders: Place, protect, and repair vapor retarders according to ASTM E 1643 and manufacturer's written instructions.
  - 1. Lap joints 6 inches (150 mm) and seal with manufacturer's recommended tape.

## 3.2 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. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.
- F. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

- G. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
  - 1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
  - 2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches (38 mm) into concrete.
  - 3. 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.
  - 4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
  - 5. Space vertical joints in walls as indicated. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
  - 6. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
  - 7. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- H. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
  - 1. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3.2-mm-) wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
- I. Isolation Joints in Slabs-on-Grade: 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. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface, unless otherwise indicated.
  - 2. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

# 3.3 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
- B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.
- C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.
  - 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 will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
  - 1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
  - 2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
  - 3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches (150 mm) into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. 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. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
  - 2. Maintain reinforcement in position on chairs during concrete placement.
  - 3. Screed slab surfaces with a straightedge and strike off to correct elevations.
  - 4. Slope surfaces uniformly to drains where required.
  - 5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

### 3.4 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. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.
- C. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or powerdriven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
  - 1. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
  - Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-foot- (3.05-m-) long straightedge resting on 2 high spots and placed anywhere on the surface does not exceed 3/16 inch (4.8 mm).

### 3.5 MISCELLANEOUS CONCRETE ITEMS

- A. Filling In: Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.
- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
- C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates from manufacturer furnishing machines and equipment.

#### 3.6 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss 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.
- C. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
  - 1. Moisture 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 (300-mm) 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 (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
    - a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
    - b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
    - c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project.

- 3. 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.
  - a. After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound will not interfere with bonding of floor covering used on Project.

## 3.7 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 (1.18-mm) 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 (13 mm) in any dimension in solid concrete, but not less than 1 inch (25 mm) in depth. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. 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 will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
  - 3. Repair defects on concealed formed surfaces that 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. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
  - Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch (0.25 mm) wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
  - 2. After concrete has cured at least 14 days, correct high areas by grinding.
  - Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
  - 4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.

- 5. Repair defective areas, except random cracks and single holes 1 inch (25 mm) or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch (19-mm) clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
- E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive, patching mortar and concrete.
- F. Repair materials and installation not specified above may be used, subject to Architect's approval.

## 3.8 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Testing and Inspecting: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
- C. Inspections:
  - 1. Steel reinforcement placement.
  - 2. Headed bolts and studs.
  - 3. Verification of use of required design mixture.
  - 4. Concrete placement, including conveying and depositing.
  - 5. Curing procedures and maintenance of curing temperature.
- D. Concrete Tests: 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 one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd. (4 cu. m), but less than 25 cu. yd. (19 cu. m), plus one set for each additional 50 cu. yd. (38 cu. m) or fraction thereof.
    - 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.
  - 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 mixture. Perform additional tests when concrete consistency appears to change.
  - 3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; 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 C 1064/C 1064M; one test hourly when air temperature is 40 deg F (4.4 deg C) and below and when 80 deg F (27 deg C) and above, and one test for each composite sample.

- 5. Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
- 6. Compression Test Specimens: ASTM C 31/C 31M.
  - a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
  - b. Cast and field cure one set of two standard cylinder specimens for each composite sample.
- 7. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.
  - a. Test one set of two field-cured specimens at 7 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.
- 8. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
- 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 (3.4 MPa).
- 10. 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.
- 11. 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.
- 12. 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. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.
- 13. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- 14. Correct deficiencies in the Work that test reports and inspections indicate dos not comply with the Contract Documents.

# END OF SECTION 033000

#### SECTION 042000 - UNIT MASONRY

PART 1 - GENERAL

- 1.1 SUMMARY
- A. Section Includes:
  - 1. Concrete masonry units (CMU's or Masonry Block).
- B. Related Sections:
  - 1. Division 05 Section "Metal Fabrications" for furnishing steel lintels and shelf angles for unit masonry.
  - 2. Division 07 Section "Sheet Metal Flashing and Trim" for furnishing manufactured reglets installed in masonry joints.

#### 1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For reinforcing steel. Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement." Show elevations of reinforced walls.
- C. Material Certificates: For each type and size of product indicated. For masonry units include material test reports substantiating compliance with requirements.
- D. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
  - Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91 for air content.
  - 2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.

### 1.3 QUALITY ASSURANCE

A. Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 602 unless modified by requirements in the Contract Documents.

## 1.4 PROJECT CONDITIONS

A. 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 ACI 530.1/ASCE 6/TMS 602.

B. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

#### PART 2 - PRODUCTS

- 2.1 MASONRY UNITS, GENERAL
- A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects will be exposed in the completed Work.
- B. Fire-Resistance Ratings: Where indicated, provide units that comply with requirements for fire-resistance ratings indicated as determined by testing according to ASTM E 119, by equivalent masonry thickness, or by other means, as acceptable to authorities having jurisdiction.
  - 2.2 CONCRETE MASONRY UNITS (MASONRY BLOCK)
- A. Shapes: Provide shapes indicated and for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
- B. Concrete Masonry Units: ASTM C 90.
  - 1. Available products:
    - a. Grand Blanc Cement Products; 800-875-7500.
    - b. National Block Company ; 734-721-4056
    - c. Best Block Company;
  - 2. Size: Nominal face dimension of 8" x 16" and nominal depth as indicated on drawing.
  - 3. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 1900 psi (13.1 MPa).
  - 4. Weight Classification: Normal weight.
  - 5. Both hollow and solid block as indicated.
  - 6. Exposed corners (including door jambs) to be radius profile typical unless otherwise noted.
- C. Fire Rating: Provide CMU with fire rating up to 2 hours as required to achieve fire ratings of wall assemblies.

### 2.3 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Refer to 'Material Finish / Color Schedule Section 000200' for color selections.
- B. Hydrated Lime: ASTM C 207, Type S.

- C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.
- D. Masonry Cement: ASTM C 91.
- E. Aggregate for Mortar: ASTM C 144.
  - 1. For joints less than 1/4 inch (6 mm) thick, use aggregate graded with 100 percent passing the No. 16 (1.18-mm) sieve.
  - 2. White-Mortar Aggregates: Natural white sand or crushed white stone.
  - 3. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.
- F. Aggregate for Grout: ASTM C 404.
- G. Epoxy Pointing Mortar: ASTM C 395, epoxy-resin-based material formulated for use as pointing mortar for structural-clay tile facing units (and approved for such use by manufacturer of units); in color indicated or, if not otherwise indicated, as selected by Architect from manufacturer's colors.
- H. Water: Potable.

### 2.4 REINFORCEMENT

- A. Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60 (Grade 420).
- B. Masonry Joint Reinforcement, General: ASTM A 951/A 951M.
  - 1. Interior Walls: Hot-dip galvanized, carbon steel.
  - 2. Exterior Walls: Hot-dip galvanized steel.
  - 3. Wire Size for Side Rods: W1.7 or 0.148-inch diameter.
  - 4. Wire Size for Cross Rods: W1.7 or 0.148-inch diameter.
  - 5. Wire Size for Veneer Ties: W1.7 or 0.148-inch diameter.
  - 6. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches (407 mm) o.c.
  - 7. Provide in lengths of not less than 10 feet (3 m), with prefabricated corner and tee units.
- C. Masonry Joint Reinforcement for Single-Wythe Masonry: Either ladder or truss type with single pair of side rods.

### 2.5 TIES AND ANCHORS

- A. 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 A 82/A 82M; with ASTM A 153/A 153M, Class B-2 coating.
  - 2. Steel Sheet, Galvanized after Fabrication: ASTM A 1008/A 1008M, Commercial Steel, with ASTM A 153/A 153M, Class B coating.
  - 3. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

- B. Wire Ties, General: Unless otherwise indicated, size wire ties to extend at least halfway through veneer but with at least 5/8-inch (16-mm) cover on outside face. Outer ends of wires are bent 90 degrees and extend 2 inches (50 mm) parallel to face of veneer.
- C. Individual Wire Ties: Rectangular units with closed ends and not less than 4 inches (100 mm) wide.
  - 1. Wire: Fabricate from 3/16-inch diameter, hot-dip galvanized steel wire.
- D. 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- (6.35-mm-) diameter, hot-dip galvanized steel wire.
  - 2. Tie Section: Triangular-shaped wire tie, sized to extend within 1 inch (25 mm) of masonry face, made from 0.187-inch diameter, hot-dip galvanized steel wire.
- E. Anchor Bolts: L-shaped steel bolts complying with ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers; hot-dip galvanized to comply with ASTM A 153/A 153M, Class C; of dimensions indicated.

## 2.6 EMBEDDED FLASHING MATERIALS

- A. Metal Flashing: Provide metal flashing complying with Division 07 Section "Sheet Metal Flashing and Trim" and as follows:
  - 1. Metal Drip Edge: Fabricate from stainless steel. Extend at least 3 inches (76 mm) into wall and 1/2 inch (13 mm) out from wall, with outer edge bent down 30 degrees and hemmed.
  - 2. Metal Sealant Stop: Fabricate from stainless steel. Extend at least 3 inches (76 mm) into wall and out to exterior face of wall. At exterior face of wall, bend metal back on itself for 3/4 inch (19 mm) and down into joint 1/4 inch (6 mm) to form a stop for retaining sealant backer rod.
  - 3. Metal Expansion-Joint Strips: Fabricate from stainless steel copper to shapes indicated.
- B. Flexible Flashing: Use the following unless otherwise indicated:
  - 1. Copper-Laminated Flashing: 5-oz./sq. ft. (1.5-kg/sq. m) copper sheet bonded between 2 layers of glass-fiber cloth. Use only where flashing is fully concealed in masonry.
    - a. Products: Subject to compliance with requirements, [provide the following] [provide one of the following] [available products that may be incorporated into the Work include, but are not limited to, the following]:
      - 1) Advanced Building Products Inc.; Copper Fabric Flashing.
      - 2) Dayton Superior Corporation, Dur-O-Wal Division; Copper Fabric Thru-Wall Flashing.
      - 3) Hohmann & Barnard, Inc.; H & B C-Fab Flashing.
      - 4) Phoenix Building Products; Type FCC-Fabric Covered Copper.
      - 5) Sandell Manufacturing Co., Inc.; Copper Fabric Flashing.
      - 6) York Manufacturing, Inc.; Multi-Flash 500.

- C. Solder and Sealants for Sheet Metal Flashings: As specified in Division 07 Section "Sheet Metal Flashing and Trim."
- D. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

## 2.7 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; formulated from neoprene.
- B. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).

### 2.8 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. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Diedrich Technologies, Inc.
    - b. EaCo Chem, Inc.
    - c. ProSoCo, Inc.
    - d. Or equal.

### 2.9 MORTAR AND GROUT MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, waterrepellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.
  - 1. Do not use calcium chloride in mortar or grout.
  - 2. Use portland cement-lime mortar unless otherwise indicated.
  - 3. For exterior masonry, use portland cement-lime mortar.
  - 4. For reinforced masonry, use portland cement-lime mortar.
  - 5. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.
- 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 C 270, Proportion Specification. Provide the following types of mortar for applications stated unless another type is indicated.
  - 1. For masonry below grade or in contact with earth, use Type S.

- 2. For reinforced masonry, interior and exterior bearing walls, use Type S.
- 3. For mortar parge coats, use Type S.
- 4. For interior non-load-bearing partitions; and for other applications where another type is not indicated, use Type N.
- 5. For interior non-load-bearing partitions, Type O may be used instead of Type N.
- D. Pigmented Mortar: Use colored cement product or select and proportion pigments with other ingredients to produce color required. Do not add pigments to colored cement products.
  - 1. Pigments shall not exceed pigment-to-cement ratio as recommended by manufacturer to maintain specified properties.
- E. Grout for Unit Masonry: Comply with ASTM C 476.
  - 1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with Table 1.15.1 in ACI 530.1/ASCE 6/TMS 602 for dimensions of grout spaces and pour height.
  - 2. Provide grout with a slump of 8 to 11 inches (203 to 279 mm) as measured according to ASTM C 143/C 143M.

## PART 3 - EXECUTION

- 3.1 INSTALLATION, GENERAL
- A. 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.
- B. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.

### 3.2 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 (12 mm) or minus 1/4 inch (6 mm).
  - 2. For location of elements in plan do not vary from that indicated by more than plus or minus 1/2 inch (12 mm).
  - 3. For location of elements in elevation do not vary from that indicated by more than plus or minus 1/4 inch (6 mm) in a story height or 1/2 inch (12 mm) 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 (6 mm in 3 m), or 1/2 inch (12 mm) 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 (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2 inch (12 mm) maximum.
- 3. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2 inch (12 mm) 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 (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2 inch (12 mm) maximum.
- 5. For lines and surfaces do not vary from straight by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2 inch (12 mm) maximum.
- C. Joints:
  - 1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm), with a maximum thickness limited to 1/2 inch (12 mm).
  - 2. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch (9 mm) or minus 1/4 inch (6 mm).
  - 3. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm).

# 3.3 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 (100-mm) horizontal face dimensions at corners or jambs.
- C. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
- D. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.
- E. Fill cores in hollow CMUs with grout 24 inches (600 mm) under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

# 3.4 MORTAR BEDDING AND JOINTING

- A. Lay hollow brick and CMUs as follows:
  - 1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
  - 2. With webs fully bedded in mortar in all courses of piers, columns, and pilasters.
  - 3. With webs fully bedded in mortar in grouted masonry, including starting course on footings.
  - 4. With entire units, including areas under cells, fully bedded in mortar at starting course on footings where cells are not grouted.
- B. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

- C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.
- D. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

## 3.5 MASONRY JOINT REINFORCEMENT

- A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch (16 mm) on exterior side of walls, 1/2 inch (13 mm) elsewhere. Lap reinforcement a minimum of 6 inches (150 mm).
  - 1. Space reinforcement not more than 16 inches (406 mm) o.c.
  - 2. Space reinforcement not more than 8 inches (203 mm) o.c. in foundation walls and parapet walls.
  - 3. Provide reinforcement not more than 8 inches (203 mm) above and below wall openings and extending 12 inches (305 mm) beyond openings in addition to continuous reinforcement.
- 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.

## 3.6 ANCHORING MASONRY TO STRUCTURAL MEMBERS

- A. Anchor masonry to structural memebrs where masonry abuts or faces structural steel or concrete to comply with the following:
  - 1. Provide an open space not less than 1 inch (25 mm) wide between masonry and structural steel or concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.
  - 2. Anchor masonry with anchors embedded in masonry joints and attached to structure.
  - 3. Space anchors as indicated, but not more than 24 inches (610 mm) o.c. vertically and 36 inches (915 mm) o.c. horizontally.
- B. Install vents in head joints in exterior wythes at spacing indicated. Use specified weep/vent products to form vents.
  - 1. Close cavities off vertically and horizontally with blocking in manner indicated. Install through-wall flashing and weep holes above horizontal blocking.

### 3.7 REINFORCED UNIT MASONRY INSTALLATION

- A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
  - 1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.

- 2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other loads that may be placed on them during construction.
- B. Placing Reinforcement: Comply with requirements in ACI 530.1/ASCE 6/TMS 602.
- C. 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 ACI 530.1/ASCE 6/TMS 602 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 (1520 mm).

## 3.8 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: Level 1 special inspections according to the "International Building Code."
  - 1. 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. Testing Frequency: One set of tests for each 5000 sq. ft. (464 sq. m) of wall area or portion thereof.
- E. Clay Masonry Unit Test: For each type of unit provided, according to ASTM C 67 for compressive strength.
- F. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C 140 for compressive strength.
- G. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.
- H. Grout Test (Compressive Strength): For each mix provided, according to ASTM C 1019.

### 3.9 REPAIRING, POINTING, AND CLEANING

- A. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- B. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
  - 1. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes.

- 2. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
- 3. Clean brick by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.
- 4. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.
- 5. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.
- 3.10 MASONRY WASTE DISPOSAL
- A. Excess Masonry Waste: Remove excess masonry waste and legally dispose of off Owner's property.

END OF SECTION 042000

#### **SECTION 055000 - METAL FABRICATIONS**

PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section Includes:
  - 1. Miscellaneous steel framing and supports.
- B. Products furnished, but not installed, under this Section:
  - 1. Loose steel lintels.
  - 2. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.

#### 1.2 PERFORMANCE REQUIREMENTS

- A. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
  - 1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

#### 1.3 SUBMITTALS

- A. Product Data: For the following:
  - 1. Paint products.
  - 2. Grout.
- B. Shop Drawings: Show fabrication and installation details for metal fabrications.
  - 1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.

#### PART 2 - PRODUCTS

- 2.1 METALS, GENERAL
  - A. Metal Surfaces, General: Provide materials with smooth, flat surfaces without blemishes.
- 2.2 FERROUS METALS
  - A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

- B. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.
- C. Steel Tubing: ASTM A 500, cold-formed steel tubing.
- D. Steel Pipe: ASTM A 53/A 53M, standard weight (Schedule 40) unless otherwise indicated.
- E. Slotted Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-4.
  - 1. Size of Channels: As indicated.
  - 2. Material: Cold-rolled steel, ASTM A 1008/A 1008M, structural steel, Grade 33 (Grade 230); 0.0528-inch; (1.35-mm) minimum thickness; coated with rust-inhibitive, baked-on, acrylic enamel.

### 2.3 FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zincplated fasteners with coating complying with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5, at exterior walls.
- B. Cast-in-Place Anchors in Concrete: Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F 2329.
- C. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors.
  - 1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5, unless otherwise indicated.
  - 2. Material for Exterior Locations and Where Stainless Steel is Indicated: Alloy Group 1 (A1) stainless-steel bolts, ASTM F 593 (ASTM F 738M), and nuts, ASTM F 594 (ASTM F 836M).
- D. Slotted-Channel Inserts: Cold-formed, hot-dip galvanized-steel box channels (struts) complying with MFMA-4, 1-5/8 by 7/8 inches (41 by 22 mm) by length indicated with anchor straps or studs not less than 3 inches (75 mm) long at not more than 8 inches (200 mm) o.c. Provide with temporary filler and tee-head bolts, complete with washers and nuts, all zinc-plated to comply with ASTM B 633, Class Fe/Zn 5, as needed for fastening to inserts.

### 2.4 MISCELLANEOUS MATERIALS

- A. Shop Primers: Provide primers that comply with Division 09 painting Sections.
- B. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
- C. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.
- 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. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

- F. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- G. Concrete: Comply with requirements in Division 03 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, concrete with a minimum 28-day compressive strength of 3000 psi (20 MPa).

### 2.5 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Use connections that maintain structural value of joined pieces.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges. Remove sharp or rough areas on exposed surfaces.
- C. Weld corners and seams continuously to comply with the following:
  - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  - 2. Obtain fusion without undercut or overlap.
  - 3. Remove welding flux immediately.
  - 4. At exposed connections, finish exposed welds and surfaces smooth and blended.
- D. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Locate joints where least conspicuous.
- E. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- F. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors not less than 24 inches (600 mm) o.c.

#### 2.6 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.
- B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.

#### 2.7 MISCELLANEOUS STEEL TRIM

- A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.
- B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.

- C. Galvanize all miscellaneous steel trim used within or on exterior walls.
- D. Prime miscellaneous steel trim with zinc-rich primer used on the interior of the building.

## 2.8 LOOSE BEARING AND LEVELING PLATES

A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.

### 2.9 LOOSE STEEL LINTELS

- A. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated.
- B. Galvanize all loose steel lintels located within exterior walls.

## 2.10 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish metal fabrications after assembly.

### 2.11 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items located in exterior walls and as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.
- B. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.
  - 1. Shop prime with primers specified in Division 09 painting Sections unless zinc-rich primer is indicated.
- C. Preparation for Shop Priming: Prepare surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
  - 1. Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
  - 2. Other Items: SSPC-SP 3, "Power Tool Cleaning."
- D. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

### PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- C. Field Welding: Comply with the following requirements:
  - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  - 2. Obtain fusion without undercut or overlap.
  - 3. Remove welding flux immediately.
  - 4. At exposed connections, finish exposed welds and surfaces smooth and blended.
- D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction.
- E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

### 3.2 INSTALLING BEARING AND LEVELING PLATES

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

#### 3.3 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

#### END OF SECTION 055000

#### SECTION 055213 - PIPE AND TUBE RAILINGS

PART 1 - GENERAL

### 1.1 SUMMARY

- A. This Section includes the following:
  - 1. Steel pipe and tube railings.
- B. See Specification 099123 "interior Painting" for railing finish.

## 1.2 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide railings capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
  - 1. Handrails:
    - 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. 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.
  - 3. Infill of Guards:
    - a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft.
    - b. Uniform load of 25 lbf/sq. ft. applied horizontally.
    - c. Infill load and other loads need not be assumed to act concurrently.
- B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

### 1.3 SUBMITTALS

- A. Product Data: For mechanically connected railings, grout, anchoring cement, and paint products.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
  - 1. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- C. Samples: For each exposed finish required.
- D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, according to ASTM E 894 and ASTM E 935.

PARTNERS 15-163 PIPE AND TUBE RAILINGS 055213 - 2

#### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  1. Steel Pipe and Tube Railings:
  - a. Pisor Industries. Inc.
  - b. Sharpe Products.
  - c. Wagner, R & B, Inc.; a division of the Wagner Companies.
  - d. Or approved equal.

# 2.2 METALS

- A. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails, unless otherwise indicated.
- B. Steel and Iron:
  - 1. Tubing: ASTM A 500 (cold formed) or ASTM A 513, Type 5 (mandrel drawn).
  - 2. Pipe: ASTM A 53/A 53M, Type F or Type S, Grade A, Standard Weight (Schedule 40), unless another grade and weight are required by structural loads.
  - 3. Plates, Shapes, and Bars: ASTM A 36/A 36M.
  - 4. Castings: Either gray or malleable iron, unless otherwise indicated.
    - a. Gray Iron: ASTM A 48/A 48M, Class 30, unless another class is indicated or required by structural loads.
    - b. Malleable Iron: ASTM A 47/A 47M.

## 2.3 MISCELLANEOUS MATERIALS

- A. Fasteners: Provide concealed fasteners, unless unavoidable or standard for railings indicated.
  - 1. Steel Railings: Plated steel fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating.
- B. Anchors: Provide torque-controlled expansion anchors, fabricated from corrosion-resistant materials with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488.
- C. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- D. Shop Primer for Galvanized Steel: Zinc-dust, zinc-oxide primer compatible with finish paint systems indicated, and complying with SSPC-Paint 5.
- E. Grout and Anchoring Cement: Factory-packaged, nonshrink, nonmetallic grout complying with ASTM C 1107; or water-resistant, nonshrink anchoring cement; recommended by manufacturer for exterior use.

## 2.4 FABRICATION

- A. General: Fabricate railings to comply with design, dimensions, and details indicated, but not less than that required to support structural loads.
- B. 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.
- C. Nonwelded Connections: Connect members with concealed mechanical fasteners and fittings.
- D. Form changes in direction by bending.
- E. Form curves by bending in jigs to produce uniform curvature; maintain cross section of member throughout bend without cracking or otherwise deforming exposed surfaces.
- F. Close exposed ends of railing members with prefabricated end fittings.
- G. Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated.
- H. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work, unless otherwise indicated.

### 2.5 FINISHES

- A. Steel and Iron:
  - 1. Galvanized Railings: Hot-dip galvanize exterior railings, after fabrication, to comply with ASTM A 123/A 123M. Provide hot-dip galvanized fittings, brackets, fasteners, sleeves, and other ferrous components.
  - 2. Shop-Primed Galvanized Railings: After galvanizing, clean railings, treat with metallic-phosphate process, and apply primer to comply with SSPC-PA 1.

### PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. General: Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation.
  - 1. Set posts plumb within a tolerance of 1/16 inch in 3 feet (2 mm in 1 m).
  - 2. 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 (5 mm in 3 m).
- B. Anchor posts to metal surfaces with oval flanges.
- C. Anchor railing ends to concrete and masonry with round flanges connected to railing ends and anchored to wall construction with anchors and bolts.
- D. Attach handrails to wall with wall brackets.
  - 1. Use type of bracket with predrilled hole for exposed bolt anchorage.

PARTNERS 15-163 PIPE AND TUBE RAILINGS 055213 - 4

## E. Adjusting and Cleaning:

- 1. Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting.
- 2. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 055213

### SECTION 076200 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section Includes:
  - 1. Manufactured reglets and counterflashing.

#### 1.2 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. Distinguish between shop- and field-assembled work.
  - 3. Include identification of finish for each item.
  - 4. Include pattern of seams and details of termination points, expansion joints and expansion-joint covers, direction of expansion, roof-penetration flashing, and connections to adjoining work.
- C. Samples: For each exposed product and for each color and texture specified.
- D. Warranty: Sample of special warranty.

### 1.3 QUALITY ASSURANCE

- A. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" unless more stringent requirements are specified or shown on Drawings.
- B. Preinstallation Conference: Conduct conference at Project site.
- C. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

### 1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

PARTNERS 15-163 SHEET METAL FLASHING AND TRIM 076200-2

#### 1.5 WARRANTY

A. Special Warranty on Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within 20 years from date of Substantial Completion.

### PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. General: Sheet metal flashing and trim assemblies 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" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.
- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
  - 1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

#### 2.2 SHEET METALS

- A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying a strippable, temporary protective film before shipping.
- B. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304, dead soft, fully annealed; 2B (bright, cold rolled) finish.
- C. Metallic-Coated Steel Sheet: Provide zinc-coated (galvanized) steel sheet according to ASTM A 653/A 653M, G90 (Z275) coating designation; prepainted by coil-coating process to comply with ASTM A 755/A 755M.
  - 1. Exposed Coil-Coated Finish:
    - a. 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. Color: As selected by Architect from manufacturer's full range.

### 2.3 UNDERLAYMENT MATERIALS

A. Felt: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.

- B. Self-Adhering, High-Temperature Sheet: Minimum 30 mils (0.76 mm) thick, consisting of a slip-resistant polyethylene- or polypropylene-film top surface laminated to a layer of butyl- or SBS-modified asphalt adhesive, with release-paper backing; specifically designed to withstand high metal temperatures beneath metal roofing. Provide primer according to written recommendations of underlayment manufacturer.
  - 1. Thermal Stability: ASTM D 1970; stable after testing at 240 deg F (116 deg C) or higher.
  - 2. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F (29 deg C) or lower.

## 2.4 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and 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. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
    - b. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
  - 2. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.
  - 3. Fasteners for Zinc-Coated (Galvanized) Steel Sheet: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329 or Series 300 stainless steel.
- C. 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 (13 mm) wide and 1/8 inch (3 mm) thick.
- D. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane polymer sealant; low modulus; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- E. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.

# 2.5 MANUFACTURED REGLETS

- A. Reglets: Units of type, material, and profile indicated, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated with factory-mitered and -welded corners and junctions and with interlocking counterflashing on exterior face, of same metal as reglet.
  - 1. Material: Stainless steel, 0.019 inch (0.48 mm) thick.

### PARTNERS 15-163 SHEET METAL FLASHING AND TRIM 076200-4

#### 2.6 FABRICATION, GENERAL

- A. General: Custom fabricate sheet metal flashing and trim to comply with details shown and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
  - 1. Obtain field measurements for accurate fit before shop fabrication.
  - 2. Form sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.
  - 3. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces exposed to view.
- B. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.
  - 1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with butyl sealant concealed within joints.
  - 2. Use lapped expansion joints only where indicated on Drawings.
- C. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal to provide for proper installation of elastomeric sealant according to cited sheet metal standard.
- D. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
- E. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard for application, but not less than thickness of metal being secured.
- F. Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use.

### 2.7 WALL SHEET METAL FABRICATIONS

- A. Through-Wall Flashing: Fabricate continuous flashings in minimum 96-inch- (2400-mm-) long, but not exceeding 12-foot- (3.6-m-) long, sections, under copings, at shelf angles, and where indicated. Fabricate discontinuous lintel, sill, and similar flashings to extend 6 inches (150 mm) beyond each side of wall openings. Form with 2-inch- (50-mm-) high, end dams where flashing is discontinuous. Fabricate from the following materials:
  - 1. Stainless Steel: 0.016 inch (0.40 mm) thick.
- B. Opening Flashings in Frame Construction: Fabricate head, sill, jamb and similar flashings to extend 4 inches (100 mm) beyond wall openings. Form head and sill flashing with 2-inch- (50-mm-) high, end dams. Fabricate from the following materials:
  - 1. Galvanized Steel: 0.022 inch (0.56 mm) thick.

## PART 3 - EXECUTION

## 3.1 UNDERLAYMENT INSTALLATION

- A. Felt Underlayment: Install felt underlayment with adhesive for temporary anchorage. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches (50 mm).
- B. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free. Prime substrate if recommended by underlayment manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation; use primer for installing underlayment at low temperatures. Apply in shingle fashion to shed water, with end laps of not less than 6 inches (150 mm) staggered 24 inches (600 mm) between courses. Overlap side edges not less than 3-1/2 inches (90 mm). Roll laps and edges with roller. Cover underlayment within 14 days.

### 3.2 INSTALLATION, GENERAL

- A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement so that completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight. Use fasteners, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
  - 1. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
  - 2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
  - 3. Space cleats not more than 12 inches (300 mm) apart. Anchor each cleat with two fasteners. Bend tabs over fasteners.
  - 4. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.
  - 5. Install sealant tape where indicated.
  - 6. Torch cutting of sheet metal flashing and trim is not permitted.
- B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by SMACNA.
  - 1. Coat back side of stainless-steel sheet metal flashing and trim with bituminous coating where flashing and trim will contact wood, ferrous metal, or cementitious construction.
  - 2. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet or install a course of polyethylene sheet.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at maximum of 10 feet (3 m) with no joints within 24 inches (600 mm) of corner or intersection.
  - 1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with sealant concealed within joints.
  - 2. Use lapped expansion joints only where indicated on Drawings.

- D. Fastener Sizes: Use fasteners of sizes that will penetrate wood sheathing not less than 1-1/4 inches (32 mm) for nails and not less than 3/4 inch (19 mm) for wood screws.
- 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. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."

## 3.3 WALL FLASHING INSTALLATION

- A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to SMACNA recommendations and as indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.
- B. Through-Wall Flashing: Installation of through-wall flashing is specified in Division 4 Section "Unit Masonry Assemblies."
- C. Opening Flashings in Frame Construction: Install continuous head, sill, jamb, and similar flashings to extend 4 inches (100 mm) beyond wall openings.

#### 3.4 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean off excess sealants.
- C. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions.

## END OF SECTION 076200
### SECTION 078413 - PENETRATION FIRESTOPPING

PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This Section includes through-penetration firestop systems for penetrations through fire-resistance-rated constructions, including both empty openings and openings containing penetrating items.
- B. All penetrations through corridor walls, corridor ceilings, storage rooms or other fire rated walls (as determined by Architect) shall be firestopped.
- C. Penetrations through horizontal assembles.

#### 1.2 PERFORMANCE REQUIREMENTS

- A. General: For penetrations through fire-resistance-rated constructions, including both empty openings and openings containing penetrating items, provide through-penetration firestop systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated.
- B. Rated Systems: Provide through-penetration firestop systems with the following ratings determined per ASTM E 814:
  - 1. F-Rated Systems: Provide through-penetration firestop systems with F-ratings indicated, but not less than that equaling or exceeding fire-resistance rating of constructions penetrated.
  - 2. L-Rated Systems: Provide through-penetration firestop systems with L-ratings of not more than 3.0 cfm/sq. ft (0.01524cu. m/s x sq. m) at both ambient temperatures and 400 deg F (204 deg C).
- C. For through-penetration firestop systems exposed to view, traffic, moisture, and physical damage, provide products that, after curing, do not deteriorate when exposed to these conditions both during and after construction.
  - 1. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.
  - 2. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.
- D. For through-penetration firestop systems exposed to view, provide products with flame-spread and smokedeveloped indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

#### 1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For each through-penetration firestop system, submit documentation, including illustrations, from a qualified testing and inspecting agency, showing each type of construction condition penetrated, relationships to adjoining construction, and type of penetrating item.
  - 1. Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular through-penetration firestop condition, submit illustration, with

modifications marked, approved by through-penetration firestop system manufacturer's fireprotection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

C. Qualification Data: For Installer.

### 1.4 QUALITY ASSURANCE

- A. Installer Qualifications: A firm that has been approved by FMG according to FMG 4991, "Approval of Firestop Contractors."
- B. Installation Responsibility: Assign installation of through-penetration firestop systems and fire-resistive joint systems in Project to a single qualified installer.
- C. Fire-Test-Response Characteristics: Provide through-penetration firestop systems that comply with the following requirements and those specified in Part 1 "Performance Requirements" Article:
  - 1. Firestopping tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL, or another agency performing testing and follow-up inspection services for firestop systems acceptable to authorities having jurisdiction.
  - 2. Through-penetration firestop systems are identical to those tested per testing standard referenced in "Part 1 Performance Requirements" Article. Provide rated systems bearing classification marking of qualified testing and inspecting agency.
- D. Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to specified requirements.
- E. Do not cover up through-penetration firestop system installations that will become concealed behind other construction until each installation has been examined by Owner's inspecting agency and Fire Marshal, if required by authorities having jurisdiction.

### PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide one of the through-penetration firestop systems indicated for each application in the Through-Penetration Firestop System Schedule or on Drawings that are produced by one of the following manufacturers:
  - 1. Grace, W. R. & Co. Conn.
  - 2. Hilti, Inc.
  - 3. 3M; Fire Protection Products Division.

# 2.2 FIRESTOPPING

A. Compatibility: Provide through-penetration firestop systems that are compatible with one another; with the substrates forming openings; and with the items, if any, penetrating through-penetration firestop systems, under conditions of service and application, as demonstrated by through-penetration firestop system manufacturer based on testing and field experience.

B. Accessories: Provide components for each through-penetration firestop system that are needed to install fill materials and to comply with Part 1 "Performance Requirements" Article. Use only components specified by through-penetration firestop system manufacturer and approved by qualified testing and inspecting agency for firestop systems indicated.

## PART 3 - EXECUTION

## 3.1 THROUGH-PENETRATION FIRESTOP SYSTEM INSTALLATION

- A. General: Install through-penetration firestop systems to comply with Part 1 "Performance Requirements" Article and with firestop system manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. Install forming/damming/backing materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
  - 1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.
- C. Install fill materials for firestop systems by proven techniques to produce the following results:
  - 1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
  - 2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
  - 3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.
- D. Identification: Identify through-penetration firestop systems with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches (150 mm) of edge of the firestop systems so that labels will be visible to anyone seeking to remove penetrating items or firestop systems. Use mechanical fasteners for metal labels. Include the following information on labels:
  - 1. The words "Warning Through-Penetration Firestop System Do Not Disturb. Notify Building Management of Any Damage."
  - 2. Contractor's name, address, and phone number.
  - 3. Through-penetration firestop system designation of applicable testing and inspecting agency.
  - 4. Date of installation.
  - 5. Through-penetration firestop system manufacturer's name.
  - 6. Installer's name.

### 3.2 FIELD QUALITY CONTROL

- A. Inspecting Agency: Owner will engage an independent inspecting agency to inspect through-penetration firestops. Independent inspecting agency shall comply with ASTM E 2174 requirements including those related to qualifications, conducting inspections, and preparing test reports.
- B. Where deficiencies are found, repair or replace through-penetration firestop systems so they comply with requirements.

PARTNERS 15-163 PENETRATION FIRESTOPPING 078413-4

C. Proceed with enclosing through-penetration firestop systems with other construction only after inspection reports are issued and firestop installations comply with requirements.

## 3.3 THROUGH-PENETRATION FIRESTOP SYSTEM SCHEDULE

- A. Where UL-classified systems are indicated, they refer to alpha-alpha-numeric designations listed in UL's "Fire Resistance Directory" under product Category XHEZ.
- B. Firestop Systems for Metallic Pipes, Conduit, or Tubing :
   1. UL-Classified Systems: W-L 1036.
- C. Firestop Systems for Nonmetallic Pipe, Conduit, or Tubing :
   1. UL-Classified Systems: W-L 2097.
- D. Firestop Systems for Electrical Cables : 1. UL-Classified Systems: W-L 3081.
- E. Firestop Systems for Cable Trays :1. UL-Classified Systems: W-L 4004.
- F. Firestop Systems for Insulated Pipes:1. UL-Classified Systems: W-L 5053.
  - 1. OL-Glassilleu Systems. W-L 503

# END OF SECTION 078413

#### **SECTION 079200 - JOINT SEALANTS**

PART 1 - GENERAL

- 1.1 SUMMARY
  - A. This Section includes joint sealants for the following applications, including those specified by reference to this section
    - 1. Silicone joint sealants.
    - 2. Urethane joint sealants.
    - 3. Mildew-resistant joint sealants.
    - 4. Latex joint sealants.
  - B. Related Sections:
    - 1. Division 13 Section "Pool Filtration System" for specialty sealants to be used on pool piping and equipment.

### 1.2 PERFORMANCE REQUIREMENTS

A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates for both exterior and interior applications.

#### 1.3 SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. Samples: For each type and color of joint sealant required, provide Samples with joint sealants in 1/2inch- (13-mm-) wide joints formed between two 6-inch- (150-mm-) long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- C. Compatibility and adhesion test reports.

#### 1.4 QUALITY ASSURANCE

- A. Preconstruction Compatibility and Adhesion Testing: Submit samples of materials that will contact or affect joint sealants to joint-sealant manufacturers for testing according to manufacturer's standard test method to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
- B. Preconstruction Field-Adhesion Testing: Before installing elastomeric sealants, field test their adhesion to Project joint substrates according to the method in ASTM C 1193 that is appropriate for the types of Project joints.

PARTNERS 15-163 JOINT SEALANTS 079200-2

#### 1.5 WARRANTY

- A. Special Installer's Warranty: Installer's standard form in which Installer agrees to repair or replace elastomeric 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.

#### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

A. 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, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer, based on testing and field experience.
- B. VOC Content of Interior Sealants: Provide interior sealants and sealant primers that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
- C.
- 1. Sealants: 250 g/L.
- 2. Sealant Primers for Nonporous Substrates: 250 g/L.
- 3. Sealant Primers for Porous Substrates: 775 g/L.

### 2.3 URETHANE JOINT SEALANTS

- A. Urethane, S, NS, 25, NT: Single-component, nonsag, nontraffic-use, plus 25 percent and minus 25 percent movement capability, urethane joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT.
  - 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 Corporation-Construction Systems.
    - b. Pecora Corporation.
    - c. Polymeric Systems, Inc.
    - d. Sika Corporation.
    - e. Tremco Incorporated.
- B. Urethane, M, P, 50, T, NT: Multicomponent, pourable, plus 50 percent and minus 50 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C 920, Type M, Grade P, Class 50, Uses T and NT.
  - a. BASF Corporation-Construction Systems.

- b. Pecora Corporation.
- c. Polymeric Systems, Inc.
- d. Sika Corporation.
- e. Tremco Incorporated.
- C. Urethane, S, P, 25, T, NT: Single-component, pourable, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C 920, Type S, Grade P, Class 25, Uses T and NT.
  - a. BASF Corporation-Construction Systems.
  - b. Pecora Corporation.
  - c. Polymeric Systems, Inc.
  - d. Sika Corporation.
  - e. Tremco Incorporated.
- D. Urethane, S, NS, 100/50, T, NT: Single-component, nonsag, plus 100 percent and minus 50 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C 920, Type S, Grade NS, Class 100/50, Uses T and NT.
  - a. BASF Corporation-Construction Systems.
  - b. Pecora Corporation.
  - c. Polymeric Systems, Inc.
  - d. Sika Corporation.
  - e. Tremco Incorporated.

### 2.4 SILICONE JOINT SEALANTS

- A. Silicone, S, NS, 100/50, NT: Single-component, nonsag, plus 100 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.
  - a. BASF Corporation-Construction Systems.
  - b. Pecora Corporation.
  - c. Polymeric Systems, Inc.
  - d. Sika Corporation.
  - e. Tremco Incorporated.
- B. Silicone, S, NS, 50, NT: Single-component, nonsag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 50, Use NT.
  - a. BASF Corporation-Construction Systems.
  - b. Pecora Corporation.
  - c. Polymeric Systems, Inc.
  - d. Sika Corporation.
  - e. Tremco Incorporated.

### 2.5 MILDEW-RESISTANT JOINT SEALANTS

- A. Mildew-Resistant Joint Sealants: Formulated for prolonged exposure to humidity with fungicide to prevent mold and mildew growth.
- B. Silicone, Mildew Resistant, Acid Curing, S, NS, 25, NT: Mildew-resistant, single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, acid-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Dow Corning Corporation.
    - b. GE Construction Sealants; Momentive Performance Materials Inc.
    - c. Soudal USA.
    - d. Tremco Incorporated.

# 2.6 LATEX JOINT SEALANTS

- A. Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. BASF Corporation-Construction Systems.
    - b. May National Associates, Inc.; a subsidiary of Sika Corporation.
    - c. Pecora Corporation.
    - d. Tremco Incorporated.

#### 2.7 JOINT-SEALANT BACKING

- A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- 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. Elastomeric Tubing Sealant Backings: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D 1056, nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to minus 26 deg F (minus 32 deg C). Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and to otherwise contribute to optimum sealant performance.
- D. 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 where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

## 2.8 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 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants.
  - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant.
    - a. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, 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.
  - 2. Remove laitance and form-release agents from concrete.
    - a. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.
- B. Joint Priming: Prime joint substrates, 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.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant 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.

# 3.2 INSTALLATION

- A. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- B. Install sealant backings 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 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.

PARTNERS 15-163 JOINT SEALANTS 079200-6

- C. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- D. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
  - 1. Place sealants so they directly contact and fully wet joint substrates.
  - 2. Completely fill recesses in each joint configuration.
  - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants 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 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 configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.
- F. 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.

## 3.3 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.
    - b. Other joints as indicated on Drawings.
  - 2. Joint Sealant: Urethane, M, P, 50, 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. Control and expansion joints in unit masonry.
    - b. Other joints as indicated on Drawings.
  - 2. Joint Sealant: Urethane, S, NS, 100/50, T, NT.
  - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
    - a. Custom color to be used at brick veneer.
- C. Joint-Sealant Application: Interior joints in horizontal traffic surfaces.
  - 1. Joint Locations:
    - a. Control and expansion joints in tile flooring.
    - b. Other joints as indicated on Drawings.

- 2. Joint Sealant: Urethane, S, P, 25, T, NT.
- 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- D. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces.
  - 1. Joint Locations:
    - a. Control and expansion joints on exposed interior surfaces of exterior walls.
    - b. Tile control and expansion joints.
    - c. Vertical joints on exposed surfaces of unit masonry, walls and partitions.
    - d. Other joints as indicated on Drawings.
  - 2. Joint Sealant: Urethane, S, NS, 25, NT.
  - 3. Joint-Sealant Color: As selected by Owner from manufacturer's full range of colors.
- E. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces not subject to significant movement.
  - 1. Joint Locations:
    - a. Control joints on exposed interior surfaces of exterior walls.
    - b. Perimeter joints between interior wall surfaces and frames of interior doors and windows.
    - c. Other joints as indicated on Drawings.
  - 2. Joint Sealant: Acrylic latex.
  - 3. Joint-Sealant Color: As selected by Owner from manufacturer's full range of colors.
- F. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces.
  - 1. Joint Locations:
    - a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
    - b. Tile control and expansion joints where indicated.
    - c. Other joints as indicated on Drawings.
  - 2. Joint Sealant: Silicone, mildew resistant, acid curing, S, NS, 25, NT.
  - 3. Joint-Sealant Color: As selected by Owner from manufacturer's full range of colors

### END OF SECTION 079200

## SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section Includes:
  - 1. Standard hollow metal doors and frames.

#### 1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Include elevations, door edge details, frame profiles, metal thicknesses, preparations for hardware, and other details.
- C. Samples for Initial Selection: For units with factory-applied color finishes.
- D. Samples for Verification: For each type of exposed finish required.
- E. Schedule: Prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings.

#### 1.3 QUALITY ASSURANCE

- A. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure as close to neutral pressure as possible according to NFPA 252 or UL 10B.
  - Temperature-Rise Limit: At vertical exit enclosures and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F above ambient after 30 minutes of standard fire-test exposure.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Amweld Building Products, LLC.
  - 2. Benchmark; a division of Therma-Tru Corporation.
  - 3. Ceco Door Products; an Assa Abloy Group company.
  - 4. Curries Company; an Assa Abloy Group company.
  - 5. Deansteel Manufacturing Company, Inc.

PARTNERS 15-163 HOLLOW METAL DOORS AND FRAMES 081113 - 2

- 6. Firedoor Corporation.
- 7. Fleming Door Products Ltd.; an Assa Abloy Group company.
- 8. Habersham Metal Products Company.
- 9. Kewanee Corporation (The).
- 10. Mesker Door Inc.
- 11. Pioneer Industries, Inc.
- 12. Security Metal Products Corp.
- 13. Steelcraft; an Ingersoll-Rand company.
- 14. Windsor Republic Doors.

#### 2.2 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008, CS, Type B; suitable for exposed applications.
- B. Hot-Rolled Steel Sheet: ASTM A 1011, CS, Type B.
- C. Frame Anchors: ASTM A 591, Commercial Steel (CS), 40Z coating designation; mill phosphatized.
  - 1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011, hot-dip galvanized according to ASTM A 153, Class B.
- D. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153.
- E. Grout: ASTM C 476, except with a maximum slump of 4 inches, as measured according to ASTM C 143.
- F. Mineral-Fiber Insulation: ASTM C 665, Type I.
- G. Glazing: Division 08 Section "Glazing."
- H. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat.

#### 2.3 STANDARD HOLLOW METAL DOORS

- A. General: Comply with ANSI/SDI A250.8.
  - 1. Design: Flush panel.
  - 2. Core Construction: Manufacturer's standard kraft-paper honeycomb, polystyrene, polyurethane, polyisocyanurate, mineral-board, or vertical steel-stiffener core.
    - a. Fire Door Core at rated openings: As required to provide fire-protection and temperaturerise ratings indicated.
  - 3. Vertical Edges for Single-Acting Doors: Manufacturer's standard.
  - 4. Top and Bottom Edges: Closed with flush or inverted 0.042-inch-thick, end closures or channels of same material as face sheets.
  - 5. Tolerances: SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."

- B. Interior Doors: Face sheets fabricated from cold-rolled steel sheet unless metallic-coated sheet is indicated. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
  - 1. Level 2 and Physical Performance Level B (Heavy Duty), Model 1 (Full Flush).
- C. Exterior Doors: Face sheets fabricated from metallic-coated steel sheet; galvanized. Comply with ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
  - 1. Level 2 and Physical Performance Level B (Heavy Duty), Model 1 (Full Flush).
- D. Hardware Reinforcement: ANSI/SDI A250.6.

# 2.4 STANDARD HOLLOW METAL FRAMES

- A. Heavy-Duty Frames: SDI A250.8, Level 2.
  - 1. Physical Performance: Level B according to SDI A250.4.
  - 2. Interior Frames:
    - a. Materials: Uncoated, steel sheet, minimum thickness of 0.053 inch.
    - b. Sidelite Frames: Fabricated from same thickness material as adjacent door frame.
    - c. Construction: Full profile welded.
  - 3. Exterior Frames: Fabricated from metallic-coated steel sheet; galvanized.
    - a. Fabricate frames with mitered or coped corners.
    - b. Fabricate frames as full profile welded unless otherwise indicated.
    - c. Frames for Level 2 Steel Doors: 0.053-inch- (1.3-mm-) thick steel sheet.
  - 4. Exposed Finish: Prime.
- B. Hardware Reinforcement: ANSI/SDI A250.6.

# 2.5 FRAME ANCHORS

- A. Jamb Anchors:
  - 1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch (1.0 mm) thick, with corrugated or perforated straps not less than 2 inches (51 mm) wide by 10 inches (254 mm) long; or wire anchors not less than 0.177 inch (4.5 mm) thick.
  - 2. Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch- (9.5-mm-) diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.
- B. Floor Anchors: Formed from same material as frames, minimum thickness of 0.042 inch (1.0 mm), and as follows:
  - 1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.

PARTNERS 15-163 HOLLOW METAL DOORS AND FRAMES 081113 - 4

#### 2.6 STOPS AND MOLDINGS

A. Moldings for Glazed Lites in Doors: Minimum 0.032 inch thick, same material as door face sheet.

#### 2.7 ACCESSORIES

- A. Ceiling Struts: Minimum 1/4-inch-thick by 1-inch-wide steel.
- B. Grout Guards: Formed from same material as frames, not less than 0.016 inch thick.

## 2.8 FABRICATION

- A. Tolerances: Fabricate hollow metal work to tolerances indicated in SDI 117.
- B. Hollow Metal Doors:
  - 1. Glazed Lites: Factory cut openings in doors.
  - 2. Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated.
- C. Hollow Metal Frames: Where frames are fabricated in sections, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
  - 1. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
  - 2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
  - 3. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
  - 4. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
  - 5. Jamb Anchors: Provide number and spacing of anchors as follows:
    - a. Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
      - 1) Two anchors per jamb up to 60 inches high.
      - 2) Three anchors per jamb from 60 to 90 inches high.
      - 3) Four anchors per jamb from 90 to 120 inches high.
      - 4) Four anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 120 inches high.
    - b. Postinstalled Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.
  - 6. Door Silencers: Except on weather-stripped doors, drill stops to receive door silencers.
    - a. Single-Door Frames: Three door silencers.
    - b. Double-Door Frames: Two door silencers.

- D. Hardware Preparation: Factory prepare hollow metal work to receive templated mortised hardware according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section "Door Hardware."
  - 1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
  - 2. Reinforce doors and frames to receive nontemplated, mortised and surface-mounted door hardware.
  - 3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.
  - 4. Coordinate locations of conduit and wiring boxes for electrical connections with Division 26 electrical Sections.
- E. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints.
  - 1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow metal work.
  - 2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
  - 3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
  - 4. Provide loose stops and moldings on inside of hollow metal work.
  - 5. Coordinate rabbet width between fixed and removable stops with type of glazing and type of installation indicated.

### 2.9 STEEL FINISHES

- A. Prime Finish: Apply manufacturer's standard primer immediately after cleaning and pretreating.
  - 1. Shop Primer: ANSI/SDI A250.10.

### PART 3 - EXECUTION

## 3.1 INSTALLATION

- A. Hollow Metal Frames: Comply with ANSI/SDI A250.11.
  - 1. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
    - a. At fire-protection-rated openings, install frames according to NFPA 80.
    - b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
    - c. Install frames with removable glazing stops located on secure side of opening.
    - d. Install door silencers in frames before grouting.
    - e. Remove temporary braces necessary for installation only after frames have been properly set and secured.

- f. Check plumbness, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
- g. Field apply bituminous coating to backs of frames that are filled with grout containing antifreezing agents.
- 2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.
  - a. Floor anchors may be set with powder-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
- 3. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
- 4. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
- 5. Ceiling Struts: Extend struts vertically from top of frame at each jamb to overhead structural supports or substrates above frame unless frame is anchored to masonry or to other structural support at each jamb. Bend top of struts to provide flush contact for securing to supporting construction. Provide adjustable wedged or bolted anchorage to frame jamb members.
- 6. Installation Tolerances: Adjust hollow metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
  - a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
  - b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
  - c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
  - d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.
- B. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.
  - 1. Non-Fire-Rated Standard Steel Doors:
    - a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.
    - b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
    - c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
    - d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 1/2 inch.
  - 2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
- C. Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with hollow metal manufacturer's written instructions.
  - 1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.

## 3.2 ADJUSTING AND CLEANING

- A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.
- B. 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.

## END OF SECTION 081113

#### SECTION 088000 - GLAZING

#### PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:
 1. Doors.

#### 1.2 DEFINITIONS

A. Interspace: Space between lites of an insulating-glass unit that contains dehydrated air or a specified gas.

#### 1.3 SUBMITTALS

- A. Product Data: For each glass product and glazing material indicated.
- B. Samples: 12-inch- (300-mm-) square, for each type of glass product indicated, other than monolithic clear float glass.
- C. Glazing Schedule: Use same designations indicated on Drawings.
- D. Preconstruction Adhesion and Compatibility Test Report: From glazing sealant manufacturer.

#### 1.4 QUALITY ASSURANCE

- A. Preconstruction Adhesion and Compatibility Testing: Submit to elastomeric glazing sealant manufacturers, for testing according to ASTM C 1087, samples of each glazing material type, tape sealant, gasket, glazing accessory, and glass-framing member that will contact or affect elastomeric glazing sealants:
- B. Glazing for Fire-Rated Door and Window Assemblies: Glazing for assemblies that comply with NFPA 80 and that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 257.
- C. Safety Glazing Products: Comply with testing requirements in 16 CFR 1201 and ANSI Z97.1.
- D. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.
  - 1. GANA Publications: GANA Laminated Division's "Laminated Glass Design Guide" and GANA's "Glazing Manual."

#### 1.5 WARRANTY

- A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer's standard form, made out to Owner and signed by coated-glass manufacturer agreeing to replace coated-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.
  - 1. Warranty Period: 10 years from date of Substantial Completion.

### 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.

# 2.2 GLASS PRODUCTS

#### 2.3 FIRE-PROTECTION-RATED GLAZING (FG-11, FG-12)

- A. Fire-Protection-Rated Glazing: Listed and labeled by a testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on positive-pressure testing according to NFPA 257 or UL 9, including the hose-stream test, and shall comply with NFPA 80.
- B. Fire-Protection-Rated Glazing Labeling: Permanently mark fire-protection-rated glazing with certification label of a testing agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name; test standard; whether glazing is permitted to be used in doors or openings; if permitted in openings, whether or not glazing has passed the hose-stream test; whether or not glazing meets 450 deg F (250 deg C) temperature-rise limitation; and the fire-resistance rating in minutes.
- C. Fire-Protection and Safety Rated (45 Minute) Glass (FG-12): Minimum 45 minute, fire-protection-rated glass; and complying with 16 CFR 1201, Category I and II.
  - Basis of Design: Subject to compliance with requirements, provide "Superlite II XL-45" as manufactured by SAFTI FIRST Fire Rated Glazing Solutions or comparable product by one of the following:
    - a. AGC Glass Company North America, Inc.
    - b. Technical Glass Products.
    - c. Vetrotech Saint-Gobain.

## 2.4 GLAZING GASKETS

- A. Dense Compression Gaskets: Molded or extruded gaskets of material indicated below, complying with standards referenced with name of elastomer indicated below, and of profile and hardness required to maintain watertight seal:
  - 1. Neoprene, ASTM C 864.
  - 2. EPDM, ASTM C 864.
  - 3. Silicone, ASTM C 1115.
  - 4. Thermoplastic polyolefin rubber, ASTM C 1115.
  - 5. Any material indicated above.

## 2.5 GLAZING SEALANTS

- A. General: Provide products of type indicated, complying with the following requirements:
  - 1. Compatibility: Select glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
  - 2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
  - 3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.
- B. Elastomeric Glazing Sealants: Comply with ASTM C 920 and other requirements indicated for each liquidapplied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.
  - 1. Single-Component Neutral-Curing Silicone Glazing Sealants:
    - a. Products:
      - 1) Tremco Spectrum II
      - 2) Silglaze II 2800
      - 3) Dow Corning 795
    - b. Type and Grade: S (single component) and NS (nonsag).
    - c. Class: 50.
    - d. Use Related to Exposure: NT (nontraffic).
    - e. Uses Related to Glazing Substrates: M, G, A, and, as applicable to glazing substrates indicated, O.
- C. Glazing Sealants for Fire-Resistive Glazing Products: Identical to products used in test assemblies to obtain fire-protection rating.

## 2.6 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based elastomeric tape with a solids content of 100 percent; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod

as recommended in writing by tape and glass manufacturers for application indicated; packaged on rolls with a release paper backing; and complying with ASTM C 1281 and AAMA 800 for products indicated below:

- 1. AAMA 804.3 tape, where indicated.
- 2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
- 3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.
- B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; packaged on rolls with release liner protecting adhesive; and complying with AAMA 800 for the following types:
  - 1. Type 1, for glazing applications in which tape acts as the primary sealant.
  - 2. Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

#### 2.7 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
- D. Spacers: Elastomeric blocks or continuous extrusions with a Shore, Type A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).
- F. Perimeter Insulation for Fire-Resistive Glazing: Identical to product used in test assembly to obtain fireresistance rating.

## 2.8 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

PART 3 - EXECUTION

### 3.1 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

- B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.
- C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
- D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- F. Provide spacers for glass lites where length plus width is larger than 50 inches (1270 mm).
- G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

### 3.2 TAPE GLAZING

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. Cover vertical framing joints by applying tapes to heads and sills first, then to jambs. Cover horizontal framing joints by applying tapes to jambs, then to heads and sills.
- D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
- E. Apply heel bead of elastomeric sealant.
- F. Center glass lites in openings on setting blocks, and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
- G. Apply cap bead of elastomeric sealant over exposed edge of tape.

# 3.3 GASKET GLAZING (DRY)

- A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

- C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- E. Install gaskets so they protrude past face of glazing stops.

## 3.4 CLEANING AND PROTECTION

- A. Immediately after installation remove nonpermanent labels and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.
- C. Remove and replace glass that is damaged during construction period.

### END OF SECTION 088000

#### **SECTION 099113 - EXTERIOR PAINTING**

#### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This Section includes surface preparation and the application of paint systems on the following exterior substrates:.
  - 1. Galvanized metal.

#### 1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: For each finish and for each color and texture required.
- C. Product List: Printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.

### 1.3 QUALITY ASSURANCE

- A. MPI Standards:
  - 1. Products: Complying with MPI standards indicated and listed in "MPI Approved Products List."
  - 2. Preparation and Workmanship: Comply with requirements in "MPI Architectural Painting Specification Manual" for products and paint systems indicated.
- B. Mockups: Apply benchmark samples 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 specified in Part 3.
    - a. Wall and Ceiling Surfaces: Provide samples of at least 100 sq. ft. (9 sq. m).
    - b. Other Items: Architect will designate items or areas required.
  - 2. Apply benchmark samples after permanent lighting and other environmental services have been activated.
  - 3. Final approval of color selections will be based on benchmark samples.
    - a. If preliminary color selections are not approved, apply additional benchmark samples of additional colors selected by Architect at no added cost to Owner.

#### 1.4 EXTRA MATERIALS

- A. Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.
  - 1. Quantity: Furnish an additional 5 percent, but not less than 2 gal. of each material and color applied.

### PART 2 - PRODUCTS

#### 2.1 PAINT, GENERAL

- A. Material Compatibility:
  - 1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
  - 2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- B. Colors: As indicated in Material Finish / Color Schedule.

### 2.2 METAL PRIMERS

- A. Cementitious Galvanized-Metal Primer: MPI #26.
  - 1. VOC Content: E Range of E1.

### 2.3 EXTERIOR LATEX PAINTS

- A. Exterior Latex (Semigloss): MPI #11 (Gloss Level 5).
  - 1. VOC Content: E Range of E1.

#### 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 work.
- B. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- C. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.

1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

### 3.2 PREPARATION AND APPLICATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.
- B. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.
  - 1. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.
- C. 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.
- D. 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.
- E. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

### 3.3 EXTERIOR PAINTING SCHEDULE

- A. Galvanized-Metal Substrates:
  - 1. Latex System: MPI EXT 5.3A.
    - a. Prime Coat: Cementitious galvanized-metal primer.
    - b. Intermediate Coat: Exterior latex matching topcoat.
    - c. Topcoat: Exterior latex (semigloss).

#### END OF SECTION 099113

### SECTION 099123 - INTERIOR PAINTING

#### PART 1 - GENERAL

### 1.1 SUMMARY

- A. This Section includes surface preparation and the application of paint systems on the following interior substrates:
  - 1. Concrete masonry units (CMU).
  - 2. Steel.
  - 3. Galvanized metal.
  - 4. Gypsum board.
  - 5. Concrete.

#### 1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: For each finish and for each color and texture required.
- C. Product List: Printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.

#### 1.3 QUALITY ASSURANCE

- A. MPI Standards:
  - 1. Products: Complying with MPI standards indicated and listed in "MPI Approved Products List."
  - 2. Preparation and Workmanship: Comply with requirements in "MPI Architectural Painting Specification Manual" for products and paint systems indicated.
  - 3. Finishes are to be as follows:
    - a. All soffits and gypsum board ceilings are to receive a 'G1" flat finish.
    - b. All gypsum board walls are to receive a 'G3' egg shell finish.
    - c. All masonry block / door frames are to receive a 'G5' semi-gloss finish.
- B. Mockups: Apply benchmark samples 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 specified in Part 3.
    - a. Wall and Ceiling Surfaces: Provide samples of at least 100 sq. ft. (9 sq. m).
    - b. Other Items: Architect will designate items or areas required.
  - 2. Apply benchmark samples after permanent lighting and other environmental services have been activated.

- 3. Final approval of color selections will be based on benchmark samples.
  - a. If preliminary color selections are not approved, apply additional benchmark samples of additional colors selected by Architect at no added cost to Owner.

### 1.4 EXTRA MATERIALS

- A. Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.
  - 1. Quantity: Furnish an additional 5 percent, but not less than 2 gal. of each material and color applied.

## PART 2 - PRODUCTS

### 2.1 PAINT, GENERAL

- A. Material Compatibility:
  - 1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
  - 2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- B. VOC Content of Field-Applied Interior Paints and Coatings: Provide products that comply with the following limits for VOC content, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24); these requirements do not apply to paints and coatings that are applied in a fabrication or finishing shop:
  - 1. Flat Paints, Coatings, and Primers: VOC content of not more than 50 g/L.
  - 2. Nonflat Paints, Coatings, and Primers: VOC content of not more than 150 g/L.
  - 3. Anti-Corrosive and Anti-Rust Paints Applied to Ferrous Metals: VOC not more than 250 g/L.
  - 4. Flat Topcoat Paints: VOC content of not more than 50 g/L.
  - 5. Nonflat Topcoat Paints: VOC content of not more than 150 g/L.
  - 6. Anti-Corrosive and Anti-Rust Paints Applied to Ferrous Metals: VOC not more than 250 g/L.
  - 7. Floor Coatings: VOC not more than 100 g/L.
  - 8. Shellacs, Clear: VOC not more than 730 g/L.
  - 9. Shellacs, Pigmented: VOC not more than 550 g/L.
  - 10. Primers, Sealers, and Undercoaters: VOC content of not more than 200 g/L.
  - 11. Zinc-Rich Industrial Maintenance Primers: VOC content of not more than 340 g/L.
  - 12. Pre-Treatment Wash Primers: VOC content of not more than 420 g/L.
- C. Chemical Components of Field-Applied Interior Paints and Coatings: Provide topcoat paints and anticorrosive and anti-rust paints applied to ferrous metals that comply with the following chemical restrictions; these requirements do not apply to paints and coatings that are applied in a fabrication or finishing shop:

- 1. Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).
- 2. Restricted Components: Paints and coatings shall not contain any of the following:
  - a. Acrolein.
  - b. Acrylonitrile.
  - c. Antimony.
  - d. Benzene.
  - e. Butyl benzyl phthalate.
  - f. Cadmium.
  - g. Di (2-ethylhexyl) phthalate.
  - h. Di-n-butyl phthalate.
  - i. Di-n-octyl phthalate.
  - j. 1,2-dichlorobenzene.
  - k. Diethyl phthalate.
  - I. Dimethyl phthalate.
  - m. Ethylbenzene.
  - n. Formaldehyde.
  - o. Hexavalent chromium.
  - p. Isophorone.
  - q. Lead.
  - r. Mercury.
  - s. Methyl ethyl ketone.
  - t. Methyl isobutyl ketone.
  - u. Methylene chloride.
  - v. Naphthalene.
  - w. Toluene (methylbenzene).
  - x. 1,1,1-trichloroethane.
  - y. Vinyl chloride.
- D. Colors: As indicated in Material Finish / Color Schedule.

# 2.2 BLOCK FILLERS

- A. Interior/Exterior Latex Block Filler: MPI #4.
  - 1. VOC Content: E Range of E2.
- B. Interior/Exterior Epoxy Block Filler: MPI #116.
  1. VOC Content: E Range of E2.

# 2.3 PRIMERS/SEALERS

- A. Interior Latex Primer/Sealer: MPI #50.
  - 1. VOC Content: E Range of E1.

PARTNERS 15-163 INTERIOR PAINTING 099123-4

### 2.4 METAL PRIMERS

- A. Quick-Drying Alkyd Metal Primer: MPI #76.
  - 1. VOC Content: E Range of E1.

### 2.5 LATEX PAINTS

- A. Interior Latex (Flat): MPI #53 (Gloss Level 1).
  - 1. VOC Content: E Range of E1.
- B. Interior Latex (Eggshell): MPI #52 (Gloss Level 3).
  - 1. VOC Content: E Range of E1.
- C. Interior Latex (Semigloss): MPI #54 (Gloss Level 5).
  - 1. VOC Content: E Range of E1.

### D. EPOXY PAINT

- 1. Interior/Exterior Epoxy (water based): MPI #115
- 2. Pigmented Epoxy / Polyamide: MPI #77

### 2.6 QUICK-DRYING ENAMELS

- A. Quick-Drying Enamel (Semigloss): MPI #81 (Gloss Level 5).
  - 1. VOC Content: E Range of E1.

### 2.7 ALKYD PAINTS

- A. Interior Alkyd (Semigloss): MPI #47 (Gloss Level 5).
  - 1. VOC Content: E Range of E2.
  - 2. Environmental Performance Rating: EPR 1.

### 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 work.

- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
  - 1. Concrete: 12 percent.
  - 2. Masonry (Clay and CMU): 12 percent.
  - 3. Wood: 15 percent.
  - 4. Gypsum Board: 12 percent.
  - 5. Plaster: 12 percent.
- C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- D. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.
  - 1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

### 3.2 PREPARATION AND APPLICATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.
- B. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.
  - 1. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.
- C. 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.
- D. Painting Mechanical and Electrical Work: Paint items exposed in equipment rooms and occupied spaces including, but not limited to, the following:
  - 1. Mechanical Work:
    - a. Uninsulated metal piping.
    - b. Uninsulated plastic piping.
    - c. Pipe hangers and supports.
    - d. Tanks that do not have factory-applied final finishes.
    - e. Visible portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets.
    - f. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
    - g. Mechanical equipment that is indicated to have a factory-primed finish for field painting.
  - 2. Electrical Work:
    - a. Telephone backer boards.
    - b. Electrical equipment that is indicated to have a factory-primed finish for field painting.

- E. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- F. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

### 3.3 INTERIOR PAINTING SCHEDULE

- A. CMU Substrates: corridors
  - 1. Latex System: MPI INT 4.2A.
    - a. Prime Coat: Interior/exterior latex block filler.
    - b. Intermediate Coat: Interior latex matching topcoat.
    - c. Topcoat: Interior latex (semigloss).
- B. Steel Substrates:
  - 1. Quick-Drying Enamel System: MPI INT 5.1A. (Use on Hollow Metal Frames, Steel Lintels)
    - a. Prime Coat: Quick-drying alkyd metal primer.
    - b. Intermediate Coat: Quick-drying enamel matching topcoat.
    - c. Topcoat: Quick-drying enamel (semigloss).
  - 2. Latex System: MPI INT 5.1.Q. (Use on Exposed Steel Roof Framing and Roof Deck)
    - a. Prime Coat: Quick-drying alkyd metal primer.
    - b. Intermediate Coat: Interior latex matching topcoat.
    - c. Topcoat: Interior latex (flat).
- F. Concrete Substrates:
  - 1. Pool Filter room and Pool Storage Room : Epoxy System
    - a. Prime Coat: Pigmented Epoxy / Polyamide
    - b. Intermediate Coat: Pigmented Epoxy / Polyamide.
    - c. Top Coat: Pigmented Epoxy / Polyamide.
  - 2. Concrete Floors in Pool filter and storage rooms: Epoxy System with color flakes and clear coat.
    - a. Basis of Design: Provide "100% solids epoxy floor system with as manufactured by Performance Floor (586.468.3400) or approved equal. System shall have color flakes uniformly broadcast across floor area (medium coverage) and shall have clear epoxy top coat. System shall have a minimum thickness of 9.7 mils, per coat.

1). Preparation: Diamond grind existing concrete floor surfaces and glazed masonry base to remove all existing paint. Prepare existing surfaces as well as new surface to receive epoxy
system per manufacturer's recommendations. Recommendations by the Society for Protective Coatings (SSPC) shall also be followed.

2). Crack Fill: Fill cracks and holes larger than  $\frac{1}{2}$ " with acceptable crack filler, prior to installation of epoxy system.

- b. Initial Coat: Provide "Performance Floor 100% solids epoxy with flake broadcast".
- c. Top Coat: Provide "Performance Polyurea Clear Coat Epoxy".
- d. Color: Match architect's sample.

### END OF SECTION 099123

SECTION 131500 – SWIMMING POOLS

PART 1: GENERAL

- 1.1 RELATED DOCUMENTS
  - A. Drawings and General Provisions of Contract, including General Conditions and Division 1 of Specifications Sections, apply to work of this Section.
  - B. The following Divisions contain requirements that relate to this Section:
    - 1. Mechanical/Electrical/Equipment Coordination: General Conditions and Division 1
    - 2. Mechanical: Plumbing Systems Division 22
    - 3. HVAC Systems and Equipment Division 22 & 26
    - 4. Electrical: Division 26
    - 5. It is to be noted that certain specific Division 22 sections as they pertain to the pool process piping have been incorporated into this specification section. They should not be construed as limitations to the work to be performed in this specification and should be used in conjunction with other relevant specification sections as they relate to Division 13150. They in no way supersede or override the individual specification section containing similar information as it pertains to other aspects of the project
  - C. Applicable requirements of the following Specifications and Codes apply to Work of this Section:
    - 1. National Spa and Pool Institute (NSPI):
      - a. Minimum Standard for Public Swimming Pools
    - 2. All local building and health codes
    - 3. National Electrical Code (NEC)
    - 4. National Sanitation Foundation (NSF): Seal of Approval Program
    - 5. American Society for Testing and Materials (ASTM): Specifications referenced herein
    - 6. Department of Public Health (MDEQ)

### 1.2 DESCRIPTION OF WORK

- A. Work of this section includes, but is not necessarily limited to, the following:
  - 1. Demolition and salvage of existing pool process piping and equipment as indicated
  - 2. Re-piping of pool including, but not limited to, the following:

PARTNERS 15-163 SWIMMING POOLS 131500 - 2

- a. Balance tank plumbing
- b. Pool suction and return piping
- c. Main drain suction piping
- d. Gutter piping
- e. Filtration & chemical control piping
- f. All valves
- 3. Replacement of support and mounting hardware
- 4. Replacement of existing filtration system w/ new sand filtration system
- 5. Replacement of flow monitoring system
- 6. Replacement of hair and lint strainer
- 7. Replacement of chlorination system
- 8. Replacement of pH control system
- 9. Replacement of pool filtration pumps
- 10. Installation of new chemical feed control system
- 11. Installation of new main drain fisher valve and associated components
- 12. Installation of new automatic / manual pool fill
- 13. Replacement of thermometers
- B. Applicable Codes and Permits
  - 1. Department of Public Health permit to be paid for and obtained by the Contractor
    - a. Four (4) sets of sealed drawings to be provided by Architect
  - 2. County and Local Departments of Public Health permit(s) to be paid for and obtained by the Contractor (if applicable)
- C. Related Work Not in Section 13150 Specified Elsewhere:
  - 1. Potable or fresh make-up water. Division 22 to provide a backflow preventer or point of connection for Division 13 to obtain make-up water for pool fill piping
  - 2. Pool heaters. Division 22 to provide and install new heaters and piping as applicable. Division 13 to provide bypass and isolation valves and terminate in flanges (4") for connection by Division 22
  - 3. Pool electrical work: All electrical connections shall be by the General Construction Contract Electrical Sub-Contractor. The Pool Contractor shall provide the filter pumps, motors, solenoids, controllers, relays, water level probes (with housing), motorized valves, etc., as shown on Contract Drawings and required by pool systems equipment manufacturer. The Electrical Contractor shall install and wire all electrical equipment furnished by the Pool Contractor and shall provide all motor starters and disconnect switches as indicated or required by Codes. The Electrical Contractor shall provide grounding and bonding per NEC Article 680. Electrical requirements are indicated on SP drawings.
- D. Description of Alternates: Alternates to the base bid in relation to Division 13150 are as follows:
  - 1. Alternate #1: PROVIDE CHLORINE GENERATION UNIT

Base bid assumes the installation of a new calcium hypo-chlorite feeder, chemicals, piping and associated valves. Electrical requirements for this unit are a dedicated 110 volt, 20 amp single phase duplex outlet provided by Division 26 Contractor.

Alternate is to install a ChlorKing NexGen pH neutral chlorine generator and all components required for a complete installation. Inclue automatic TDS controller option.

Division 22 will need to provide a 2" vent (plastic) to atmosphere in the room for connection by Division 13.

Division 26 will need to provide a 240 volt, 30 amp single phase outlet (or hardwire unit control box). Division 13 to provide all inter system wiring.

### 1.3 QUALITY ASSURANCE

- A. Qualifications of Pool Contractor: Work of this Section shall be performed by a contractor who has a minimum of five (5) projects with a proven seven (7) year record of competence and experience in the construction/modification of similar facilities of this size and complexity. If not listed in the below pre-approved list below, prequalification is required prior to bid, no exceptions will be granted. This must be received by the Architect ten (10) days prior to the bid date on the appropriate AIA form. (AIA A305)
  - 1. Pre-approved pool contractor list (Pre-qualification submittal as listed above is not required):
    - a. Aquatic Source 248-366-0606
    - b. B & B Pools 734-522-7946
    - c. Baruzzini Construction 810-229-8996
- B. Performance Criteria: Certain sections of the Specifications contain performance criteria rather than product descriptions. It shall be the obligation of the Pool Contractor to ensure that all criteria are satisfied and the burden or proof of conformance shall rest with the Pool Contractor. The Architect/Engineer shall require complete calculations, past performance records and, if required, inspection trips of similar facilities to substantiate conformance with these criteria. The Architect/Engineer shall be sole judge of conformance, and the Pool Contractor is cautioned that he will be required to bid and provide a finished product meeting all stated criteria and meeting or exceeding Department of Public Health requirements and the intent of these specifications.
- C. All work of this Section shall be performed by the qualified Pool Contractor or a Subcontractor to the qualified Pool Contractor unless otherwise pre-approved in writing by the Architect. A representative of the Pool Contractor shall oversee work subcontracted by the Pool Contractor at all times that subcontractor provides work at the site

### 1.4 TESTING / FIELD QUALITY CONTROL

- A. Testing and Flushing of Piping: Test to insure that piping is free from leaks, defects and obstructions
  - 1. Contractor shall be responsible for discovering leaks and making necessary repairs:
    - a. Pressure piping and suction piping: After the piece is laid, the joints completed subject new lines to a hydrostatic pressure of not less than 50 pounds per square inch. Joints shall remain watertight under this pressure for a period of two (2) hours. All air must be expelled from pipes prior to testing.
    - b. Gravity lines: A water test shall be applied to all gravity drain piping systems, either in their entirety or in sections. All openings shall be tightly plugged and each system filled with water and tested with at least a 10 foot head of water (23 psi). The water shall be kept in the system, or in the portion under test, for at least fifteen (15) minutes before the inspection starts.

System shall be water tight at all joints.

- c. Provide test results to the Architect/Engineer before covering pipes or filling of the pool
- 2. Leaks shall be repaired and tested repeatedly until leakage or infiltration is approved
- B. Water Treatment
  - 1. Obtain a chemical analysis of the source/pool make-up water supply and submit to Architect/Engineer prior to ordering water treatment systems. Include the following:
    - a. Total Alkalinity/PPM
    - b. Calcium Hardness/PPM
    - c. Chlorine/PPM
    - d. PH
    - e. Iron
    - f. Copper
  - 2. Provide twenty four (24) buckets of calcium hypo-chlorite
  - 3. Provide for a complete fill of new CO2 600 gallon storage tank
  - 4. Should Salt alternate be accepted, provide for initial fill of brine tank and and additional twenty (20) bags of the specified salt
  - 5. Treat and balance pool water prior to turnover of pool to the Owner (using water and chemicals provided by the Contractor).
  - 6. Pool water: balance to establish a total alkalinity level of 60-125 PPM and calcium hardness level of 180-375 PPM (3 times alkalinity level).

### 1.5 SUBMITTALS

- A. Submittals Required
  - 1. Refer to General Conditions and Division 1 for number required.
  - 2. Refer to Section 13150, Parts 2 and 3 for submittal required.
  - 3. The Contractor shall submit for approval to the Architect/Engineer complete lists, including descriptions, catalogs, cuts, etc., and where applicable dimensioned shop drawings of all material, fixtures and equipment to be furnished and installed under this Specification. Submittals shall adequately and completely describe the equipment, including where necessary or requested complete construction and installation dimensions, complete capacity and performance data, all accessory and auxiliary equipment and all pertinent details of manufacture. Shop drawings for equipment shall be submitted, and approval of shop drawing shall be obtained before proceeding with fabrication or procurement. Shop drawings shall not be "doctored" reproducible(s) of Architects/Engineers drawings. Shop drawings and submittals shall be provided complete and bound in a 3-ring binder or as approved otherwise.
  - 4. Early identify all "schedule critical" submittals for A/E review as not to impose hardship on schedule

- B. Product Data: Provide manufacturer's/installer's written installation instructions.
- C. Certificates: Submit in duplicate a certificate from the manufacturer, properly attested, stating the material and construction comply with the requirements of the drawings and specifications. Certificates shall be furnished before the installation of the equipment.
- D. Shop Drawings:
  - 1. Submit shop drawings as required by Parts 2 and 3 of this Section.
  - 2. The drawings accompanying this Specification are essentially diagrammatic in nature and show the general arrangement of all equipment, piping, ductwork, services, etc. Because of the small scale of the drawings, it is not possible to show all offsets, fittings and accessories that may be required. The Contractor shall carefully investigate the structural and finish conditions of all his work and shall arrange such work accordingly; furnishing all fittings, pipe and accessories that may be required to meet such conditions. Where conditions necessitate a rearrangement, the Contractor shall obtain the Architect/Engineer's approval. Locate all valves for maximum operation accessibility and room for replacement between all fittings.
- E. Samples: Submit tile samples and other samples of materials, finishes and trim as may be requested by the Architect/Engineer.
- F. Schedule of Values: Provide A/E with Schedule of Values relevant to this project and relevant to Division 13 and this specification and accompanying set of drawings
- G. Valve Charts: Submit two (2) copies of valve charts for each piping system, consisting of Isometric Drawings, or piping layouts showing and identifying each valve and describing its function to the Architect/Engineer for approval.
  - 1. Upon completion of the Work, one (1) copy of each chart sealed to rigid backboard with clear lacquer placed under glass and framed, shall be hung in a conspicuous location in the equipment room
- H. Operation and Maintenance Manuals:
  - 1. Submit to the Architect/Engineer four (4) copies at substantial completion of the project.
- I. Furnish to the Architect/Engineer the following:
  - 1. Submittals
    - a. Water Treatment Analysis
    - b. Pumps
    - c. Strainers
    - d. Chlorinators
    - e. Chemical Controllers
    - f. Filters
    - g. Storage Tanks
    - h. Valves (TUBV, butterfly, actuated, solenoid, pilot, brass, etc.)
    - i. Gauges, Thermometers and Flow Meters
    - j. Water Level Controllers
    - k. Piping Materials (pipe, fittings, solvents, cements)
    - I. Pipe Hangers, Supports & Hardware

PARTNERS 15-163 SWIMMING POOLS 131500 - 6

- 2. Shop Drawings
  - a. Filters
  - b. Pneumatic Systems
  - c. Flow Cells
  - d. Pedestrian Grating(s)
- 3. Test Results
  - a. Piping Pressure Testing
- 4. Guarantees/Warranties
  - a. Standard 1-Year
  - b. Special Equipment Warranties (manufacturer extended)
  - c. Future 3-Days of Instruction and Operational Checkout
- 5. Close Out Documents
  - a. O & M Manuals
  - b. As Built Drawings
  - c. Owners Certification of Instruction

### 1.6 DELIVERY, STORAGE AND HANDLING

- A. Refer to General Conditions and Division 1 of the Specifications for additional requirements.
- B. Deliver all materials and equipment to the work site in original packages, fully identified with manufacturer's label. Store off ground and protect from weather with a suitable covering.
- C. Protect plastic pipe from exposure to chemicals (aromatic hydrocarbons, halogenated hydrocarbons and other esters and keytones) that might attack the material. Protect all pipe from mechanical damage and long exposure to sunlight during storage.
- D. Deliver all material to jobsite in a timely manner as not to impede construction schedule
- E. Store chemicals per manufacturer's written instructions
- 1.7 WARRANTIES
  - A. Warranty: Provide one (1) year warranty covering all pool workmanship, materials and equipment. Refer to General Conditions and Division 1 of the Specifications for additional requirements.
- 1.8 SUBSTITUTIONS
  - A. Refer to General Conditions and Division 1 -General Requirements.
  - B. Basis of Design: Specifications and drawings include specified manufacturers and specific model numbers. These are offered as the "basis of design." It is the intent of these specifications, not to limit the competitive bidding of like products, but to establish the minimum and specific criteria by which all proposed product substitutions shall be designed to. While variation from these products is allowed, Contractor shall be liable for the following:

- 1. Insure that differing products conform to the design specifications established by the "basis of design" product.
- 2. Assume liability for extra costs related to other divisions that interface with division 13 "basis of design" products that are substituted.
- 3. Costs of architect/consultant review time to insure products conform with the "basis of design" products
- 4. Any other costs to the project that relate to the substitution of the "basis of design" products shall be borne by this contractor.

PART 2: PRODUCTS

- 2.1 RECIRCULATION PIPING:
  - A. All pool recirculating plumbing and piping (unless noted otherwise) shall be rigid PVC Schedule 80 NSF Approved for potable water.
  - B. The pool contractor shall remain responsible for all pool piping installed for the operation of the pool for the duration of the project. Pay special attention to the dictated interfaces with Division 22 and provide connections and piping as required
  - C. All piping shall be provided at the maximum height possible to prevent encroachment into spaces requiring clear head room (or as shown on drawings). Maintain maximum head height possible.
  - D. Provide connections to existing plumbing as indicated using inside the fitting couplings and or standard socket couplings
  - E. All PVC piping is to be solvent welded with commercial grade glue and primer. NO PURPLE PRIMER IS ALLOWED
- 2.2 PIPING & EQUIPMENT HARDWARE:
  - A. Pipe clamps shall be stainless steel in construction
  - B. All hangers, threaded rods, supports, bolts, nuts, washers and anchors used are to be stainless steel in construction
  - C. All uni-strut and uni-strut components, including spring nuts are to be stainless steel in construction
  - D. All piping shall be installed so pipe does not move when pump is turned on and off. All piping shall be plumb and level. All hangers shall be placed at valve locations. Make allowances in all piping for expansion and contraction. Maximum spacing for pipe hangers is as follows:

SCH 80 PVC Piping	Max. Spacing	Round Rod Support (min.)
<sup>3</sup> / <sub>4</sub> " - 2"	5'-0"	3/8"
2 <sup>1</sup> / <sub>2</sub> " – 4"	6'-0"	1/2"
6"	6'-0"	3/4"
8" – 10"	6'-0"	7/8"
12" – 16"	8'-0"	1"

- 2.3 VALVES:
  - A. Butterfly Valves:
    - 1. All valves 2 <sup>1</sup>/<sub>2</sub>" or large are to be butterfly valves
    - 2. Acceptable Manufacturers:
      - a. Bray Series 30 Butterfly valves (basis of design)
      - b. Dominion by Neptune Benson
    - 3. All valves 6" and smaller shall have lever operators
    - 4. All valves 8" and larger shall have gear operators with wheels
      - a. All gear operated valves higher than 8'-0" A.F.F. shall have stainless steel chain fall operators
    - 5. Valve construction is to be as follows:
      - b. Body... Polyester coated cast iron
      - c. Disc.... Coated Ductile Iron
      - d. Stem.... 316 stainless steel
      - e. Seat.... EPDM food grade
  - B. Ball Valves:
    - 1. All valves 2" and smaller are to be ball valves
    - 2. Valves used in PVC pool plumbing are to be schedule 80 true union ball valves
    - 3. Valves used in copper plumbing are to be brass ball valves
  - C. Provide all specialty butterfly valves, check valves, solenoid valves, actuated valves and pilot valves as indicated on the drawings and in the valve schedule

### 2.4 HIGH RATE SAND FILTRATION EQUIPMENT

### A. Intent

- 1. Have installed a complete filtration and recirculation system for the swimming pool. It is intended to limit the bidding to a style of product and company that has a proven history and record of performance.
- 2. Due to the specialized nature of certain components required for this project, these specifications, in some instances, refer to various components by trade or manufacturers name.
- 3. Whenever a proprietary (trade) name is used within this Specification Section, it is used for informational purposes to describe a standard of required function, dimension, appearance and quality. References to materials by trade name, make or model number shall not be construed as limiting competition.

### B. Quality Assurance

- Due to the specialized nature of the specified work and products, all bidders shall be required to have a minimum of five (5) years of operating history. The equipment described herein shall be products of a manufacturer regularly engaged in the fabrication of filtration and recirculating systems for at least fifteen (15) years and shall be a professional engineering corporation.
- 2. The owner requires that filters bear the National Sanitation Foundation (NSF) seal for Standard #50. This NSF listing is required by the owner regardless of local health department regulations
- 3. The specified filter system shall have had an NSF listing for at least three (3) years prior to the project bid date.
- 4. As assurance that each item of apparatus is properly sized to perform in conjunction with each other, the owner requires bidders to use the filter manufacturer as a single source of supply for the items of equipment as listed and described herewith.

### C. Guarantee

1. The "EQUIPMENT SUPPLIER" shall guarantee that the equipment to be furnished is of the correct capacity, that the various parts are designed to operate correctly and in conjunction with each other, that if the installation is made in accordance with the project drawings and operated in accordance with the suppliers instructions, the system will perform the prescribed functions correctly, the water entering the pool will be clear, bright, free from suspended matter visible to the unaided eye, and will be sanitary to the satisfaction of all authorities having jurisdiction.

### D. Filter System

- 1. The filter system under this section shall be two (2) TR-140C sand filters by Pentair plumbed in series as detailed on the drawings.
- 2. It is the intent of these specifications to describe a filter system complete with all accessory items supplied and warranted by one manufacturer.
- 3. The primary components of the system consist of the main filter tank, hub and lateral assemblies, pressure gauge, lid, lid wrench, bleeder valve, bulkhead assemblies and tank drain.
- 4. All components and related subassemblies shall be factory assembled and tested prior to shipment.
- E. Filter System Capacity
  - 1. The filter system shall have a capacity of filtering 74,000 gallons in 6 hours at a rate of 205 gallons per minute.
  - 2. The system shall consist of two (2) tanks with a total effective filter surface area of 14.12 square feet and operate at a rate of 14.52 gallons per minute per square foot of filter area.
  - 3. The filter area shall be provided as specified and as listed in NSF-Standard 50 to provide the specific filter rate. No modification, manipulation or interpretation of these values shall be permitted.
  - 4. Note that any and all substitutions must fit through existing doors and corridors leading to the pump

room. Any modifications to these means of egress for filter placement shall be borne by the pool contractor, including restoration of these areas to pre-construction condition

### F. Filter Tanks

- 1. The filter tanks shall not be one-piece, fiberglass-reinforced tanks with UV-resistant surface
- 2. Tank shall have a heavy duty access lid with an integrated pressure gauge
- 3. Each tank shall be equipped with threaded bulkhead connections

### G. Media

Sand shall be a carefully selected grade of hard, uniformly graded silica material. Media shall be naturally rounded particles of silica or milled angularly shaped particles of silica quartz. Sand shall have a particle size between .45mm and .55 mm. (#20). No more than 1.5% shall be allowed to pass through a #40 sieve (.0164"). Uniformity coefficient shall not exceed 1.53. Specific gravity to be not less than 2.5. Filter shall contain enough sand to provide for 13 ½" of free board per manufacturers recommendation. Sand shall be delivered and stored in 50 pound bags (approximately one half cubic foot) for ease of handling and elimination of possible contamination. Media shall be free from minerals which may precipitate onto pool surfaces.

### 2.5 HAIR AND LINT STRAINERS

- A. Strainer body shall be entirely constructed of high strength vinylester fiberglass not less than ¼" in thickness. All exterior surfaces shall be impregnated with special UV stabilizers. The unit shall be equipped with a 4" influent connection and a 4" straight effluent connection. Connections shall be of typical construction with 1" thick fixed flanges. Flanged connections shall be ANSI standard dimensions.
- B. Strainer body shall include one (1) <sup>3</sup>/<sub>4</sub>" F.P.T. drain connection and (1) <sup>1</sup>/<sub>4</sub>" F.P.T. gauge connection (on the influent side). Unit shall include securing assemblies to permit easy opening and closing of strainer lid without the use of tools. Strainers with Influent connections 4" and smaller shall have four (4) securing assemblies. Strainers with Influent connections 5"-8" shall have six (6) securing assemblies. Strainers with Influent connections 10"-16" shall have eight (8) securing assemblies.
- C. Provide one (1) stainless steel basket and one (1) additional to serve as a spare. Basket shall be Type 304 stainless frame and mesh with 5/32" perforations and not less than 62% open area. Open area of basket shall be no less than 4 times greater than the influent connection. Strainer basket shall have a welded intermediate baffle to reduce cleaning frequency. Basket handle shall be 1/8" in thickness. Strainer basket shall have a 20-25 mil electrostatic applied powder coat finish.
- D. Strainer lid shall be 1" thick transparent acrylic machined to eliminate sharp edges and house securing assemblies. Lid shall be grooved to house rubber gasket. Lid shall be seated with a 1/8" thick, full faced 40 durometer neoprene rubber gasket. Strainer lids on units with 10" connections and larger shall include a stainless steel cross brace.
- E. Strainers with Influent connections up to 8" shall be pressure tested to 50 psi. Strainers with Influent connections 10" and up shall be pressure tested to 30 psi, as manufactured by Neptune-Benson.

### 2.6 RECIRCULATION PUMPS

- A. The specifying engineer reserves the right to specify a primary supplier / lead spec manufacturer on all supplied schedule and specification documents. These primary suppliers have led their respective industry in research and development and their products have had proven track records in the field. These primary suppliers, in the opinion of this engineering firm, produce a superior product to the alternately listed manufacturers. The contractor may choose to supply equivalent equipment as manufactured by the alternately specified manufacturer. This alternately specified equipment shall be supplied on an alternate basis and based on the approval of the supplied alternate manufacturer's submittals. The use of a primary supplier and deduct alternates protects the specifying engineer's design concept, but allows for a check-and-balance system to protect the post-commissioning owner.
- B. Contractor shall furnish and install new close-coupled foot mounted end suction pump for pool process water as indicated on the drawings. Pumps shall be Model e-1531 as manufactured by Bell & Gossett under base bid. Equivalent units as manufactured by other manufacturers may be submitted as alternates. Pumps shall meet types, sizes, capacities, and characteristics as scheduled on the Equipment Schedule drawings. Pump substitutions shall be provided with connection sizes equal to those scheduled. Pump connections shall not be downsized. Pump substitutions shall not be provided at efficiencies less than those scheduled.

## C. COMPONENTS

- The pumps shall be close-coupled, foot mounted, single stage, end suction, in cast iron stainless steel fitted construction specifically designed for quiet operation. Suitable standard operations at 225° F and 175 PSIG working pressure or optional temperatures to 250° F working pressures shall not be de-rated at temperatures up to 250° F.
- 2. The pumps shall have a solid alloy steel shaft that is integral to the motor. A stainless steel shaft sleeve shall be employed to completely cover the wetted area under the seal.
- 3. The motor bearings shall support the shaft via heavy-duty grease lubricated ball bearings.
- 4. Pump shall be equipped with an internally flushed mechanical seal assembly installed in an enlarged tapered seal chamber. Seal assembly shall have Buna bellows and seat gasket, stainless steel spring, and be of a carbon / ceramic design with the carbon face rotating against a stationary ceramic face.
- 5. Motor shaft shall connect to a brass or stainless steel impeller. Impeller shall be hydraulically and dynamically balanced to ANSI/HI 9.6.4-2009, ISO 1940 balance grade G6.3, keyed to the shaft and secured by a stainless steel locking caps crew.
- 6. Pump should be designed to allow for true back pull-out access to the pump's working components for ease of maintenance.
- Pump volute shall be of a cast iron design for HVAC systems rated for 175 PSIG with integral cast iron flanges drilled for 125# ANSI companion flanges NPT pipe. Volute shall include gauge ports at nozzles, and vent and drain ports.
- 8. Motors shall meet scheduled horsepower, speed, voltage, and enclosure design. Motors shall be TEFC. Motors shall be at least 90% efficiency. Motors shall have heavy-duty grease lubricated ball bearings to offset the additional bearing loads associated with the closed-coupled pump design. Motors shall be non-overloading at any point on the pump curve and shall meet NEMA specifications.

- Pumps shall conform to ANSI/HI 9.6.3.1-2012 standard for Preferred Operating Region (POR) unless otherwise approved by the engineer. The pump NPSH shall conform to the ANSI/HI 9.6.1-2012 standards for Centrifugal and Vertical Pumps for NPSH Margin.
- 10. Pump shall be of a maintainable design and for ease of maintenance should use machine fit parts and not press fit components.
- 11. Pump manufacturer shall be ISO-9001 certified.
- 12. Each pump shall be factory tested and name-plated before shipment.
- 13. Suction and discharge of pumps shall be fitted with vibration couplings as indicated on the drawings.
- 14. Install pumps on existing pump pad. Modify pad as indicated and as necessary to provide for adequate support
- 2.7 SWIMMING POOL WATER CHEMISTRY CONTROL

## A. SUMMARY

- 1. A PROGRAMMABLE CHEMICAL AUTOMATION SYSTEM shall be supplied for continuous monitoring of water chemistry
- 2. (ORP, PPM, pH and Temperature), Langelier Saturation Index and temperature and for automatic control of the chemical feeders and heater. The controller shall include a programmable microprocessor with an eight (8)-line display screen and a sixteen (16)-key keyboard for operator access.
- 3. The system shall be a <u>CHEMTROL™ PC3000 PROGRAMMABLE CONTROLLER</u> of current design and model manufactured by SANTA BARBARA CONTROL SYSTEMS of Santa Barbara, California or a technically equal system certified by the specifying agent as capable of providing equal performance for all operating functions.
- 4. Exceptions to the specifications shall be described in detail together with a list of ten (10) similar operating systems of same model and manufacture, with the name, address and telephone number of operating personnel in the State of Michigan

# **B. SPECIFICATIONS**

- The controller shall automatically activate the appropriate chemical feeders in order to maintain the sanitizer level within +/-0.1 parts per million (PPM) or +/- 10 mV (millivolts) of Oxidation-Reduction Potential (ORP) and the pH within +/- 0.1 pH unit of the set points selected by the operator. ORP and Sanitizer functions shall include seven-day, level-based chemical saver programs. All setpoint and calibration levels shall be adjustable with a numeric keypad mounted on the front panel of the unit. Controllers with internal switches or calibration adjustments will not be considered equal.
- The controller shall be capable of actuating all outputs in the following operator-selectable modes: off, manual, automatic and timer cycle. In the automatic mode, the operator shall be able to choose between on/off control with adjustable dead band or proportional feed control with adjustable dead band and progressive control zones.

- 3. The controller shall include a programmable seven-day shock program with operator selectable ON and OFF times for each day of the week and optional separate chemical feeder relay control.
- 4. The controller shall include automatic control of a chemical feeder for Automated Chloramine Treatment (A.C.T.). This will require the optional PPM sensor for chlorine control.
- 5. The controller shall have the capability to operate an Ozone generator utilizing an internal spare relay with high ORP lockout.
- 6. The controller shall include a temperature sensor and automatic control of the heater with a seven-day energy saver program.
- 7. The controller shall continuously calculate and display the Langelier Saturation Index using either sensor data and/or manual input for pH, temperature, total alkalinity and calcium hardness. The resulting calculated water condition shall be displayed on the main screen as either "Scaling", "Corrosive" or "OK".
- 8. The controller shall be contained in a NEMA Type 4X (rain and splash proof) lockable fiberglass cabinet with an LCD graphicdisplay screen of eight (8) lines of twenty two (22) alphanumeric characters. The main screen shall display current readings, control modes and operational status for ORP, PPM, pH, temperature (flow rate, influent and effluent pressure displays available with optional installation.) A 16-key touch pad shall be provided for direct access to all the menus and submenus and for entering numerical data. Controllers with smaller displays or displays that require scrolling through menus will not be considered equal. All screens shall have the capability of being displayed at any time in unabbreviated English, French or Spanish and in US or metric units.
- 9. The sensor bypass line shall include an in-line filter, a flowmeter, a safety flow switch, a sampling spigot and two flow control valves, or shall include a flow cell assembly with a safety flow switch.
- 10. The controller shall be factory set to water treatment industry standards. The operator shall be able at any time to adjust all programmable functions to preferred settings. The controller shall have a reset mode to reset all or selected functions to the original factory standards.
- 11. The controller shall have the capability to calibrate all sensor inputs, depending on the accuracy needed, using 1-, 2-, or 3-point calibration to determine respectively the origin, slope and curvature of the calibration curve.
- 12. The controller shall include programmable high and low alarm levels for all control functions with operator-selectable feed lockout and alarm buzzer options. A Remote Alarm relay shall be included in parallel with alarm buzzer for operator selectable voltage or dry contact output.
- 13. The controller shall continuously monitor and alert for failure of ORP and pH probes using dynamic probe testing before the water chemistry gets out of range. Failure alarms based on safety timers or out-of-range alarms will not be considered equal.
- 14. The controller shall include a seven (7) day program for automatic sensor cleaning.
- 15. The controller shall record and display the elapsed run time for each activation event and a cumulative run time reset table at any time by the operator. The controller shall provide for operator-adjustable event run time limits and total run time alarms for all control functions.
- 16. The controller shall include a memory storage battery with minimum reserve power for six (6) months.

PARTNERS 15-163 SWIMMING POOLS 131500 - 14

- 17. The controller shall include an on-board memory chip for storing of test data on operator-selectable schedules. RS-232 serial communications port shall be included for on-site downloading of the test data. Test data storage must consist of the following sensor inputs: ORP, PPM, pH, Temperature (Conductivity or TDS, Pressure influent of filter, Main flow rate available with optional sensors). The controller shall insert a test data every time power is turned on to indicate power failures. Controllers failing to data log all listed parameters will not be considered equal.
- 18. The controller shall include an on-screen visual display of all test data logged in memory. Controllers that require the use of external accessories or equipment, such as portable computers or remote access computers, to retrieve or display test data shall not be considered equal.

## C. REQUIRED CONTROLLER OPTIONS

- <u>PPM SENSOR</u>: A solid-state PPM SENSOR shall monitor and display the Free Chlorine concentration in water in ppm or mg/l and shall be used to control the chlorine feed device. The sensor readings must be accurate to 0.01 PPM and must not be affected by Cyanuric Acid and/or oxidizers. PPM values derived from ORP sensor readings shall not be acceptable. The PPM sensor shall not require the use of chemical reagents and/or of a special flow cell for water flow and pressure regulation. This option is required for all A.C.T. programs.
- <u>TDS3</u>: The controller shall include a conductivity/temperature sensor for display of TDS in parts per millions or conductivity in micro Siemens/cm. It shall automatically control a water dump valve for automatic purging of saturated water, or injection of a saline solution in for use with salt chlorine generator. The controller shall also monitor and display the water temperature in degrees Fahrenheit or Celsius with adjustable high and low alarms.
- 3. <u>SCA</u>: The ORP and pH sensors shall be mounted in a see-through flow cell with a clear cover located inside a lockable fiberglass enclosure with a window. Optional Temperature and TDS sensors will be mounted on corner Tee in-line with flow cell.
- 4. <u>WEBSERVER</u>: The controller shall be equipped with a modem and capability to be controlled and monitored from any remote computer or device with a web browser. Manufacturer of controller to provide hosting of the site and the controller at no charge to the Owner. System to be capable of sending text messages and e-mails to selected contacts in case of controller alarm.

### D. WARRANTY

- The controller shall be covered by a standard manufacturer warranty of five (5) years. Special extensions
  of more limited warranties shall not be considered acceptable. All sensors will be covered by a standard
  one (1) year warranty. Other parts shall be covered by their own manufacturer's warranty. The controller shall not require a service technician for annual calibration, seasonal start up, or whenever chemicals supplier or type are changed.
- 2. The manufacturer shall supply a complete instruction, operating and maintenance manual. Check-out of installation, start up, and instruction of operating personnel shall be performed by an authorized and

properly trained manufacturer representative.

### 2.8 CO2 pH CONTROL SYSTEM

- A. Provide 600 gallon storage tank for system. Tank to be chained to the wall for security. Provide tubing and accessories to incorporate an exterior surface mounted fill box to the system. Box to be corrosion resistant and tamper proof.
- B. Feed unit shall be a single tank C02 metering system and take nominal 800 psi pressure from direct reading pressure gauges. One gauge shall read tank pressure. The other shall read regulated by a T-bar. Unit shall be tank mountable and shall connect to C02 cylinders by 3/16" I.D. braided tubing rated for not less than 1000 psi. Discharge from unit shall be through thick watt 3/8" OD polyethylene tubing to the feed unit.
- C. C02 from the pressure reducing valve shall be brought to the feed unit in thick watt 3/8", OD polyethylene tubing. Feed system shall include 120 volt AC solenoid operated valve for remote on/off control of C02 feed. C02 feed unit shall also include rate adjusting flow meter scaled from 0-30 SCFH and have a pressure rating of 100 psi.
- D. C02 from feed unit shall be injected through ½" NPT fitting. Unit shall cause C02 to be totally diffused and made to go fully into solution without evidence of C02 bubbling at any point where water is open to atmosphere. Unit must be equipped with a check valve to prevent the flow of water into the feed unit.
- E. Unit shall be tied into the 110 volt relay powered by the automated chemical feed system

### 2.9 AUTOMATIC MAKE-UP WATER LEVEL CONTROLLER

- A. Pool water level shall be maintained by an automatic make-up level controller by Jandy, model # K-1100 'Levolor.'
- B. Control panel to be 110 volt
- C. Sensor wire and sensor to be 24 volt compatible. Sensor to be mounted in surge tank at proper level and be adjustable without the use of small tools
- D. Provide a 1" slow close, 24 volt solenoid and install in auxiliary loop off of main water fill

### 2.10 POOL SANITATION EQUIPMENT

- A. Base Bid for pool sanitation is a calcium hypo-chlorite feeder
- B. Provide add alternate for specified chlorine generator
- C. Calcium Hypo-Chlorite Feeder:
  - 1. General Description
    - a. The system shall be designed to feed low concentrations of calcium hypochlorite in solution intermittently or continuously as required for pool and spa applications. The system shall be a single pre-assembled, package unit with a welded aluminum frame consisting of chlorinator, electrical box, centrifugal pump, and balance tank for ease of installation and operation. The system shall be the PowerBase Model #3075 by Axiall Corporation. Only Accu-Tab® Blue SI

calcium hypochlorite tablets by Axiall Corporation shall be used, with the patented solution modifier and the patented blue colorant added for safety (to help prevent accidental mixing with other chemicals).

- b. The base proposal requires furnishing equipment as specified herein, though substitutions will be considered. The bidder is cautioned that substitutions must meet the quality and operational requirements of each feature specified below. Batch systems with pressure mixing components producing chlorine concentrations exceeding the limits of the specifications will not be considered.
- c. Any system offered shall use an NSF Standard 50 listed erosion feeder and tablet combination, and shall be capable of meeting all requirements of the Health Department having jurisdiction over the installation.
- 2. System Features
  - a. A maximum chlorine solution level of 0.05% (500 ppm) shall be maintained to prevent calcification in system components. Systems producing chlorine concentrations higher than 0.05% shall not be acceptable.
  - b. Delivery shall be by erosion feed technology to control accurate and consistent concentration limits in the chlorine treatment solution. Soaking type, spray and/or vortex technology systems shall not be acceptable.
  - c. The chlorinator shall automatically and continuously feed a limited quantity of chlorine in solution as needed; when the system is not running, no more chlorine than that amount which can be fed in one minute or less shall be left in the tank to prevent dilution. Batch systems preparing excess quantities of solution for delivery over an extended period shall not be acceptable.
  - d. A centrifugal pump wired to the system electrical box shall feed freshly mixed chlorine treatment solution only as required for maximum efficiency. Batch systems requiring the use of a metering pump or pumps to feed pre-prepared standing solution shall not be acceptable.
  - e. All piping in the chlorinator unit shall be Schedule 40 PVC. Systems with flexible tubing shall not be acceptable.
- 3. System Components
  - a. Tablet Chlorinator. Accu-Tab® chlorinators by Axiall Corporation are designed exclusively for Accu-Tab® Blue SI calcium hypochlorite tablets by Axiall Corporation. Tablets are placed on a sieve plate inside the chlorinator; as water flows across the sieve plate, the tablets erode at a rate proportional to the flow rate.
  - b. Inlet Water Supply Connection. Model 3075, 1-1/2" FNPT (water supply of 30 GPM required)
  - c. *Inlet Solenoid Valve.* Opens and closes on command when the system receives a signal. 110 VAC required.
  - d. Flow Meter. A rotameter (flow-through) flow meter, measuring the flow of the water-dissolving

stream to the chlorinator.

- e. *Flow Control Valve*. PVC gate valve mounted in line with the flow meter allows operator to adjust flow of water-dissolving stream.
- f. Solution Tank. PowerBase units made of high-density polyethylene, PowerBase AT units made of PVC. Capacities: Model 3075, 22 gallons
- g. Primary Solution Tank Level Control. Made from Schedule 80 PVC and 316L stainless steel, this 1" float valve meters the tablet by-pass flow. The by-pass stream balances the variation in the water-dissolving stream. The float valve opens or closes to maintain the pump rate as it is manually throttled.
- Secondary High Level Solution Tank Control. Prevents the solution tank from overflowing. High level: when activated, a switch opens the circuit to the solenoid valve, causing the valve to close.
- i. Solution Delivery Pump. Delivers chlorinated solution to the return line. A single-stage centrifugal pump is provided for systems with pressures up to 20 PSIG. (For systems requiring a discharge pressures greater than 20 PSIG, a custom selected pump shall be utilized.)
- j. Solution Injection Pump Air Bleed. Used to prime the pump at start-up, or at any time, if necessary.
- k. *Primary Backflow Prevention.* A PVC-spring-assisted check valve prevents reverse flow of water into the system.
- I. Discharge Control Valve (manual). Used to balance system output water flow with system input water flow.
- m. Outlet Connection. Model 3075, 1-1/2" FNPT
- n. Nema 4X Electrical Enclosure.
- o. Aluminum Frame, Type 6061-T.
- 4. Electrical Requirements
  - a. Two electrical circuits are required for operation: (1) 110v 20 amp power, and (1) 110v control circuit from a pool controller.
  - b. Division 26 is to provide receptacle for pump operation
  - c. Pool contractor is to provide power wiring between unit and chemical controller
- 5. Warranty
  - a. The manufacturer shall guarantee in writing that this unit, if operated in accordance with written instructions given and accepted by the Owner, will perform in complete accord with the speci-

fications. All components will be warranted against manufacturers' defects for twelve (12) months from its original installation date or thirteen (13) months from its Axiall Corporation shipment date, whichever first occurs.

- D. Chlorine Generator:
  - 1. The NEXGEN on-site chlorine generator shall be a ChlorKing model #10 or equal.
  - 2. Summary
    - a. The package system shall consist of one (1) pH neutral on-site chlorine generator. The design of the system shall be such that pool water is the supply water and pool water is chlorinated directly by the NEXGEN system. Chlorine shall not be distributed to a secondary storage tank. Chlorine generators that require fresh water and water softeners shall not be accepted as equal. The system shall be completely factory piped and shall have a magnetic drive circulating pump, heat exchanger, blower, electrode stack[s], flow switches, air flow sensors, actuated ball valve and water cooled power supply. The NEXGEN system shall be capable of monitoring the pH and salt levels of the incoming swimming pool water and adjusting the chlorine produced as required to maintain pH in the range of 7.0 8.0, and salt in the range of 5,000 7,000ppm inside the chlorine production tank. The entire package shall be skid mounted, pre-piped, assembled, and output tested and ready for installation. The manufacturer shall verify proper operation of the cells and all controls by connection to water for a factory test prior to shipping.
    - b. Request for substitution for the specified make and model will not be considered unless equal to the specified system in every respect and must be submitted to the specifying agent not less than 10 calendar days prior to bid date. Requests for substitution must include a sample system with all specified features; complete documentation relating to all the specified features; and manufacturer's sales literature, engineering drawings, and installation, operation, and maintenance manuals. Failure to provide these or any other information necessary to confirm that all specified features are provided will be cause for rejection of substitution request

# 3. Certifications

a. The NEXGEN shall be certified and listed by NSF International under the latest edition of the NSF/ANSI standard 50. The NEXGEN shall be ETL listed by Intertek and certified to UL 1081.

# 4. Construction

- a. The NEXGEN shall be constructed on a heavy gauge steel skid assembly, primed and prepainted on both sides. A chlorine generating tank shall be mounted on the skid encompassing a heat exchanger coil, toroidal conductivity probe and pH probe.
- b. Between 1 and 4 electrode stack assemblies [model specific], housed in clear schedule 40 PVC shall be mounted on the skid, plumbed in 2" schedule 80 PVC pipe with a circulation loop to and from the chlorine generating tank.
- c. A magnetic drive circulating pump shall be mounted on the skid to circulate water through the electrode stack assemblies into the chlorine generating tank. The pump shall be factory wired and controlled by the NEXGEN power supply.

- d. A titanium flow sensor shall be factory mounted in the circulation plumbing to not allow the NEXGEN to operate when there is not sufficient flow.
- e. A blower shall be mounted on the skid and plumbed using 2" schedule 80 PVC into the top of the chlorine generating tank. A second vent line shall be run from the top of the chlorine generating tank to atmosphere for the removal of hydrogen.
- f. A titanium air flow sensor shall be factory mounted in the pipe between the blower and the chlorine generating tank to not allow the NEXGEN to operate when there is not sufficient air flow.
- g. A pressure switch shall be mounted on the skid and plumbed into the swimming pool return line to not allow the NEXGEN to operate when there is not sufficient flow in the return line.
- h. Stenner peristaltic pumps shall be mounted on the skid and plumbed into the chlorine generating circulation loop on the skid, to inject acid for pH control and salt addition. The pumps shall be powered from the NEXGEN power supply.
- i. Grade 2 titanium with ruthenium dioxide high efficiency coating shall be used for the electrode stack[s] construction with a minimum 4mm plate spacing for reliable operation in swimming pool water applications.

### 5. Valves

a. An actuated ball valve shall be factory mounted on the skid to allow chlorine flow to the pool on demand, through the use of a pressure drop venturi factory mounted on the skid.

### 6. Controls

- a. The NEXGEN shall utilize 24 VDC control circuit and components. The control system shall have an electronic display for NEXGEN set-up, status and diagnostics.
- b. The NEXGEN system shall have an LCD touch screen display showing vitals of the system operation. A control signal from an external ORP/PPM controller shall activate a relay allowing for chlorine generation. Supply voltage shall be 208-240 volt/60 hertz/ single phase.
- c. Touch screen interface shall be equipped to display cell voltage, cell amperage, salt concentration, water temperature, pH and feed modes.
- d. Touch screen historical reports shall have access to recorded events log displaying every event/action made by the NEXGEN system in the last 365 days, including run times, alarms, on/off status, user commands, external ORP/PPM/HRR controller run requests, water temperature, pH records and fault reports with corrections.

### 7. Electrical Controls

- a. The NEXGEN shall be equipped with a high voltage terminal strip for supply voltage. Supply voltage shall be 208-240 volt/60 hertz/ single phase. This circuit and connection is to be provided by Division 26
- b. A booster pump (not factory mounted on the skid) shall be installed prior to the incoming water

to the NEXGEN system to provide adequate flow. The booster pump shall be field wired to the terminal block located in the NEXGEN power supply. This wiring and interlock is to be provided by the Pool Contractor.

c. An external PPM/ORP/HRR controller shall be connected to the "blue power cord" located on the NEXGEN power supply. This wiring and interlock is to be provided by the Pool Contractor.

### 8. Venting

- a. Rigid PVC or CPVC pipe from the top of the chlorine generating tank to atmosphere in a continuous upward gradient. The NEXGEN's total combined exhaust venting length shall not exceed 100 equivalent feet.
- b. Division 22 shall provide 2" stub into the pool mechanical room that runs to atmosphere
- c. Pool contractor to connect to stub and run pipe to equipment and make final connection
- 9. Operations & Ratings
  - a. The NEXGEN shall be capable of producing 10 lbs of equivalent 12% chlorine in a 24 hour period (as certified by NSF international)
  - b. The NEXGEN shall be capable of operating in air temperatures between 35 F and 115 F and water temperatures between 40 F and 104 F.
- 10. Commissioning
  - a. A factory trained and certified service technician (through ChlorKing training) shall perform commissioning of the NEXGEN on-site chlorine generating system.
  - b. Printed and bound operating, installation and service manuals shall be supplied with the NEXGEN.
  - c. Provide a full salt tank with installation as well as twenty (20), 40 lb. bags of Solar Salt

### 11. Warranty

- a. 3 year limited warranty
  - i. 2 year pro-rated warranty on the electrode plates (cells)
  - ii. 1 year warranty on electrical items
- b. Manufacturer must maintain spare or replacement parts in the USA for next day delivery.
- 12. Back-Up Chlorination
  - a. As part of the installation provide a back-up chlorination system consisting of the following components:
    - i. 45M5 110 volt Stenner chemical metering pump that can be tied into the chemical controller feed in case of emergency
    - ii. 20 gallon double containment storage tank to put liquid chlorine in in case of emergency

iii. Tubing and injector with an isolation valve that can be turned on and activated to use in case of emergency

## 2.11 SYSTEM ACCESSORIES

- A. System Flow Meter
  - 1. The flow sensor shall be a Georg Fischer Signet, blue cap model 2536 or equal.
  - 2. Sensor shall be capable of sensing flow in either direction (bi-directional).
  - 3. The flow sensor shall be insertion paddlewheel, with an electrical output signal proportional to flow velocity over a range of 0.3-20 feet per second. The output signal shall be an open-collector transistor pulse.
  - 4. Signal transmission lengths shall be capable of distances up to 1000 feet.
  - 5. Sensor shall operate with a power input of 3.3 24 vdc, with a maximum current draw of < 20 mA.
  - 6. The sensor shall utilize an Installation Fitting that is factory set to control proper flow sensor insertion depth, and orientate sensor to be parallel with fluid flow. Fitting to be a schedule 80 PVC clamp on saddle specifically designed so that flow meter insertion is at the proper depth for correct operation.
  - 7. With a fully developed flow profile the sensor output shall be linear to  $\pm 1\%$  of full range, with a repeatability of  $\pm 0.5\%$  of full range, and supplied with a certificate traceable to N.I.S.T.
  - 8. Three optional sensor lengths shall allow the flow sensor to install into pipes from 0.5 to 36 inches.
  - 9. The sensor body materials shall be glass-filled polypropylene (black) or PVDF (natural).
  - 10. The flow sensor shall be equipped with dual o-ring seals. The elastomeric seals shall be FPM-Viton® (standard) with optional EPDM or FFPM-Kalrez®.
  - 11. Rotor pins shall be Titanium (standard for PP), Hastelloy-C or PVDF (standard for PVDF), with optional ceramic, Tantalum, or stainless steel.
  - 12. Rotor material shall be black PVDF (standard for PP) or natural PVDF (standard for PVDF) with optional Tefzel® with or without Fluoraloy B® sleeve.
  - 13. Sensor shall be wired into the new chemical controller for correct display of flow on the main screen without having to drive into the controller menus
  - 14. Install with at least 10 times the pipe diameter in distance upstream of the nearest pipe disturbance and 4 times downstream (in accordance with manufacturers written specifications)
- B. Backwash Flow Meter
  - 1. Install a model F-300 flow meter by Blue & White on the backwash line that can be read from ground level
  - 2. Install with at least 10 times the pipe diameter in distance upstream of the nearest pipe disturbance and

PARTNERS 15-163 SWIMMING POOLS 131500 - 22

4 times downstream (in accordance with manufacturers written specifications)

- C. Gauges
  - Install a heavy duty, 4" face diameter, ¼" NPT bottom connection, liquid filled compound gauge 0-30 Hg & 0-30 psi with an isolation snubber and petcock on the suction side of the pump(s) and discharge side of the pump(s). Two are required
- D. Thermometers
  - 1. Install three (3) 6.5" Trerice, 2" in-line straight thermometers and brass wells
    - a. Install one in the heater outlet line
    - b. Install one in the heater inlet line
    - c. Install one on the mixed water return line

END OF SECTION 131500

## SECTION 200010 - BASIC MECHANICAL REQUIREMENTS

## 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 APPLICATION

- A. This section applies to all mechanical work. The contractors involved shall check all sections of the specifications in addition to the particular section covering their specific trade. Each distinct section of the specifications aimed for one trade may have detailed information with regards to other trades, therefore, it is imperative that all sections be reviewed to get a complete picture of all other trades' functions and work required
- B. The mechanical contractor is responsible for the installation and operation of the hvac systems and temperature control systems.
- C. The mechanical contractor is responsible for receiving, unloading and placement of all of the owner provided equipment.

## 1.3 DRAWINGS

- A. The drawings are diagrammatic and show general location and arrangement of all the equipment and piping.
- B. Do not scale drawings for measurements.
- C. Field verifications of actual existing conditions are required by the contractor since actual locations, distances, and levels will be governed by actual field conditions. All measurements shall be verified at the site.
- D. Examine the drawings of other trades and verify the conditions governing the work on the job site. Arrange work accordingly, providing such fittings, traps, valves and accessories as may be required to meet such conditions.
- E. If during field verification, the contractor identifies that there may require substantial changes from the original plans, the contractor shall notify the architect for agreement on necessary adjustment before the installation is started
- F. Discrepancies shown between plans, or between plans and actual field conditions, or between plans and specifications shall promptly be brought to the attention of the architect for a decision.
- G. Drawings and specifications are intended to cover the completed installation of systems to function as described. The omission of the expressed reference to any item of labor and material necessary to

comply with practice codes, ordinances, etc., shall not relieve the contractor from providing such additional labor and material at no cost to Owner.

- H. The drawings show the location and general arrangement of equipment, piping and related items. They shall be followed as closely as elements of the construction will permit.
- I. Deviations from the drawings, with the exception of minor changes in routing and other such incidental changes that do not affect the functioning or serviceability of the systems, shall not be made without the written approval of the Architect.
- J. The architectural and structural drawings take precedence in all matters pertaining to the building structure, mechanical drawings in all matters pertaining to mechanical trades and electrical drawings in all matters pertaining to electrical trades. Where there are conflicts or differences between the drawings for the various trades, report such conflicts or differences to the Architect for resolution.

## 1.4 PERMITS

A. Unless otherwise indicated, all required permits, licenses, inspections, approvals and fees for mechanical work shall be secured and paid for by the contractor. All work shall conform to all applicable codes, rules and regulations.

## 1.5 CODES

- A. All work shall be executed in accordance with the rules and regulations set forth in local and state codes. Prepare any detailed drawings or diagrams, which may be required by the governing authorities. Where the drawings and/or specifications indicate materials for construction in excess of code requirements, the drawings and/or specifications shall govern.
  - 1. Michigan Mechanical Code, 2012.
  - 2. Michigan Plumbing Code, 2012.

### 1.6 MAINTENANCE

- A. Provide 40 hours of instruction to the owner's designated personnel in the maintenance and operation of equipment and systems.
- B. Provide complete maintenance and operating instructional manuals covering all mechanical equipment herein specified, together with parts lists. Maintenance and operating instructional manuals shall be job specific to this project. Generic manuals are not acceptable. Four (4) copies of all literature shall be furnished for owner and shall be bound in book or ring binder form. Maintenance and operating instructional manuals shall be provided when construction is approximately 75% complete.

## 1.7 WARRANTY AND GUARANTEE

A. Contractor shall guarantee all work installed by him or his subcontractors to be free from defect in material and workmanship for a period of one year from date of final acceptance of the work, unless a longer period is stipulated under specific headings. Contractor shall repair or replace at no additional cost to the owner, any material or equipment developing defects and shall also make good any damage caused by such defects or the correction of defects. Repairs or replacements shall bear additional guarantee, as

originally called for, dated from the final acceptance of the repair or replacement. This requirement shall be binding even though it will exceed product guarantees normally furnished by some manufacturers. Contractor shall submit his own and each equipment manufacturers written certificates, warranting that each item of equipment furnished complies with all requirements of the drawings and specifications. Note that guarantee shall run from date of final acceptance of the work, not from date of installation of a device or piece of equipment.

## 1.8 SUBMITTALS

- A. Types of submittals include the following:
  - 1. Shop Drawings
  - 2. Product Data Sheets
  - 3. Samples
  - 4. Manufacturers Instructions
  - 5. Maintenance Data
  - 6. Warranty
- B. Installation of any item that requires submittal approval by the engineer shall be installed at the contractors risk. The contractor, at his cost, shall remove all work installed prior to approval of the submittal.
- C. The engineer will not be responsible for errors in quantities, or dimensions required to fit the job condition, details of fabrication to insure proper assembly at the job, or for errors resulting from mistakes in submittals.
- D. For underground piping, record dimensions and invert elevations of all piping, including all offsets, fittings, cathodic protection and accessories. Locate dimensions from benchmarks that will be preserved after construction is complete.
- E. Product data cut sheets shall be submitted on the material and equipment as requested in these specifications.

### 1.9 RECORD DRAWINGS

- A. Record drawings shall be maintained by the contractor up to date as the project progresses.
- B. Recording all deviations from the contract documents, indicate exact locations of all buried services both inside and outside of the building; include concealed piping and equipment in the entire contract. Final record drawings shall reflect the as-built conditions.

# 1.10 QUALITY ASSURANCE

- A. Other referenced standards:
  - 1. Comply with referenced standards, guidelines, data sheets from various associations, including NFPA, ANSI, ASTM, ASME, ASHRAE

PARTNERS 15-163 Hamtramck Public Schools Pool Equipment Room 200010 - 4

# PART 2 PRODUCTS

### 2.1 SLEEVES AND ESCUTCHEONS

A. Provide sleeves wherever pipes pass through exterior wall, and floors. Sleeves shall be schedule 40 steel pipe cut to length. Sleeves shall terminate flush with walls, partitions and ceilings in finished areas. All sleeves through floor shall extend 2" above floor. Provide cast brass nickel-plated escutcheons with positive catches on each visible sleeve penetration. Sleves are to be sealed at each installation with a 3M approved sealant. The space between the inside of the sleeve and the outside of the pipe or conduit with in the sleeve shall be sealed at each installation with a 3M approved sealant.

### 2.2 DIELECTRIC UNIONS

A. Dielectric unions shall be used to connect dissimilar metals (such as steel and copper) to prevent electrolytic action.

### 2.3 FILTERS

A. Provide and maintain filters in air handling systems throughout the construction period and prior to final acceptance of the building. Do not run air handling equipment without all prefilters and final filters as specified. Immediately prior to final building acceptance by the owner, contractor shall replace all disposable type air filters with new.

### 2.4 BUILDING ATTACHMENTS FOR MECHANICAL WORK SUPPORTS

- A. General Requirements:
  - 1. Provide building attachments required for supporting mechanical work, suitably selected and installed for the loads applied with a minimum additional safety factor of 3.
  - 2. Where specified attachments are not suitable for conditions, submit to Engineer for approval, proposal for alternate building attachments.
  - 3. Approved Manufacturers: Grinnell, or equivalent products by Michigan Hanger and B-Line.
  - 4. Provide supplemental trapeze supports where necessary. Design trapeze to support all trades. Coordinate loads, and supports with all trades. Size trapeze for maximum deflection of 1/64 of the span.
- B. Attachments to Structural Steel:
  - 1. Support mechanical work from building structural steel where possible and approved. No welding or bolting to structural steel is permitted unless authorized by Architect. C-clamps are not permitted.
    - a. Center beam clamp for loads over 120 lb.: Malleable center hung Grinnell Fig. 228.
    - b. Side beam clamp with retaining clips for loads up to 120 lb.
- C. Cast in Place Concrete Inserts:
  - Provide inserts selected for applied load of present load plus 100% for future, and coordinated with concrete work. Except as detailed on drawings, inserts shall be Unistrut or Grinnell. Plan, lay out and coordinate setting of inserts prior to concrete pour. Use Grinnell Fig. 285 lightweight concrete insert for loads up to 400# or Grinnell Fig. 281 Wedge Type concrete insert for loads up to 1200#

- D. Drilled Insert Anchors:
  - 1. Where mechanical work cannot be supported from structural steel, or cast in place concrete inserts, provide drilled concrete insert anchors. Submit for approval, project specific installation drawings for all loads over 100 lbs. Install inserts in web of beam if possible and approved. Insert depth shall not exceed two thirds the thickness of the concrete. Where existing concrete appears to be deteriorating, or where applied load at insert exceeds 1000 lbs., conduct test of concrete to determine derated capacity of insert. Anchors may be adhesive or expansion type up to 1000 lbs., and shall be adhesive type for loads over 1000 lbs.
  - 2. Manufacturers: Hilti

# PART 3 EXECUTION

- 3.1 GENERAL
  - A. Demolition of mechanical equipment shall include all existing piping, valves, controls, supports and equipment where such items are not required for reuse. Mechanical equipment not specified for reuse shall be removed by the mechanical contractor from the site.
  - B. Existing piping and ductwork: when encountered during the course of work, protect, brace and support existing piping and ductwork where required for proper execution of the work.
  - C. Interruption of existing active piping and ductwork: when the course of work makes shut-down of services unavoidable, the mechanical contractor shall schedule the shut-down at such time as approved by the owners representative, which will cause least interference with established operating routine.
  - D. Arrange work accordingly, providing such fittings as duct transitions traps, valves and accessories necessary to complete all construction in an orderiy fashion.
  - E. Install all equipment in strict accordance all directions and recommendations furnished by the manufacturer.

### 3.2 ACCESSIBILITY

A. Do not locate traps, controls, unions, pull boxes, etc. in any system at a location that will be inaccessible after construction is completed. Maintain accessibility for all components in mechanical, electrical, and plumbing systems.

### 3.3 ACCESS PANELS:

- A. Furnish access panels to access valves, traps, control valves or devices, dampers, damper motors, etc. Access panels shall be sized as necessary for ample access, or as indicated on drawings, but no smaller than 12" x 12" where devices are within easy reach of operator, and at least 24"x24" when operator must pass through opening in order to reach the devices. Architectural Trades shall install access panels coordinated with Mechanical Trades.
- B. Access panels in fire rated walls or ceiling must be U.L. labeled for intended use. Unless otherwise indicated on plans, access doors shall be hinged flush type steel framed panel, 14 gauge minimum for frame, and with anchor straps. Only narrow border shall be exposed. Hinges shall be concealed type.

PARTNERS 15-163 Hamtramck Public Schools Pool Equipment Room 200010 - 6

Locking device shall be flush type and screw driver operated. Metal surfaces shall be prime coated with rust-inhibitive paint. Panels shall be compatible with architectural adjacent materials Manufacturer: Milcor, Bilco.

C. Coordinate location with architect prior to installation.

# 3.4 CUTTING AND PATCHING

- A. All cutting required shall be done by the contractor whose work is involved, without extra cost the owner. All patching and restoration including the furnishing and installation of access panels in ceiling, walls; etc. Within the building lines shall be done by the respective, responsible contractor. No cutting of structural steel, concrete, or wood shall be done without prior approval and explicit directions of the architect patched by the respective, responsible contractor.
- B. The contractor, under whose jurisdiction the work may fall, shall provide labor, material, and tools required to cut, repair, protect, cap, or relocate existing pipes, conduits, or utilities interfering with or uncovered during work, per regulations of the authorities having jurisdiction.

## 3.5 ROUGH-IN FOR CONNECTION TO EQUIPMENT

A. It shall be the responsibility of each contractor to study the architectural, structural, electrical, and mechanical drawings, conferring with the various trades involved and checking with the supplier of equipment in order to properly rough-in for all equipment.

### 3.6 MATERIAL AND EQUIPMENT

A. All material and equipment shall be new and of the best quality used for the purpose in good commercial practice, and shall be the standard product of reputable manufacturers. The material and equipment must meet approval of state and local codes in the area it is being used. Roof decks shall not be used to support piping, conduit, equipment, devices, etc.

## 3.7 SEAL PENETRATIONS

A. Seal the space around pipes in sleeves and around duct openings through walls, floors and ceilings. Provide adequate clearance to allow for proper sealing.

### 3.8 FIRE STOPPING

A. Provide UL classified firestopping system for mechanical penetrations through rated walls and floors to maintain the fire rating.

### 3.9 CONTROL WIRING

A. All control wiring for mechanical and electrical equipment, including motor starters, shall be 120 volt maximum and wired with one side of the coil grounded and the operating contacts in the north side of the circuit. All control wiring shall be installed in conduit.

END OF SECTION

## SECTION 200020 - ELECTRICAL REQUIREMENTS FOR MECHANICAL WORK

## 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 SECTION INCLUDES
  - A. Basic electrical requirements for mechanical work.

## PART 2 PRODUCTS

- 2.1 MATERIALS
  - A. Mechanical equipment is to be furnished with motors, electrical controls and protective devices, and integral operating devices which are normally included by the manufacturer or required by the Contract Documents.
  - B. The Mechanical Trades shall provide all control wiring, 120 volts and less, for the equipment and devices furnished under Division 21, 22, and 23 of these specifications, including all wiring devices, conduit, etc.
  - C. Power wiring 120 volts and greater shall be by the Electrical Trades.

## 2.2 QUALITY ASSURANCE

A. All electrical devices provided by Mechanical Trades, and all electrical devices furnished as part of the mechanical equipment shall be UnderwritersLaboratories (UL) listed.

### PART 3 EXECUTION

# 3.1 INSTALLATION

A. Install in accordance with manufacturer's instructions.

# END OF SECTION

PARTNERS 15-163 Hamtramck Public Schools Pool Equipment Room 200020 - 2

# SECTION 220553 - IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

- PART 1 GENERAL
- 1.1 SECTION INCLUDES
  - A. Nameplates.
  - B. Tags.
  - C. Pipe Markers.

# 1.2 REFERENCE STANDARDS

A. ASME A13.1 - Scheme for the Identification of Piping Systems; The American Society of Mechanical Engineers; 2007.

# PART 2 PRODUCTS

# 2.1 MANUFACTURERS

- A. Brady Corp.
- B. Champion-America, Inc.
- C. Seton Identification Products.

# 2.2 NAMEPLATES

- A. Description: Laminated three-layer plastic with engraved letters.
  - 1. Letter Color: White.
  - 2. Letter Height: 1/4 inch.
  - 3. Background Color: Black.

# 2.3 TAGS

- A. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.
- B. Chart: Typewritten letter size list in anodized aluminum frame.

# 2.4 PIPE MARKERS

- A. Comply with ASME A13.1.
- B. Plastic Pipe Markers: Factory fabricated, flexible, semi- rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.

PARTNERS 15-163 Hamtramck Public Schools Pool Equipment Room 220553 - 2

PART 3 EXECUTION

## 3.1 PREPARATION

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

### 3.2 INSTALLATION

- A. Install plastic nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.
- B. Install tags with corrosion resistant chain.
- C. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.
- D. Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe.
- E. Identify piping, concealed or exposed, with plastic tape pipe markers. Use tags on piping 3/4 inch diameter and smaller. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.
- F. Install ductwork with plastic nameplates. Identify with air handling unit identification number and area served. Locate identification at air handling unit, at each side of penetration of structure or enclosure, and at each obstruction.

# 3.3 SCHEDULES

A. Identify all mechanical equipment, piping, and ductwork with nameplates, tags and markers. END OF SECTION

## SECTION 220719 - PLUMBING PIPING INSULATION

PART 1 GENERAL

- 1.1 SECTION INCLUDES
  - A. Piping insulation.
  - B. Jackets and accessories.

## 1.2 REFERENCE STANDARDS

- A. ASTM B209 Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- B. ASTM B209M Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate [Metric]; 2014.
- C. ASTM C177 Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded Hot Plate Apparatus; 2013.
- D. ASTM C195 Standard Specification for Mineral Fiber Thermal Insulating Cement; 2007 (Reapproved 2013).
- E. ASTM C534/C534M Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form; 2014.
- F. ASTM C547 Standard Specification for Mineral Fiber Pipe Insulation; 2015.
- G. ASTM C795 Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel; 2008 (Reapproved 2013).
- H. ASTM D1056 Standard Specification for Flexible Cellular Materials--Sponge or Expanded Rubber; 2014.
- I. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials; 2014.
- J. ASTM E96/E96M Standard Test Methods for Water Vapor Transmission of Materials; 2014.
- K. NFPA 255 Standard Method of Test of Surface Burning Characteristics of Building Materials; National Fire Protection Association; 2006.
- L. UL 723 Standard for Test for Surface Burning Characteristics of Building Materials; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.

# 1.3 SUBMITTALS

A. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

# PART 2 PRODUCTS

### 2.1 GENERAL REQUIREMENTS FOR ALL PRODUCTS OF THIS SECTION

- A. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.
- 2.2 GLASS FIBER
  - A. Manufacturers:
    - 1. Knauf Insulation: www.knaufusa.com.
    - 2. Johns Manville Corporation: www.jm.com.
    - 3. Owens Corning Corp: www.owenscorning.com.
  - B. Insulation: ASTM C547 and ASTM C795; rigid molded, noncombustible.
    - 1. 'K' value: ASTM C177, 0.24 at 75 degrees F.
    - 2. Maximum service temperature: 850 degrees F.
    - 3. Maximum moisture absorption: 0.2 percent by volume.
    - 4. Density: 3.5 lb/cu. ft
  - C. Vapor Barrier Jacket:
    - 1. White kraft paper with glass fiber yarn, bonded to aluminized film; moisture vapor transmission when tested in accordance with ASTM E 96 of 0.02 perm-inches.
  - D. Tie Wire:
    - 1. 0.048 inch stainless steel with twisted ends on maximum 12 inch centers.
  - E. Vapor Barrier Lap Adhesive: Compatible with insulation.
    - 1. Vapor Barrier Lap Adhesive shall be compatible with the insulation and as recommended by the insulation manufacturer
  - F. Insulating Cement/Mastic: ASTM C195; hydraulic setting on mineral wool.
    - 1. ASTM C195; hydraulic setting on mineral wool.
  - G. Fibrous Glass Fabric:
    - 1. Cloth: Untreated; 9 oz/sq yd weight.
    - 2. Blanket: 1.0 lb/cu ft density.
    - 3. Weave: 5x5.
  - H. Indoor Vapor Barrier Finish:
    - 1. Vinyl emulsion type acrylic, compatible with insulation, white color.
## 2.3 JACKETS

- A. PVC Plastic.
  - 1. Manufacturers:
    - a. Johns Manville Corporation: www.jm.com.
    - b. Protto
    - c. Ceelco
  - 2. Jacket: One piece molded type fitting covers and sheet material, off-white color.
    - a. Minimum Service Temperature: 0 degrees F.
    - b. Maximum Service Temperature: 150 degrees F.
    - c. Moisture Vapor Permeability: 0.002 perm inch, maximum, when tested in accordance with ASTM E96/E96M.
    - d. Thickness: 10 mil.
    - e. Connections: Brush on welding adhesive.

# PART 3 EXECUTION

# 3.1 EXAMINATION

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

## 3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with NAIMA National Insulation Standards.
- C. Exposed Piping: Locate insulation and cover seams in least visible locations.
- D. Glass fiber insulated pipes conveying fluids below ambient temperature:
  - 1. Provide vapor barrier jackets, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples and vapor barrier mastic.
  - 2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor barrier adhesive or PVC fitting covers.
- E. Glass fiber insulated pipes conveying fluids above ambient temperature:
  - 1. Provide standard jackets, with vapor barrier, factory-applied or field-applied. Secure with selfsealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples.
  - 2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers.
- F. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions.

PARTNERS 15-163 Hamtramck Public Schools Pool Equipment Room 220719 - 4

# 3.3 SCHEDULES

- A. Plumbing Systems:
  - 1. Domestic Hot Water Supply and Return
    - a. Glass Fiber Insulation:
      - 1) Pipe Size Range: 1/2-3 inch.
      - 2) Thickness: 1 inch.
  - 2. Domestic Potable and non Potable Cold Water:
    - a. Glass Fiber Insulation:
      - 1) Pipe Size Range: 3 inch.
        - (a) Thickness: 1 inch.

## SECTION 221005 - PLUMBING PIPING

- PART 1 GENERAL
- 1.1 SECTION INCLUDES
  - A. Pipe, pipe fittings, valves, and connections for piping systems.
    - 1. Domestic water.
    - 2. Gas.
    - 3. Pipe hangers and supports.
    - 4. Valves.
    - 5. Flow controls.
    - 6. Check.
    - 7. Strainers.

### 1.2 REFERENCE STANDARDS

- A. ASME B16.3 Malleable Iron Threaded Fittings: Classes 150 and 300; The American Society of Mechanical Engineers; 2011.
- B. ASME B16.4 Gray Iron Threaded Fittings: Classes 125 and 250; The American Society of Mechanical Engineers; 2011.
- C. ASME B16.18 Cast Copper Alloy Solder Joint Pressure Fittings; The American Society of Mechanical Engineers; 2012 (ANSI B16.18).
- D. ASME B16.22 Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; The American Society of Mechanical Engineers; 2013.
- E. ASME B31.1 Power Piping; The American Society of Mechanical Engineers; 2014 (ANSI/ASME B31.1).
- F. ASME B31.9 Building Services Piping; The American Society of Mechanical Engineers; 2014 (ANSI/ASME B31.9).
- G. ASME BPVC-IX Boiler and Pressure Vessel Code, Section IX Welding, Brazing, and Fusing Qualifications; The American Society of Mechanical Engineers; 2013.
- H. ASTM A53/A53M Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.
- I. ASTM A234/A234M Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service; 2015.
- J. ASTM B32 Standard Specification for Solder Metal; 2008 (Reapproved 2014).
- K. ASTM B88 Standard Specification for Seamless Copper Water Tube; 2014.

- L. ASTM B88M Standard Specification for Seamless Copper Water Tube (Metric); 2013.
- M. ASTM B813 Standard Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube; 2010.
- N. ASTM B828 Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings; 2002 (Reapproved 2010).
- O. AWWA C651 Disinfecting Water Mains; American Water Works Association; 2005 (ANSI/AWWA C651).
- P. MSS SP-58 Pipe Hangers and Supports Materials, Design, Manufacture, Selection, Application, and Installation; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.; 2009.
- Q. MSS SP-70 Cast Iron Gate Valves, Flanged and Threaded Ends; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.; 2011.
- R. MSS SP-71 Cast Iron Swing Check Valves, Flanged and Threaded Ends; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.; 2011.
- S. MSS SP-80 Bronze Gate, Globe, Angle and Check Valves; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.; 2013.
- T. MSS SP-85 Cast Iron Globe & Angle Valves, Flanged and Threaded Ends; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.; 2011.
- U. MSS SP-110 Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.; 2010.
- V. NSF 61 Drinking Water System Components Health Effects; 2014.
- W. NSF 372 Drinking Water System Components Lead Content; 2011.

### 1.3 QUALITY ASSURANCE

- A. Perform Work in accordance with State of Michigan standards.
- B. Welding Materials and Procedures: Conform to ASME BPVC-IX and applicable state labor regulations.
- C. Welder Qualifications: Certified in accordance with ASME BPVC-IX.

## 1.4 REGULATORY REQUIREMENTS

- A. Perform Work in accordance with State of Michigan plumbing code.
- B. Conform to applicable code for installation of backflow prevention devices.
- C. Provide certificate of compliance from authority having jurisdiction indicating approval of installation of backflow prevention devices.

## 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- B. Provide temporary protective coating on cast iron and steel valves.
- C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.
- 1.6 FIELD CONDITIONS
  - A. Do not install underground piping when bedding is wet or frozen.

## PART 2 PRODUCTS

- 2.1 GENERAL REQUIREMENTS
  - A. Potable Water Supply Systems: Provide piping, pipe fittings, and solder and flux (if used), that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.
- 2.2 DOMESTIC WATER PIPING, ABOVE GRADE
  - A. Copper Tube: ASTM B88 (ASTM B88M), Type K (A), Drawn (H).
    - 1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
    - 2. Joints: ASTM B32, alloy Sn95 solder.
  - B. Steel Pipe: ASTM A53/A53M Schedule 40, galvanized, using one of the following joint types:
    - 1. Threaded Joints: ASME B16.4 cast iron fittings.

### 2.3 NATURAL GAS PIPING, ABOVE GRADE

- A. Steel Pipe: ASTM A53/A53M Schedule 40 black.
  - 1. Fittings: ASME B16.3, malleable iron, or ASTM A234/A234M, wrought steel welding type.
  - 2. Joints: Threaded or welded to ASME B31.1.

### 2.4 PIPE HANGERS AND SUPPORTS

- A. Provide hangers and supports that comply with MSS SP-58.
  - 1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
  - 2. Overhead Supports: Individual steel rod hangers attached to structure or to trapeze hangers.
  - 3. Trapeze Hangers: Welded steel channel frames attached to structure.
  - 4. Vertical Pipe Support: Steel riser clamp.

PARTNERS 15-163 Hamtramck Public Schools Pool Equipment Room 221005 - 4

- B. Plumbing Piping Water:
  - 1. Conform to ASME B31.9.
  - 2. Hangers for Pipe Sizes 1/2 Inch to 1-1/2 Inches: Malleable iron, adjustable swivel, split ring.
  - 3. Hangers for Cold Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
  - 4. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
  - 5. Floor Support for Hot Pipe Sizes to 4 Inches: Cast iron adjustable pipe saddle, locknut, nipple, floor flange, and concrete pier or steel support.
  - 6. Floor Support for Hot Pipe Sizes 6 Inches and Over: Adjustable cast iron pipe roll and stand, steel screws, and concrete pier or steel support.
  - 7. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

### 2.5 GATE VALVES

- A. Manufacturers:
  - 1. Conbraco Industries, Inc: www.apollovalves.com.
  - 2. Nibco, Inc: www.nibco.com.
  - 3. Milwaukee Valve Company: www.milwaukeevalve.com.
- B. 2 Inches and Larger:
  - 1. MSS SP-70, Class 125, iron body, bronze trim, outside screw and yoke, handwheel, solid wedge disc, flanged ends. Provide chain-wheel operators for valves 6 inches and larger mounted over 8 feet above floor.

#### 2.6 GLOBE VALVES

- A. Manufacturers:
  - 1. Tyco Flow Control: www.tycoflowcontrol.com.
  - 2. Conbraco Industries, Inc: www.apollovalves.com.
  - 3. Nibco, Inc: www.nibco.com.
  - 4. Milwaukee Valve Company: www.milwaukeevalve.com.
- B. Up To and Including 3 Inches:
  - 1. MSS SP-80, Class 125, bronze body, bronze trim, handwheel, bronze disc, solder ends.
- C. 2 Inches and Larger:
  - 1. MSS SP-85, Class 125, iron body, bronze trim, handwheel, outside screw and yoke, renewable bronze plug-type disc, renewable seat, flanged ends. Provide chain-wheel operators for valves 6 inches and larger mounted over 8 feet above floor.

## 2.7 BALL VALVES

A. Manufacturers:

- 1. Tyco Flow Control: www.tycoflowcontrol.com.
- 2. Conbraco Industries, Inc: www.apollovalves.com.
- 3. Nibco, Inc: www.nibco.com.
- 4. Milwaukee Valve Company: www.milwaukeevalve.com.
- B. Construction, 4 Inches and Smaller: MSS SP-110, Class 150, 400 psi CWP, bronze, two piece body, chrome plated brass ball, regular port, teflon seats and stuffing box ring, blow-out proof stem, lever handle with balancing stops, solder ends with union.

## 2.8 FLOW CONTROLS

- A. Manufacturers:
  - 1. Tyco Flow Control: www.tycoflowcontrol.com.
  - 2. ITT Bell & Gossett: www.bellgossett.com.
  - 3. Griswold Controls: www.griswoldcontrols.com.
  - 4. Taco, Inc: www.taco-hvac.com.
- B. Construction: Class 125, Brass or bronze body with union on inlet and outlet, temperature and pressure test plug on inlet and outlet, blowdown/backflush drain.
- C. Calibration: Control flow within 5 percent of selected rating, over operating pressure range of 10 times minimum pressure required for control, maximum minimum pressure 3.5 psi.

### 2.9 SWING CHECK VALVES

- A. Manufacturers:
  - 1. Tyco Flow Control: www.tycoflowcontrol.com.
  - 2. Hammond Valve: www.hammondvalve.com.
  - 3. Nibco, Inc: www.nibco.com.
  - 4. Milwaukee Valve Company: www.milwaukeevalve.com.
- B. Up to 2 Inches:
  - 1. MSS SP-80, Class 125, bronze body and cap, bronze swing disc with rubber seat, solder ends.
- C. Over 2 Inches:
  - 1. MSS SP-71, Class 125, iron body, bronze swing disc, renewable disc seal and seat, flanged or grooved ends.

### 2.10 SPRING LOADED CHECK VALVES

- A. Manufacturers:
  - 1. Tyco Flow Control: www.tycoflowcontrol.com.
  - 2. Hammond Valve: www.hammondvalve.com.
  - 3. Crane Co.: www.cranecpe.com.

### PARTNERS 15-163 Hamtramck Public Schools Pool Equipment Room 221005 - 6

- 4. Milwaukee Valve Company: www.milwaukeevalve.com.
- B. Class 125, iron body, bronze trim, stainless steel springs, bronze disc, Buna N seals, wafer style ends.

### 2.11 STRAINERS

- A. Manufacturers:
  - 1. Mueller Steam Specialties
  - 2. Nibco, Inc.
  - 3. Watts Water Technologies
  - 4. Zurn Industries, LLC.
- B. Size 2 inch and Under:
  - 1. Class 150, lead free, threaded bronze body 300 psi CWP, Y pattern with 1/32 inch stainless steel perforated screen.
- C. Size 1-1/2 inch to 4 inch:
  - 1. Class 125, flanged iron body, Y pattern with 1/16 inch stainless steel perforated screen.

## PART 3 EXECUTION

- 3.1 EXAMINATION
  - A. Verify that excavations are to required grade, dry, and not over-excavated.

### 3.2 PREPARATION

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

### 3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions. Cast iron soil pipe installed in accordance to CISPI's Handbook.
- B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- C. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
- D. Install piping to maintain headroom, conserve space, and not interfere with use of space.
- E. Group piping whenever practical at common elevations.

- F. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.
- G. Provide access where valves and fittings are not exposed.
- H. Establish elevations of buried piping outside the building to ensure not less than 4 ft of cover.
- I. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.
- J. Provide support for utility meters in accordance with requirements of utility companies.
- K. Install valves with stems upright or horizontal, not inverted.
- L. Copper Pipe and Tube: Make soldered joints in accordance with ASTM B828, using specified solder, and flux meeting ASTM B813; in potable water systems use flux also complying with NSF 61 and NSF 372.
- M. Sleeve pipes passing through partitions, walls and floors.
- N. Inserts:
  - 1. Provide inserts for placement in concrete formwork.
  - 2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
  - 3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
  - 4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
  - 5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut above slab.
- O. Pipe Hangers and Supports:
  - 1. Install in accordance with ASME B31.9.
  - 2. Support horizontal piping as scheduled.
  - 3. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
  - 4. Place hangers within 12 inches of each horizontal elbow.
  - 5. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
  - 6. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.
  - 7. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
  - 8. Provide copper plated hangers and supports for copper piping.
  - 9. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.
  - 10. Support cast iron drainage piping at every joint.

## 3.4 APPLICATION

- A. Install unions downstream of valves and at equipment or apparatus connections.
- B. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.
- C. Install gate valves for shut-off and to isolate equipment, part of systems, or vertical risers.
- D. Install globe valves for throttling, bypass, or manual flow control services.
- E. Provide spring loaded check valves on discharge of water pumps.
- F. Provide flow controls in water recirculating systems where indicated.

#### 3.5 TOLERANCES

- A. Drainage Piping: Establish invert elevations within 1/2 inch vertically of location indicated and slope to drain at minimum of 1/8 inch per foot slope.
- B. Water Piping: Slope at minimum of 1/32 inch per foot and arrange to drain at low points.

#### 3.6 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

- A. Disinfect water distribution system in accordance with Section 331300.
- B. Prior to starting work, verify system is complete, flushed and clean.
- C. Ensure Ph of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda or soda ash) or acid (hydrochloric).
- D. Inject disinfectant, free chlorine in liquid, powder, tablet or gas form, throughout system to obtain 50 to 80 mg/L residual.
- E. Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15 percent of outlets.
- F. Maintain disinfectant in system for 24 hours.
- G. If final disinfectant residual tests less than 25 mg/L, repeat treatment.
- H. Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L.
- I. Take samples no sooner than 24 hours after flushing, from 10 percent of outlets and from water entry, and analyze in accordance with AWWA C651.

### 3.7 SCHEDULES

A. Pipe Hanger Spacing:

PARTNERS 15-163 Hamtramck Public Schools Pool Equipment Room 221005 - 9

- 1. Metal Piping:
  - a. Pipe size: 1/2 inches to 1-1/4 inches:
    - 1) Maximum hanger spacing: 6.5 ft.
    - 2) Hanger rod diameter: 3/8 inches.
  - b. Pipe size: 1-1/2 inches to 2 inches:
    - 1) Maximum hanger spacing: 10 ft.
    - 2) Hanger rod diameter: 3/8 inch.
  - c. Pipe size: 2-1/2 inches to 3 inches:
    - 1) Maximum hanger spacing: 10 ft.
- 2. Plastic Piping:
  - a. All Sizes:
    - 1) Maximum hanger spacing: 6 ft.
    - 2) Hanger rod diameter: 3/8 inch.

PARTNERS 15-163 Hamtramck Public Schools Pool Equipment Room 221005 - 10

## SECTION 221006 - PLUMBING PIPING SPECIALTIES

PART 1 GENERAL

- 1.1 SECTION INCLUDES
  - A. Backflow preventers.

## 1.2 RELATED REQUIREMENTS

- A. Section 221005 Plumbing Piping.
- B. Section 224000 Plumbing Fixtures.
- C. Section 223000 Plumbing Equipment.

## 1.3 REFERENCE STANDARDS

- A. ASME A112.6.3 Floor and Trench Drains; The American Society of Mechanical Engineers; 2001 (R2007).
- B. ASME A112.21.2M Roof Drains; The American Society of Mechanical Engineers; 1983.
- C. ASSE 1013 Reduced Pressure Principle Backflow Preventers and Reduced Pressure Fire Protection Principle Backflow Preventers; American Society of Sanitary Engineering; 2011.
- D. ASSE 1019 Vacuum Breaker Wall Hydrants, Freeze Resistant Automatic Draining Type; American Society of Sanitary Engineering; 2011 (ANSI/ASSE 1019).
- E. NSF 61 Drinking Water System Components Health Effects; 2012.
- F. NSF 372 Drinking Water System Components Lead Content; 2011.

### 1.4 SUBMITTALS

- A. Product Data: Provide component sizes, rough-in requirements, service sizes, and finishes.
- B. Shop Drawings: Indicate dimensions, weights, and placement of openings and holes.
- C. Manufacturer's Instructions: Indicate Manufacturer's Installation Instructions: Indicate assembly and support requirements.
- 1.5 DELIVERY, STORAGE, AND HANDLING
  - A. Accept specialties on site in original factory packaging. Inspect for damage.

PARTNERS 15-163 Hamtramck Public Schools Pool Equipment Room 221006 - 2

# PART 2 PRODUCTS

#### 2.1 GENERAL REQUIREMENTS

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

#### 2.2 BACKFLOW PREVENTERS

- A. Manufacturers:
  - 1. Conbraco Industries: www.apollovalves.com.
  - 2. Watts Regulator Company: www.wattsregulator.com.
- B. Reduced Pressure Backflow Preventers:
  - 1. ASSE 1013; bronze body with bronze internal parts and stainless steel springs; two independently operating, spring loaded check valves; diaphragm type differential pressure relief valve located between check valves; third check valve that opens under back pressure in case of diaphragm failure; non-threaded vent outlet; assembled with two gate valves, strainer, and four test cocks.

### PART 3 EXECUTION

- 3.1 INSTALLATION
  - A. Install in accordance with manufacturer's instructions.
  - B. Install approved potable water protection devices where contamination of domestic water may occur; This includes fire sprinkler system.
  - C. Install approved potable water protection devices on plumbing lines where contamination of domestic water may occur; on boiler feed water lines, janitor rooms, fire sprinkler systems, premise isolation, irrigation systems, interior and exterior hose bibs.
  - D. Pipe relief from backflow preventer to nearest drain.

# SECTION 225100 - SWIMMING POOL PLUMBING SYSTEMS

## PART 1 GENERAL

- 1.1 SECTION INCLUDES
  - A. Pipe and Pipe Fittings, Valves, Strainers.
  - B. Water Heaters.

### 1.2 REFERENCE STANDARDS

- A. ASME B16.22 Wrought Copper and Copper Alloy Solder Joint Pressure Fittings; The American Society of Mechanical Engineers; 2013.
- B. ASTM B32 Standard Specification for Solder Metal; 2008 (Reapproved 2014).
- C. ASTM B88 Standard Specification for Seamless Copper Water Tube; 2014.
- D. ASTM B88M Standard Specification for Seamless Copper Water Tube (Metric); 2013.

## 1.3 SUBMITTALS

- A. Product Data:
  - 1. Include data on pipe materials, pipe fittings, valves and accessories.
  - 2. Include component sizes, rough-in requirements, service sizes, and finishes.
  - 3. Include product description, model, dimensions, component sizes, rough-in requirements, service sizes, and finishes.
  - 4. Provide electrical characteristics and connection requirements.

### 1.4 REGULATORY REQUIREMENTS

- A. Conform to applicable code for installation of swimming pool systems.
- B. Perform work in accordance with local health department regulations.
- C. Provide certificate of compliance from Authority Having Jurisdiction indicating approval of installation.
- D. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.
- 1.5 DELIVERY, STORAGE, AND HANDLING
  - A. Accept equipment on site in shipping containers with labeling in place. Inspect for damage.

PARTNERS 15-163 Hamtramck Public Schools Pool Equipment Room 225100 - 2

B. Protect equipment from damage and elements by maintaining shipping packaging in place until installation. Maintain temporary inlet and outlet caps in place until installation.

# PART 2 PRODUCTS

- 2.1 PIPE AND FITTINGS
  - A. Copper Tube: ASTM B88 (ASTM B88M), Type K (A), drawn.
    - 1. Fittings: ASME B16.22, wrought copper.
    - 2. Joints: ASTM B32, solder, Grade Sn95.
  - B. Flanges for Pipe Sizes over 2 inches: PVC for plastic piping; bronze for copper piping.

## 2.2 GAS FIRED WATER HEATER

- A. Manufacturers:
  - 1. Hayward Pool Products, Inc: www.haywardpool.com.
  - 2. Pentair, Inc: www.pentair.com.
  - 3. Laars Heating Systems: www.laars.com.
  - 4. Lochinvar.www.lochinvar.com

## PART 3 EXECUTION

### 3.1 INSTALLATION

- A. Install equipment in accordance with manufacturer's instructions.
- B. Install piping to conserve building space, not interfere with use of space and other work. Route piping in orderly manner, and maintain gradient. Group whenever practical at common elevations.
- C. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. Provide access to valves and fittings.
- D. Pumps:
  - 1. Provide line sized valve and strainer on suction and line sized soft seated check valve and valve on discharge.

SECTION 230593 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 2 PRODUCTS - NOT USED

## PART 3 EXECUTION

- 2.1 GENERAL REQUIREMENTS
  - A. Perform total system balance in accordance with one of the following:
  - B. Begin work after completion of systems to be tested, adjusted, or balanced and complete work prior to Substantial Completion of the project.
  - C. TAB Agency Qualifications:

1. Company specializing in the testing, adjusting, and balancing of systems specified in this section.

# SECTION 230713 - DUCT INSULATION

PART 1 GENERAL

- 1.1 SECTION INCLUDES
  - A. Duct insulation.
  - B. Duct Liner.

## 1.2 RELATED REQUIREMENTS

- A. Section 233100 HVAC Ducts and Casings: Glass fiber ducts.
- 1.3 REFERENCE STANDARDS
  - A. ASTM C518 Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2010.
  - B. ASTM C553 Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications; 2013.
  - C. ASTM C612 Standard Specification for Mineral Fiber Block and Board Thermal Insulation; 2014.
  - D. ASTM C916 Standard Specification for Adhesives for Duct Thermal Insulation; 2014.
  - E. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials; 2014.
  - F. ASTM E96/E96M Standard Test Methods for Water Vapor Transmission of Materials; 2014.
  - G. NFPA 255 Standard Method of Test of Surface Burning Characteristics of Building Materials; National Fire Protection Association; 2006.
  - H. SMACNA (DCS) HVAC Duct Construction Standards Metal and Flexible; Sheet Metal and Air Conditioning Contractors' National Association; 2005.
  - I. UL 723 Standard for Test for Surface Burning Characteristics of Building Materials; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.
- 1.4 SUBMITTALS
  - A. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.
  - B. Manufacturer's Instructions: Indicate installation procedures necessary to ensure acceptable workmanship and that installation standards will be achieved.

PARTNERS 15-163 Hamtramck Public Schools Pool Equipment Room 230713 - 2

#### 1.5 QUALITY ASSURANCE

- A. Applicator Qualifications: Company specializing in performing the type of work specified in this section and approved by manufacturer.
- 1.6 DELIVERY, STORAGE, AND HANDLING
  - A. Accept materials on site in original factory packaging, labelled with manufacturer's identification, including product density and thickness.
  - B. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.
- 1.7 FIELD CONDITIONS
  - A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.
  - B. Maintain temperature during and after installation for minimum period of 24 hours.

### PART 2 PRODUCTS

- 2.1 REQUIREMENTS FOR ALL PRODUCTS OF THIS SECTION
  - A. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84, NFPA 255, or UL 723.
- 2.2 GLASS FIBER, FLEXIBLE WRAP
  - A. Manufacturer:
    - 1. Knauf Insulation: www.knaufusa.com.
    - 2. Johns Manville: www.jm.com.
    - 3. Owens Corning Corporation: www.ocbuildingspec.com.
    - 4. CertainTeed Corporation: www.certainteed.com.
  - B. Insulation: ASTM C553; flexible, noncombustible blanket.
    - 1. 'K' value: 0.31 at 75 degrees F, when tested in accordance with ASTM C518.
    - 2. Maximum Service Temperature: 1200 degrees F.
    - 3. Maximum Water Vapor Sorption: 5.0 percent by weight.
  - C. Insulation shall be 1.5 lb/cu. ft. density. Refer to Schedule below for thickness.
  - D. Vapor Barrier Jacket:
    - 1. Kraft paper with glass fiber yarn and bonded to aluminized film.
    - 2. Secure with pressure sensitive tape.

- E. Vapor Barrier Tape:
  - 1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.
- F. Tie Wire: Annealed steel, 16 gage, 0.0508 inch diameter.

# 2.3 GLASS FIBER, RIGID (EXTERIOR BOARD DUCT INSULATION)

- A. Manufacturer:
  - 1. Knauf Insulation: www.knaufusa.com.
  - 2. Johns Manville: www.jm.com.
  - 3. Owens Corning Corp: www.owenscorning.com.
  - 4. CertainTeed Corporation: www.certainteed.com.
- B. Insulation: ASTM C612; rigid, noncombustible blanket.
  - 1. 'K' value: 0.31 at 75 degrees F, when tested in accordance with ASTM C518.
  - 2. Maximum service temperature: 450 degrees F.
  - 3. Maximum Water Vapor Sorption: 5.0 percent.
- C. Vapor Barrier Jacket:
  - 1. Kraft paper with glass fiber yarn and bonded to aluminized film.
  - 2. Moisture Vapor Permeability: 0.029 ng/Pa s m (0.02 perm inch), when tested in accordance with ASTM E96/E96M.
  - 3. Secure with two coats of vapor barrier mastic and glass tape.
- D. Vapor Barrier Tape:
  - 1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive. The use of duct tape is prohibited.

# 2.4 DUCT LINER

- A. Manufacturers:
  - 1. Knauf Insulation: www.knaufusa.com.
  - 2. Johns Manville: www.jm.com.
  - 3. Owens Corning Corp; Model Fiberglas Duct Liner Board: www.owenscorning.com.
  - 4. CertainTeed Corporation: www.certainteed.com.
- B. Insulation: ASTM C 1071; flexible, noncombustible blanket with poly vinyl acetate polymer impregnated surface and edge coat.
  - 1. Apparent Thermal Conductivity: Maximum of 0.31 at 75 degrees F.
  - 2. Service Temperature: Up to 250 degrees F.
  - 3. Rated Velocity on Coated Air Side for Air Erosion: 5,000 fpm, minimum.
  - 4. Maximum Velocity on Coated Air Side: 5,000 fpm.

PARTNERS 15-163 Hamtramck Public Schools Pool Equipment Room 230713 - 4

- 5. Minimum Noise Reduction Coefficients:
- 6. 1 inch Thickness: 0.45.
- C. Adhesive: Waterproof, fire-retardant type, ASTM C916.
- D. Liner Fasteners: Galvanized steel, self-adhesive pad with integral head.
  - 1. Density: 1.5 lb/cu ft
  - 2. Liner shall meet Anti-Bacterial Requirements of ASTM C 1071, ASTM G 21 and ASTM G 22
  - 3. Liner shall be cleanable in accordance with NAIMA "Duct Cleaning Guide."

### PART 3 EXECUTION

## 3.1 EXAMINATION

- A. Verify that ducts have been pressure and leak tested before applying insulation materials.
- B. Verify that surfaces are clean, foreign material removed, and dry.

## 3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with NAIMA National Insulation Standards.
- C. Insulated ducts conveying air below ambient temperature:
  - 1. Provide insulation with vapor barrier jackets.
  - 2. Finish with tape and vapor barrier jacket.
  - 3. Continue insulation through walls penetrtions and at hanger connections.
  - 4. Insulate entire system including fittings, joints, flanges, fire dampers, flexible connections, and expansion joints.
- D. Exterior Applications: Provide insulation with vapor barrier jacket. Cover with with calked aluminum jacket with seams located on bottom side of horizontal duct section.
- E. External Duct Insulation Application:
  - 1. Secure insulation with vapor barrier with wires and seal jacket joints with vapor barrier adhesive or tape to match jacket.
  - 2. Secure insulation without vapor barrier with staples, tape, or wires.
  - 3. Install without sag on underside of duct. Use adhesive or mechanical fasteners where necessary to prevent sagging. Lift duct off trapeze hangers and insert spacers.
  - 4. Seal vapor barrier penetrations by mechanical fasteners with vapor barrier adhesive.
  - 5. Stop and point insulation around access doors and damper operators to allow operation without disturbing wrapping.
- F. Duct and Plenum Liner Application:

- 1. Adhere insulation with adhesive for 90 percent coverage.
- 2. Secure insulation with mechanical liner fasteners. Refer to SMACNA (DCS) for spacing.
- 3. Seal and smooth joints. Seal and coat transverse joints.
- 4. Seal liner surface penetrations with adhesive.
- 5. Duct dimensions indicated are net inside dimensions required for air flow. Increase duct size to allow for insulation thickness.
- 6. Provide nosing on all exposed fibergalss edges.

# 3.3 SCHEDULES

- A. Exhaust Ducts Within 10 ft of Exterior Openings:
  - 1. Flexible Glass Fiber Duct Insulation: 1 inches thick.
- B. Relief Ducts Within 10 ft of Exterior Openings:
  - 1. Flexible Glass Fiber Duct Insulation: 1 inches thick.
- C. Outside Air Intake Ducts:
  - 1. Flexible Glass Fiber Duct Insulation: 1 inches thick.
- D. Outside Air and Exhaust Air Plenums:
  - 1. Flexible Glass Fiber Duct Insulation: 1 inches thick.
  - 2. Rigid Glass Fiber Duct Insulation: 1 inch thick.
- E. Return Air Ductwork (located in plenum/conditioned space):
  - 1. Duct Liner: 1 inches thick (first ten feet only) from unit.
- F. Supply Ductwork (located in plenum or unconditioned spaces):
  - 1. Flexible Glass Fiber Duct Insulation: 1 inches thick.
- G. Supply Ductwork (located exposed in conditioned space):
  - 1. No Insulation Required

# SECTION 230913 - INSTRUMENTATION AND CONTROL DEVICES FOR HVAC

## PART 1 GENERAL

- 1.1 SUBMITTALS
  - A. Product Data: Provide description and engineering data for each control system component. Include sizing as requested. Provide data for each system component and software module.
- 1.2 QUALITY ASSURANCE
  - A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

### 1.3 WARRANTY

- A. See Section 017800 Closeout Submittals, for additional warranty requirements.
- B. Correct defective Work within a five year period after Substantial Completion.
- C. Provide five year manufacturer's warranty for control air compressors.

### PART 2 PRODUCTS

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

### 2.2 CONTROL PANELS

- A. Unitized cabinet type for each system under automatic control with relays and controls mounted in cabinet and temperature indicators, pressure gages, pilot lights, push buttons and switches flush on cabinet panel face.
- B. NEMA 250, general purpose utility enclosures with enamelled finished face panel.
- C. Provide common keying for all panels.

### 2.3 CONTROL VALVES

- A. Globe Pattern:
  - 1. Up to 2 inches: Bronze body, bronze trim, rising stem, renewable composition disc, screwed ends with backseating capacity repackable under pressure.
  - 2. Over 2 inches: Iron body, bronze trim, rising stem, plug-type disc, flanged ends, renewable seat and disc.
  - 3. Hydronic Systems:

PARTNERS 15-163 Hamtramck Public Schools Pool Equipment Room 230913 - 2

- a. Rate for service pressure of 125 psig at 250 degrees F.
- b. Replaceable plugs and seats of stainless steel.
- c. Size for 3 psig maximum pressure drop at design flow rate.
- d. Two way valves shall have equal percentage characteristics, three way valves linear characteristics. Size two way valve operators to close valves against pump shut off head.
- B. Butterfly Pattern:
  - 1. Iron body, bronze disc, resilient replaceable seat for service to 180 degrees F wafer or lug ends, extended neck.
  - 2. Hydronic Systems:
    - a. Rate for service pressure of 125 psig at 250 degrees F.
    - b. Size for 1 psig maximum pressure drop at design flow rate.
- C. Electronic Operators:
  - 1. Valves shall spring return to normal position as indicated on freeze, fire, or temperature protection.
  - 2. Select operator for full shut off at maximum pump differential pressure.

#### 2.4 DAMPERS

- A. Performance: Test in accordance with AMCA 500-D.
- B. Frames: Galvanized steel, welded or riveted with corner reinforcement, minimum 12 gage, 0.1046 inch.
- C. Blades: Galvanized steel, maximum blade size 8 inches wide, 48 inches long, minimum 22 gage, 0.0299 inch, attached to minimum 1/2 inch shafts with set screws.
- D. Blade Seals: Synthetic elastomeric inflatable mechanically attached, field replaceable.
- E. Jamb Seals: Spring stainless steel.
- F. Shaft Bearings: Oil impregnated sintered bronze.
- G. Linkage Bearings: Oil impregnated sintered bronze.
- H. Leakage: Less than one percent based on approach velocity of 2000 ft/min and 4 inches wg.
- I. Maximum Pressure Differential: 6 inches wg.
- J. Temperature Limits: -40 to 200 degrees F.

#### 2.5 DAMPER OPERATORS

- A. General: Provide smooth proportional control with sufficient power for air velocities 20 percent greater than maximum design velocity and to provide tight seal against maximum system pressures. Provide spring return for two position control and for fail safe operation.
  - 1. Provide sufficient number of operators to achieve unrestricted movement throughout damper range.

- 2. Provide one operator for maximum 36 sq ft damper section.
- B. Pilot Positioners: Starting point adjustable from 2 to 12 psig and operating span adjustable from 5 to 13 psig.
- C. Electric Operators:
  - 1. Spring return, adjustable stroke motor having oil immersed gear train, with auxiliary end switch.

# 2.6 THERMOSTATS

- A. Electric Room Thermostats:
  - 1. Type: NEMA DC 3, 24 volts, with setback/setup temperature control.
  - 2. Service: Cooling only.
  - 3. Covers: Locking with set point adjustment, with thermometer.
- B. Line Voltage Thermostats:
  - 1. Integral manual On/Off/Auto selector switch, single or two pole as required.
  - 2. Dead band: Maximum 2 degrees F.
  - 3. Cover: Locking with set point adjustment, with thermometer.
  - 4. Rating: Motor load.
- C. Room Thermostat Accessories:
  - 1. Thermostat Covers: Vandal proof clear plastic.
  - 2. Insulating Bases: For thermostats located on exterior walls.
- D. Outdoor Reset Thermostat:
  - 1. Remote bulb or bimetal rod and tube type, proportioning action with adjustable throttling range, adjustable setpoint.
  - 2. Scale range: -10 to 70 degrees F.
- E. Airstream Thermostats:
  - 1. Remote bulb or bimetallic rod and tube type, proportional action with adjustable setpoint in middle of range and adjustable throttling range.
  - 2. Averaging service remote bulb element: 7.5 feet.
- F. Electric Low Limit Duct Thermostat:
  - 1. Snap acting, single pole, single throw, manual reset switch that trips if temperature sensed across any 12 inches of bulb length is equal to or below setpoint,
  - 2. Bulb length: Minimum 20 feet.
  - 3. Provide one thermostat for every 20 sq ft of coil surface.
- G. Electric High Limit Duct Thermostat:

PARTNERS 15-163 Hamtramck Public Schools Pool Equipment Room 230913 - 4

- 1. Snap acting, single pole, single throw, manual reset switch that trips if temperature sensed across any 12 inches of bulb length is equal to or above setpoint,
- 2. Bulb length: Minimum 20 feet.
- 3. Provide one thermostat for every 20 sq ft of coil surface.
- H. Fire Thermostats:
  - 1. UL labeled, factory set in accordance with NFPA 90A.
  - 2. Normally closed contacts, manual reset.
- I. Heating/Cooling Valve Top Thermostats:
  - 1. Proportional acting for proportional flow, molded rubber diaphragm, remote bulb liquid filled element, direct and reverse acting at differential pressure to 25 psig, cast housing with position indicator and adjusting knob.

## 2.7 TIME CLOCKS

- A. Seven day programming switch timer with synchronous timing motor and seven day dial, continuously charged Ni-cad battery driven power failure 8 hour carry over and multiple switch trippers to control systems for minimum of two and maximum of eight signals per day with two normally open and two normally closed output switches.
- B. Solid state programmable time control with a minimum of 7 separate programs, 24 hour battery carry over, duty cycling.

### 2.8 TRANSMITTERS

- A. Pressure Transmitters:
  - 1. One pipe direct acting indicating type for gas, liquid, or steam service, range suitable for system, proportional electronic output.
- B. Temperature Transmitters:
  - One pipe, directly proportional output signal to measured variable, linearity within plus or minus 1/2 percent of range for 200 degree F span and plus or minus 1 percent for 50 degree F span, with 50 degrees F temperature range, compensated bulb, averaging capillary, or rod and tube operation on 20 psig input pressure and 3 to 15 psig output.
- C. Humidity Transmitters:
  - 1. One pipe, directly proportioned output signal to measured variable, linearity within plus or minus 1 percent for 70 percent relative humidity span, capable of withstanding 95 percent relative humidity without loss of calibration.

# PART 3 EXECUTION

# 3.1 EXAMINATION

A. Verify existing conditions before starting work.

- B. Verify that systems are ready to receive work.
- C. Beginning of installation means installer accepts existing conditions.
- D. Sequence work to ensure installation of components is complementary to installation of similar components in other systems.
- E. Coordinate installation of system components with installation of mechanical systems equipment such as air handling units and air terminal units.
- F. Ensure installation of components is complementary to installation of similar components.
- G. Coordinate installation of system components with installation of mechanical systems equipment such as air handling units and air terminal units.

## 3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Check and verify location of thermostats with plans and room details before installation. Locate 60 inches above floor. Align with lighting switches and humidistats. Refer to Section 262726.
- C. Mount freeze protection thermostats using flanges and element holders.
- D. Mount outdoor reset thermostats and outdoor sensors indoors, with sensing elements outdoors with sun shield.
- E. Provide guards on thermostats in entrances.
- F. Provide mixing dampers of opposed blade construction arranged to mix streams. Provide pilot positioners on mixed air damper motors. Provide separate minimum outside air damper section adjacent to return air dampers with separate damper motor.
- G. Provide isolation (two position) dampers of parallel blade construction.
- H. Install damper motors on outside of duct in warm areas. Do not install motors in locations at outdoor temperatures.
- I. Mount control panels adjacent to associated equipment on vibration free walls or free standing angle iron supports. One cabinet may accommodate more than one system in same equipment room. Provide engraved plastic nameplates for instruments and controls inside cabinet and engraved plastic nameplates on cabinet face.
- J. Install "hand/off/auto" selector switches to override automatic interlock controls when switch is in "hand" position.

PARTNERS 15-163 Hamtramck Public Schools Pool Equipment Room 230913 - 6

K. Provide conduit and electrical wiring in accordance with Section 262717. Electrical material and installation shall be in accordance with appropriate requirements of Division 26.

# SECTION 232213 - STEAM AND CONDENSATE HEATING PIPING

PART 1 GENERAL

- 1.1 SECTION INCLUDES
  - A. Pipe and pipe fittings.
  - B. Valves.
  - C. Steam piping system.
  - D. Steam condensate piping system.

### 1.2 RELATED REQUIREMENTS

- A. Section 230548 Vibration and Seismic Controls for HVAC Piping and Equipment.
- B. Section 230553 Identification for HVAC Piping and Equipment.
- C. Section 230719 HVAC Piping Insulation.
- D. Section 232214 Steam and Condensate Heating Specialties.
- E. Section 232500 HVAC Water Treatment: Pipe cleaning.

### 1.3 REFERENCE STANDARDS

- A. ASME (BPV IX) Boiler and Pressure Vessel Code, Section IX Welding and Brazing Qualifications; The American Society of Mechanical Engineers; 2013.
- B. ASME B16.3 Malleable Iron Threaded Fittings: Classes 150 and 300; The American Society of Mechanical Engineers; 2011.
- C. ASME B16.18 Cast Copper Alloy Solder Joint Pressure Fittings; The American Society of Mechanical Engineers; 2012 (ANSI B16.18).
- D. ASME B31.1 Power Piping; The American Society of Mechanical Engineers; 2012 (ANSI/ASME B31.1).
- E. ASME B31.9 Building Services Piping; The American Society of Mechanical Engineers; 2011 (ANSI/ASME B31.9).
- F. ASTM A53/A53M Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated, Welded and Seamless; 2012.
- G. ASTM A234/A234M Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service; 2013.

### PARTNERS 15-163 Hamtramck Public Schools Pool Equipment Room 232213 - 2

- H. AWS D1.1/D1.1M Structural Welding Code Steel; American Welding Society; 2010.
- I. MSS SP-58 Pipe Hangers and Supports Materials, Design and Manufacture, Selection, Application, and Installation; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.; 2009.

#### 1.4 SYSTEM DESCRIPTION

- A. Use unions and flanges downstream of valves and at equipment or apparatus connections. Use dielectric unions where joining dissimilar materials. Do not use direct welded or threaded connections.
- B. Provide pipe hangers and supports in accordance with ASME B31.9 unless indicated otherwise.

### 1.5 SUBMITTALS

- A. See Section 013000 Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on pipe materials, pipe fittings, valves and accessories. Provide manufacturers catalogue information. Indicate valve data and ratings.
- C. Welders Certificate: Include welders certification of compliance with ASME (BPV IX).
- D. Manufacturer's Installation Instructions: Indicate hanging and support methods, joining procedures.
- E. Project Record Documents: Record actual locations of valves.
- F. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.

#### 1.6 QUALITY ASSURANCE

A. Welder Qualifications: Certified in accordance with ASME (BPV IX).

#### 1.7 REGULATORY REQUIREMENTS

- A. Conform to ASME B31.9 and ASME B31.1 code for installation of piping system.
- 1.8 DELIVERY, STORAGE, AND HANDLING
  - A. Accept valves on site in shipping containers with labelling in place. Inspect for damage.
  - B. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
  - C. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

## PART 2 PRODUCTS

## 2.1 LOW PRESSURE STEAM PIPING (15 PSIG MAXIMUM)

- A. Steel Pipe: ASTM A53/A53M, Schedule 40, black.
  - 1. Fittings: ASME B16.3 malleable iron Class 125, or ASTM A234/A234M wrought steel.
  - 2. Joints: Threaded, or AWS D1.1 welded.

## 2.2 BOILER FEEDWATER, BLOWDOWN AND MISC. BOILER PIPING

- A. Steel Pipe: ASTM A53/A53M, Schedule 40, black.
  - 1. Fittings: ASME B16.3 malleable iron Class 125, or ASTM A234/A234M wrought steel.
  - 2. Joints: Threaded, or AWS D1.1 welded.

## 2.3 LOW PRESSURE STEAM CONDENSATE PIPING

- A. Steel Pipe: ASTM A53/A53M, Schedule 80, black.
  - 1. Fittings: ASME B16.3 malleable iron Class 125, or ASTM A234/A234M wrought steel.
  - 2. Joints: Threaded, or AWS D1.1 welded.

# 2.4 PIPE HANGERS AND SUPPORTS

- A. Provide hangers and supports that comply with MSS SP-58.
  - 1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
- B. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch: Malleable iron, adjustable swivel, split ring.
- C. Hangers for Pipe Sizes 2 to 4 Inches: Carbon steel, adjustable, clevis.
- D. Hangers for Pipe Sizes 6 Inches and Over: Adjustable steel yoke, cast iron roll, double hanger.
- E. Multiple or Trapeze Hangers for Pipe Sizes to 4 inches: Steel channels with welded spacers and hanger rods.
- F. Multiple or Trapeze Hangers for Pipe Sizes 6 Inches and Over: Steel channels with welded spacers and hanger rods; cast iron roll and stand.
- G. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
- H. Wall Support for Pipe Sizes 4 to 5 Inches: Welded steel bracket and wrought steel clamp.
- I. Wall Support for Pipe Sizes 6 Inches and Over: Welded steel bracket and wrought steel clamp; adjustable steel yoke and cast iron roll.
- J. Vertical Support: Steel riser clamp.

### PARTNERS 15-163 Hamtramck Public Schools Pool Equipment Room 232213 - 4

- K. Hanger Rods: Mild steel threaded both ends, threaded one end, or continuous threaded.
- L. Inserts: Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

## 2.5 UNIONS, FLANGES, AND COUPLINGS

- A. Unions for Pipe 2 Inches and Under:
  - 1. Ferrous Piping: 150 psig galvanized malleable iron, threaded.
- B. Flanges for Pipe Over 2 Inches:
  - 1. Ferrous Piping: 150 psig forged steel, slip-on.

#### 2.6 GATE VALVES

- A. Up To and Including 2 Inches:
  - 1. Bronze body, bronze trim, screwed bonnet, non-rising stem, lockshield stem, inside screw with backseating stem, solid wedge disc, alloy seat rings, solder ends.
- B. Over 2 Inches:
  - 1. Iron body, bronze trim, bolted bonnet, rising stem, handwheel, outside screw and yoke, solid wedge disc with bronze seat rings, flanged ends.

### 2.7 BALL VALVES

- A. Up To and Including 2 Inches:
  - 1. Bronze one piece body, chrome plated bass ball, teflon seats and stuffing box ring, lever handle, threaded ends with union.

### 2.8 SWING CHECK VALVES

- A. Up To and Including 2 Inches:
  - 1. Bronze or iron body, bronze trim, bronze rotating swing disc with composition seat, solder ends.
- B. Over 2 Inches:
  - 1. Iron body, bronze trim, bronze or bronze faced rotating swing disc, renewable disc and seat, flanged ends.

### PART 3 EXECUTION

### 3.1 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt on inside and outside before assembly.

- C. Prepare piping connections to equipment with flanges or unions.
- D. Keep open ends of pipe free from scale and dirt. Whenever work is suspended during construction protect open ends with temporary plugs or caps.
- E. After completion, fill, clean, and treat systems. Refer to Section 232500.

## 3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Route piping in orderly manner, plumb and parallel to building structure, and maintain gradient.
- C. Install piping to conserve building space and avoid interference with use of space.
- D. Sleeve pipe passing through partitions, walls, and floors.
- E. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- F. Provide clearance for installation of insulation and access to valves and fittings.
- G. Slope steam piping one inch in 40 feet in direction of flow. Use eccentric reducers to maintain bottom of pipe level.
- H. Slope steam condensate piping one inch in 40 feet. Provide drip trap assembly at low points and before control valves. Run condensate lines from trap to nearest condensate receiver. Provide loop vents over trapped sections.
- I. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welds.

# 3.3 SCHEDULES

- A. Hanger Spacing for Steel Steam Piping.
  - 1. 1/2 inch: Maximum span, 8 feet; minimum rod size, 1/4 inch.
  - 2. 3/4 inch and 1 inch: Maximum span, 9 feet; minimum rod size, 1/4 inch.
  - 3. 1-1/4 inches: Maximum span, 11 feet; minimum rod size, 3/8 inch.
  - 4. 1-1/2 inches: Maximum span, 12 feet; minimum rod size, 3/8 inch.
  - 5. 2 inches: Maximum span, 13 feet; minimum rod size, 3/8 inch.
  - 6. 2-1/2 inches: Maximum span, 14 feet; minimum rod size, 3/8 inch.
  - 7. 3 inches: Maximum span, 15 feet; minimum rod size, 3/8 inch.
  - 8. 4 inches: Maximum span, 17 feet; minimum rod size, 1/2 inch.
- B. Hanger Spacing for Steel Steam Condensate Piping.
  - 1. 1/2 inch, 3/4 inch, and 1 inch: Maximum span, 7 feet; minimum rod size, 1/4 inch.

PARTNERS 15-163 Hamtramck Public Schools Pool Equipment Room 232213 - 6

- 2. 1-1/4 inches: Maximum span, 8 feet; minimum rod size, 3/8 inch.
- 3. 1-1/2 inches: Maximum span, 9 feet; minimum rod size, 3/8 inch.
- 4. 2 inches: Maximum span, 10 feet; minimum rod size, 3/8 inch.
### SECTION 232214 - STEAM AND CONDENSATE HEATING SPECIALTIES

PART 1 GENERAL

- 1.1 SECTION INCLUDES
  - A. Steam traps.
  - B. Steam air vents.
  - C. Boiler feed units.

### 1.2 RELATED REQUIREMENTS

- A. Section 230719 HVAC Piping Insulation.
- B. Section 232213 Steam and Condensate Heating Piping.
- C. Section 235233.16 Steel Water-Tube Boilers.

### 1.3 REFERENCE STANDARDS

- A. ASME BPVC-VIII-1 Boiler and Pressure Vessel Code, Section VIII, Division 1 Rules for Construction of Pressure Vessels; The American Society of Mechanical Engineers; 2013.
- B. ASME B31.9 Building Services Piping; The American Society of Mechanical Engineers; 2014 (ANSI/ASME B31.9).
- C. ASTM A105/A105M Standard Specification for Carbon Steel Forgings for Piping Applications; 2013.
- D. ASTM A126 Standard Specification for Grey Iron Castings for Valves, Flanges, and Pipe Fittings; 2004 (Reapproved 2014).
- E. NEMA 250 Enclosures for Electrical Equipment (1000 Volts Maximum); National Electrical Manufacturers Association; 2008.

#### 1.4 SUBMITTALS

- A. Product Data:
  - 1. Provide for manufactured products and assemblies required for this project.
  - 2. Include product description, model, dimensions, component sizes, rough-in requirements, service sizes, and finishes.
  - 3. Submit schedule indicating manufacturer, model number, size, location, rated capacity, load served, and features for each specialty.
  - 4. Include electrical characteristics and connection requirements.

PARTNERS 15-163 Hamtramck Public Schools Pool Equipment Room 232214 - 2

- B. Manufacturer's Installation Instructions: Indicate application, selection, and hookup configuration. Include pipe and accessory elevations.
- C. Operation and Maintenance Data: Include installation instructions, servicing requirements, and recommended spare parts lists.
- D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. Steam Trap Service Kits: One for each type and size.

#### 1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with State of Michigan standard for installation of boilers and pressure vessels.
- B. Products Requiring Electrical Connection: Listed and classified by UL as suitable for the purpose indicated.
- 1.6 DELIVERY, STORAGE, AND HANDLING
  - A. Boiler Feed Unit has been pre-purchased and will be provided for installation. Coordinate with the Boiler Feed Unit Manufacturer's Representative for delivery scheduling to correspond with the requirements of the project schedule.
  - B. Receive, store and protect the pre-purchased boilers boiler feed unit before, during and after installation. Contractor shall be responsible to inspect equiment upon delivery. Contractor shall take responsibility for equipment once it is received at the site, prior to being turned over to the owner for use.
  - C. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
  - D. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
  - E. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

## 1.7 WARRANTY

- A. Complete parts and labor warranty for one (1) year from boiler start-up or 18 months from the date of shipment, whichever comes first.
- B. The contractor shall be the 1st point of contact for warranty coverage for the boiler system, including the pre-purchased boilers.

## PART 2 PRODUCTS

## 2.1 STEAM TRAPS

- A. Manufacturers:
  - 1. Armstrong International, Inc: www.armstronginternational.com.

- 2. Hoffman Specialty/Bell & Gossett
- 3. Marshall Engineered Products Company: www.mepcollc.com.
- 4. Spirax-Sarco: www.spiraxsarco.com/us.
- B. Steam Trap Applications:
  - 1. Use Float and Thermostatic Traps for:
    - a. Heating coils.
    - b. Main headers.
- C. Steam Trap Performance:
  - 1. Select to handle minimum of two times maximum condensate load of apparatus served.
  - 2. Pressure Differentials:
    - a. Low Pressure Systems (15 psi maximum): 2 psi.
- D. Float and Thermostatic Traps: ASTM A126 cast iron or semi-steel body and bolted cover, stainless steel or bronze bellows type air vent, stainless steel or copper float, stainless steel lever and valve assembly
  - 1. Rating: 15 psi WSP.
  - 2. Features: Access to internal parts without disturbing piping, bottom drain plug.
  - 3. Accessories: Gage glass with shut-off cocks.

### 2.2 STEAM AIR VENTS

- A. Manufacturers:
  - 1. Armstrong International, Inc: www.armstronginternational.com.
  - 2. ITT Hoffman Specialty: www.hoffmanspecialty.com.
  - 3. Spirax-Sarco: www.spiraxsarco.com/us.
- B. 125 psi WSP: Balanced pressure type; cast brass body and cover; access to internal parts without disturbing piping; stainless steel bellows, stainless steel valve and seat.

#### 2.3 LOW PRESSURE BOILER FEED UNITS - PRE-PURCHASED BY THE OWNER-INCLUDED FOR REFERENCE ONLY

- A. Manufacturers:
  - 1. Bell & Gossett Hoffman Specialties/Domestic Series
- B. The boiler feed system shall be supplied by the same manufacturer or manufacturer's representative for the low pressure steam boilers to obtain single source responsibility for the boilers and boiler feed system.
- C. Boiler Feed Units: Consist of receiver, inlet strainer, pump isolation valves, pumps, water make-up assembly, electric control components and accessories.
- D. Condensate Receiver: Horizontal steel tank, equipped with water level gage, dial thermometer, pressure gages on pump discharge, bronze isolation valves between pumps and receiver, and lifter eye bolts. The

#### PARTNERS 15-163 Hamtramck Public Schools Pool Equipment Room 232214 - 4

system shall have the storage capacity to overflow of at least 1 gallon per 1 boiler horsepower of the boilers it is servicing.

- E. Tank tappings: tank shall be supplied (at a minimum) with the following tappings:
  - 1. 4" flanged connections for condensate return
  - 2. 3" threaded connectionfor condensate return and vent
  - 3. pump suction couplings
  - 4. manual fill connection
  - 5. overflow connection
  - 6. drain connection
  - 7. sight glass with brass valves
  - 8. blowout opening properly designed to keep the pressure in the tank at atmoshperic
  - 9. chemical feed tapping
  - 10. sample tapping
- F. Inlet Strainer: Cast iron, with vertical self-cleaning easily removable bronze screen and large dirt pocket, mounted on receiver.
- G. Water Make-Up Assembly:
  - 1. A mechanical float-type make-up water control shall be provided to accept incoming water up to a differential pressure of 100 psi. The make-up valve assembly shall mount directly into the tank to eliminate unnecessary external piping and be removable from the outside of the vessel for easy maintenance and inspection. The make-up valve shall be made of brass or bronze with a copper float that does not require external power for operation.
  - 2. Capacity: Equal to one boiler feed pump.
  - 3. With strainer, and manual bypass.
- H. Pumps: Vertical design. Pump size shall be based on schedule below. The pump shall be a vertical multistage pump (Goulds SSV, Grundfos CR, or similar) with stainless steel impellers and a minimum of 250F seals. The pump motors shall be 3-phase, TEFC motors. Each boiler feed pumps shall be supplied with the boiler feed system and be capable of pumping twice the evaporation rate of the boiler it serves at 3% above the boiler relief valve setting per the ASME code. Centrifugal pumps, specifically suited for the application, are also acceptable.
- I. Steel support stand: The entire boiler feed system shall be provided on a steel stand to house the tanks, pumps, control panel and misc. accessories. The stand shall be constructed so the top of the tank is 54" above the floor. If the inlet strainer and 4" flanged connection are located on the side/end of the tank, this connection could be as high as 60" to the centerline of the 4" connection.
- J. The base shall extend in front of the storage vessel for pump mounting and easier access to the pump(s) for inspection and maintenance. All exposed metal surfaces shall be protected with a suitable heat and rust resisting paint.
- K. Control Panel: The control panel shall be configured to allow selection of which two pumps will be in service, designating the third pump as back-up. Terminal strips shall be provided for field wiring of boiler

interlock to start pumps with signal from the boiler water level control. The complete boiler feed system will have single point electrical connection located in a UL listed Nema 12 control panel. Liquid tight conduit shall be used between the panel and external electrical items mounted on the boiler feed system package. Control panels shall be UL listed and labeled. All wiring between control panel, pumps and electrical devices provided will be factory completed.

- Each pump shall have a thru-the-door (3-phase) pump disconnect switch, 3-phase protection by Class LPJ fusing or similar fuse, and a motor starter with overloads. A hand-off-auto switch and pilot light shall also be provided for each pump. Pumps shall be provided with low water level cutoff, locking out the pumps if the tank level is too low. All pump electrical components shall be wired and factory checked before shipment.
- 2. Provide a fused control circuit transformer to reduce the 3-phase supplied power to 120/1/60 for the control circuit, external resets, 115v holding coils, starter overload heaters, and selector switches.
- 3. Provide, as a minimum, outputs from the control panel to the Building Automation System (BAS) as follows. Wire to terminal strip for connection to BAS.
  - a. Status to indicate system enabled/disabled
  - b. An alarm condition
  - c. Pump activated, for each pump
  - d. Provide a current sensing relay for each pump to provide status
  - e. Low level cut-out

### PART 3 EXECUTION

- 3.1 SYSTEM STARTUP
  - A. Provide the services of manufacturer's field representative for starting and testing unit.
- 3.2 CLOSEOUT ACTIVITIES
  - A. Train operating personnel in operation and maintenance of units.
  - B. Provide the services of manufacturer's field representative to conduct training.

#### 3.3 INSTALLATION

- A. Install steam and steam condensate piping and specialties in accordance with ASME B31.9.
- B. Install specialties in accordance with manufacturer's instructions.
- C. Steam Traps:
  - 1. Provide minimum 3/4 inch size on steam mains and branches.
  - 2. Install with union or flanged connections at both ends.
  - 3. Provide gate valve and strainer at inlet, and gate valve and check valve at discharge.
  - 4. Provide minimum 10 inch long, line size dirt pocket between apparatus and trap.
- D. Terminate relief valves to outdoors. Provide drip pan elbow with drain connection to nearest floor drain.

PARTNERS 15-163 Hamtramck Public Schools Pool Equipment Room 232214 - 6

# 3.4 SCHEDULES

- A. Pre-Purchased Boiler Feed Unit:
  - 1. Tag: NMS BFU-1
  - 2. Receiver Capacity: 500 Gallons
  - 3. Number of Pumps: three (3) one for each of two boilers, one back-up
  - 4. Pump Capacity: 20 gpm
  - 5. Pump Head: 35 psi
  - 6. Power: 208V, 3 phase, 60 Hz, single point power connection with main disconnect.

END OF SECTION

### SECTION 233100 - HVAC DUCTS AND CASINGS

PART 1 GENERAL

- 1.1 SECTION INCLUDES
  - A. Single-wall rectangular ducts and fittings.
  - B. Sheet metal materials.
  - C. Sealants and gaskets.
  - D. Hangers and supports.

### 1.2 RELATED REQUIREMENTS

- A. Section 016116 Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 230593 Testing, Adjusting, and Balancing for HVAC.
- C. Section 230713 Duct Insulation: External insulation and duct liner.
- D. Section 233300 Air Duct Accessories.
- E. Section 233700 Air Outlets and Inlets.

#### 1.3 REFERENCE STANDARDS

- A. ASTM A36/A36M Standard Specification for Carbon Structural Steel; 2014.
- B. ASTM A276/A276M Standard Specification for Stainless Steel Bars and Shapes; 2015.
- C. ASTM A653/A653M Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- D. ASTM A1011/A1011M Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low Alloy, High-Strength Low-Alloy With Improved Formability, and Ultra-High Strength; 2014.
- E. ASTM B209 Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- F. NFPA 90A Standard for the Installation of Air-Conditioning and Ventilating Systems; National Fire Protection Association; 2012.
- G. NFPA 96 Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations; National Fire Protection Association; 2014.

PARTNERS 15-163 Hamtramck Public Schools Pool Equipment Room 233100 - 2

- H. SMACNA (LEAK) HVAC Air Duct Leakage Test Manual; Sheet Metal and Air Conditioning Contractors' National Association; 2012, 2nd Edition.
- I. SMACNA (DCS) HVAC Duct Construction Standards Metal and Flexible; Sheet Metal and Air Conditioning Contractors' National Association; 2005.
- J. UL 181 Standard for Factory-Made Air Ducts and Air Connectors; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.
- K. UL 1978 Grease Ducts; Current Edition, Including All Revisions.

### 1.4 **PERFORMANCE REQUIREMENTS**

- A. Delegated Duct Design: Duct construction, including sheet metal thicknesses, seam and joint construction, reinforcements, and hangers and supports, shall comply with SMACNA's "HVAC Duct Construction Standards Metal and Flexible" and performance requirements and design criteria indicated in "Duct Schedule" Article.
- B. Structural Performance: Duct hangers and supports shall withstand the effects of gravity loads and stresses within limits and under conditions described in SMACNA's "HVAC Duct Construction Standards Metal and Flexible" and ASCE/SEI 7.
- C. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

#### 1.5 SUBMITTALS

- A. Product Data: Provide data for duct materials, duct liner, duct connections, and factory fabricated fittings.
- B. Shop Drawings: Submit 1/4 scale, double line shop drawings that indicate duct fittings, duct size, bottom of duct elevations, necessary offsets to accomodate building structure, particulars such as gages, sizes, welds, elevations, all fittings, and configuration prior to start of work for all systems.

#### 1.6 REGULATORY REQUIREMENTS

- A. Construct ductwork to NFPA 90A standards.
- B. Construct ductwork to SMACNA (DCS) HVAC Duct Construction Standards Metal and Flexible; Sheet Metal and Air Conditioning Contractors' National Association; 1995, Second Edition with Addendum No. 1.

## PART 2 PRODUCTS

## 2.1 SINGLE-WALL RECTANGULAR DUCT AND FITTING ASSEMBLIES

- A. Regulatory Requirements: Construct ductwork to NFPA 90A standards.
- B. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.

- C. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards Metal and Flexible," Figure 2-1, "Rectangular Duct/Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards Metal and Flexible."
- D. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Duct/Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- E. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 4, "Fittings and Other Construction," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards -Metal and Flexible."

### 2.2 MATERIALS

- A. Galvanized Steel for Ducts: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G60/Z180 coating.
- B. General Material Requirements: Comply with SMACNA's "HVAC Duct Construction Standards Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.
- C. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.
  - 1. Galvanized Coating Designation: G90.
  - 2. Finishes for Surfaces Exposed to View: Mill phosphatized.
- D. Carbon-Steel Sheets: Comply with ASTM A 1008/A 1008M, with oiled, matte finish for exposed ducts.
- E. Stainless-Steel Sheets: Comply with ASTM A 480/A 480M, Type 304 or 316, as indicated in the "Duct Schedule" Article; cold rolled, annealed, sheet. Exposed surface finish shall be No. 2B, No. 2D, No. 3, or No. 4 as indicated in the "Duct Schedule" Article.
- F. Reinforcement Shapes and Plates: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
  - 1. Where black- and galvanized-steel shapes and plates are used to reinforce aluminum ducts, isolate the different metals with butyl rubber, neoprene, or EPDM gasket materials.
- G. Tie Rods: Galvanized steel, 1/4-inchminimum diameter for lengths 36 inches or less; 3/8-inchminimum diameter for lengths longer than 36 inches.

#### PARTNERS 15-163 Hamtramck Public Schools Pool Equipment Room 233100 - 4

## 2.3 SEALANTS AND GASKETS

- A. General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets shall be a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.
- B. Two-Part Tape Sealing System:
  - 1. Tape: Woven cotton fiber impregnated with mineral gypsum and modified acrylic/silicone activator to react exothermically with tape to form hard, durable, airtight seal.
  - 2. Tape Width: 3 inches.
  - 3. Sealant: Modified styrene acrylic.
  - 4. Water resistant.
  - 5. Mold and mildew resistant.
  - 6. Maximum Static-Pressure Class: 10-inch wg, positive and negative.
  - 7. Service: Indoor and outdoor.
  - 8. Service Temperature: Minus 40 to plus 200 deg F.
  - 9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum.
  - 10. For indoor applications, sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
  - 11. Sealant shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- C. Water-Based Joint and Seam Sealant:
  - 1. Application Method: Brush on.
  - 2. Solids Content: Minimum 65 percent.
  - 3. Shore A Hardness: Minimum 20.
  - 4. Water resistant.
  - 5. Mold and mildew resistant.
  - 6. VOC: Maximum 75 g/L (less water).
  - 7. Maximum Static-Pressure Class: 10-inch wg, positive and negative.
  - 8. Service: Indoor or outdoor.
  - 9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.
- D. Flanged Joint Sealant: Comply with ASTM C 920.
  - 1. General: Single-component, acid-curing, silicone, elastomeric.
  - 2. Type: S.
  - 3. Grade: NS.
  - 4. Class: 25.
  - 5. Use: O.

- 6. For indoor applications, sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- 7. Sealant shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- E. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.
- F. Round Duct Joint O-Ring Seals:
  - 1. Seal shall provide maximum leakage class of 3 cfm/100 sq. ft. at 1-inch wgand shall be rated for

### 2.4 HANGERS AND SUPPORTS

- A. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.
- B. Hanger Rods for Corrosive Environments: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.
- C. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards Metal and Flexible, "Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct."
- D. Steel Cables for Galvanized-Steel Ducts: Galvanized steel complying with ASTM A 603.
- E. Steel Cables for Stainless-Steel Ducts: Stainless steel complying with ASTM A 492.
- F. Steel Cable End Connections: Cadmium-plated steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.
- G. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.
- H. Trapeze and Riser Supports:
  - 1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.
  - 2. Supports for Stainless-Steel Ducts: Stainless-steel shapes and plates.
  - 3. Supports for Aluminum Ducts: Aluminum or galvanized steel coated with zinc chromate.

### 2.5 DUCTWORK FABRICATION

- A. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.
- B. Provide turning vanes in all mitered elbows.
- C. Construct T's, bends, and elbows with radius of not less than 1-1/2 times width of duct on centerline. Where not possible and where rectangular elbows must be used, provide air foil turning vanes of perforated metal with glass fiber insulation.

### PARTNERS 15-163 Hamtramck Public Schools Pool Equipment Room 233100 - 6

- D. T's, bends, and elbows: Construct according to SMACNA (DCS).
- E. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.
- F. Fabricate continuously welded round and oval duct fittings in accordance with SMACNA (DCS).
- G. Fabricate continuously welded round and oval duct fittings two gages heavier than duct gages indicated in SMACNA Standard. Joints shall be minimum 4 inch cemented slip joint, brazed or electric welded. Prime coat welded joints.
- H. Provide standard 45 degree lateral wye takeoffs unless otherwise indicated where 90 degree conical tee connections may be used.
- I. Where ducts are connected to exterior wall louvers and duct outlet is smaller than louver frame, provide blank-out panels sealing louver area around duct. Use same material as duct, painted black on exterior side; seal to louver frame and duct.

#### 2.6 MANUFACTURED DUCTWORK AND FITTINGS

- A. Manufacture in accordance with SMACNA HVAC Duct Construction Standards Metal and Flexible, and as indicated. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.
- B. Flat Oval Ducts: Machine made from round spiral lockseam duct.
  - 1. Manufacture in accordance with SMACNA (DCS).
  - 2. Fittings: Manufacture at least two gages heavier metal than duct.
  - 3. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.
- C. Flexible Ducts: Black polymer film supported by helically wound spring steel wire.
  - 1. UL labeled.
  - 2. Insulation: Fiberglass insulation with polyethylene vapor barrier film.
  - 3. Pressure Rating: 4 inches WG positive and 0.5 inches WG negative.
  - 4. Maximum Velocity: 4000 fpm.
  - 5. Temperature Range: Minus 20 degrees F to 175 degrees F.

#### PART 3 EXECUTION

#### 3.1 INSTALLATION

- A. Install, support, and seal ducts in accordance with SMACNA (DCS).
- B. Install in accordance with manufacturer's instructions.
- C. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction

loss for air-handling equipment sizing and for other design considerations. Install duct systems as indicated unless deviations to layout are approved on Shop Drawings and Coordination Drawings.

- D. Install ducts according to SMACNA's "HVAC Duct Construction Standards Metal and Flexible" unless otherwise indicated.
- E. Install round ducts in maximum practical lengths.
- F. Install ducts with fewest possible joints.
- G. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.
- H. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.
- I. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.
- J. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.
- K. Route ducts to avoid passing through transformer vaults and electrical equipment rooms and enclosures.
- L. Where ducts pass through non-fire-rated interior partitions and exterior walls and are exposed to view, cover the opening between the partition and duct or duct insulation with sheet metal flanges of same metal thickness as the duct. Overlap openings on four sides by at least 1-1/2 inches.
- M. Where ducts pass through fire-rated interior partitions and exterior walls, install fire dampers. Comply with requirements in Section 233300 "Air Duct Accessories" for fire and smoke dampers.
- N. Protect duct interiors from moisture, construction debris and dust, and other foreign materials. Comply with SMACNA's "IAQ Guidelines for Occupied Buildings Under Construction," Appendix G, "Duct Cleanliness for New Construction Guidelines."
- O. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.
- P. Duct sizes indicated are inside clear dimensions. For lined ducts, maintain sizes inside lining.
- Q. Use crimp joints with or without bead for joining round duct sizes 8 inch and smaller with crimp in direction of air flow.
- R. Use double nuts and lock washers on threaded rod supports.

## 3.2 HANGER AND SUPPORT INSTALLATION

A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 5, "Hangers and Supports."

PARTNERS 15-163 Hamtramck Public Schools Pool Equipment Room 233100 - 8

- B. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.
  - 1. Where practical, install concrete inserts before placing concrete.
  - 2. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
  - 3. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches thick.
  - 4. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.
  - 5. Do not use powder-actuated concrete fasteners for seismic restraints.
- C. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inchesof each elbow and within 48 inchesof each branch intersection.
- D. Hangers Exposed to View: Threaded rod and angle or channel supports.
- E. Support vertical ducts with steel angles or channel secured to the sides of the duct with welds, bolts, sheet metal screws, or blind rivets; support at each floor and at a maximum intervals of 16 feet.
- F. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

## 3.3 INSTALLATION OF EXPOSED DUCTWORK

- A. Protect ducts exposed in finished spaces from being dented, scratched, or damaged.
- B. Trim duct sealants flush with metal. Create a smooth and uniform exposed bead. Do not use two-part tape sealing system.
- C. Grind welds to provide smooth surface free of burrs, sharp edges, and weld splatter. When welding stainless steel with a No. 3 or 4 finish, grind the welds flush, polish the exposed welds, and treat the welds to remove discoloration caused by welding.
- D. Maintain consistency, symmetry, and uniformity in the arrangement and fabrication of fittings, hangers and supports, duct accessories, and air outlets.
- E. Repair or replace damaged sections and finished work that does not comply with these requirements.

## 3.4 DUCT SEALING

- A. Seal ducts for duct static-pressure, seal classes, and leakage classes specified in "Duct Schedule" Article according to SMACNA's "HVAC Duct Construction Standards Metal and Flexible."
- B. Seal ducts to the following seal classes according to SMACNA's "HVAC Duct Construction Standards Metal and Flexible":
  - 1. Comply with SMACNA's "HVAC Duct Construction Standards Metal and Flexible."

- 2. Outdoor, Supply-Air Ducts: Seal Class A.
- 3. Outdoor, Exhaust Ducts: Seal Class C.
- 4. Outdoor, Return-Air Ducts: Seal Class C.
- 5. Unconditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wgand Lower: Seal Class B.
- 6. Unconditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg: Seal Class A.
- 7. Unconditioned Space, Exhaust Ducts: Seal Class C.
- 8. Unconditioned Space, Return-Air Ducts: Seal Class B.
- 9. Conditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wgand Lower: Seal Class C.
- 10. Conditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg: Seal Class B.
- 11. Conditioned Space, Exhaust Ducts: Seal Class B.
- 12. Conditioned Space, Return-Air Ducts: Seal Class C.
- 13. All locations, Laboratory Exhaust Ducts: Seal Class A.

# 3.5 DUCT CLEANING

- A. Clean new duct system(s) before testing, adjusting, and balancing.
- B. Use service openings for entry and inspection.
  - 1. Create new openings and install access panels appropriate for duct static-pressure class if required for cleaning access. Provide insulated panels for insulated or lined duct. Patch insulation and liner as recommended by duct liner manufacturer. Comply with Section 233300 "Air Duct Accessories" for access panels and doors.
  - 2. Disconnect and reconnect flexible ducts as needed for cleaning and inspection.
  - 3. Remove and reinstall ceiling to gain access during the cleaning process.
- C. Particulate Collection and Odor Control:
  - 1. When venting vacuuming system inside the building, use HEPA filtration with 99.97 percent collection efficiency for 0.3-micron-size (or larger) particles.
  - When venting vacuuming system to outdoors, use filter to collect debris removed from HVAC system, and locate exhaust downwind and away from air intakes and other points of entry into building.
- D. Clean the following components by removing surface contaminants and deposits:
  - 1. Air outlets and inlets (registers, grilles, and diffusers).
  - 2. Supply, return, and exhaust fans including fan housings, plenums (except ceiling supply and return plenums), scrolls, blades or vanes, shafts, baffles, dampers, and drive assemblies.
  - 3. Air-handling unit internal surfaces and components including mixing box, coil section, air wash systems, spray eliminators, condensate drain pans, humidifiers and dehumidifiers, filters and filter sections, and condensate collectors and drains.
  - 4. Coils and related components.
  - 5. Return-air ducts, dampers, actuators, and turning vanes except in ceiling plenums and mechanical equipment rooms.
  - 6. Supply-air ducts, dampers, actuators, and turning vanes.

PARTNERS 15-163 Hamtramck Public Schools Pool Equipment Room 233100 - 10

- 7. 7. Dedicated exhaust and ventilation components and makeup air systems.
- E. Mechanical Cleaning Methodology:
  - 1. Clean metal duct systems using mechanical cleaning methods that extract contaminants from within duct systems and remove contaminants from building.
  - 2. Use vacuum-collection devices that are operated continuously during cleaning. Connect vacuum device to downstream end of duct sections so areas being cleaned are under negative pressure.
  - 3. Use mechanical agitation to dislodge debris adhered to interior duct surfaces without damaging integrity of metal ducts, duct liner, or duct accessories.
  - 4. Clean fibrous-glass duct liner with HEPA vacuuming equipment; do not permit duct liner to get wet. Replace fibrous-glass duct liner that is damaged, deteriorated, or delaminated or that has friable material, mold, or fungus growth.
  - 5. Clean coils and coil drain pans according to NADCA 1992. Keep drain pan operational. Rinse coils with clean water to remove latent residues and cleaning materials; comb and straighten fins.
  - 6. Provide drainage and cleanup for wash-down procedures.
  - 7. Antimicrobial Agents and Coatings: Apply EPA-registered antimicrobial agents if fungus is present. Apply antimicrobial agents according to manufacturer's written instructions after removal of surface deposits and debris.

### 3.6 FIELD QUALITY CONTROLS

- A. Perform tests and inspections.
- B. Leakage Tests:
  - 1. Comply with SMACNA's "HVAC Air Duct Leakage Test Manual." Submit a test report for each test.
  - 2. Test the following systems:
    - a. Ducts with a Pressure Class Higher Than 3-Inch wg: Test representative duct sections, selected by Architect from sections installed, totaling no less than 25 percent of total installed duct area for each designated pressure class.
  - 3. Disassemble, reassemble, and seal segments of systems to accommodate leakage testing and for compliance with test requirements.
  - 4. Keep open ends of ductwork covered during construction.
  - 5. Test for leaks before applying external insulation.
  - 6. Conduct tests at static pressures equal to maximum design pressure of system or section being tested. If static-pressure classes are not indicated, test system at maximum system design pressure. Do not pressurize systems above maximum design operating pressure.
  - 7. Give seven days' advance notice for testing.
- C. Duct System Cleanliness Tests:
  - 1. Visually inspect duct system to ensure that no visible contaminants are present.
  - 2. Test sections of metal duct system, chosen randomly by Owner, for cleanliness according to "Vacuum Test" in NADCAACR, "Assessment, Cleaning and Restoration of HVAC Systems."
    - a. Acceptable Cleanliness Level: Net weight of debris collected on the filter media shall not exceed 0.75 mg/100 sq. cm.

- D. Duct system will be considered defective if it does not pass tests and inspections.
- E. Prepare test and inspection reports.

# 3.7 SCHEDULES

- A. Supply Ducts:
  - 1. Ducts Connected to Fan Coil Units, Furnaces, Heat Pumps, and Terminal Units:
    - a. Pressure Class: Positive 1-inch wg.
    - b. Minimum SMACNA Seal Class: C.
    - c. SMACNA Leakage Class for Rectangular: 12.
    - d. SMACNA Leakage Class for Round and Flat Oval: 6.
  - 2. Ducts Connected to Constant-Volume Air-Handling Units:
    - a. Pressure Class: Positive 4-inch wg.
    - b. Minimum SMACNA Seal Class: A.
    - c. SMACNA Leakage Class for Rectangular: 6.
    - d. SMACNA Leakage Class for Round and Flat Oval: 3.
  - 3. Ducts Connected to Variable-Air-Volume Air-Handling Units:
    - a. Pressure Class: Positive 4-inch wg.
    - b. Minimum SMACNA Seal Class: A.
    - c. SMACNA Leakage Class for Rectangular: 6.
    - d. SMACNA Leakage Class for Round and Flat Oval: 3.
- B. Return Ducts:
  - 1. Ducts Connected to Fan Coil Units, Furnaces, Heat Pumps, and Terminal Units:
    - a. Pressure Class: Positive or negative 1-inch wg.
    - b. Minimum SMACNA Seal Class: B.
    - c. SMACNA Leakage Class for Rectangular: 12.
    - d. SMACNA Leakage Class for Round and Flat Oval: 6.
  - 2. Ducts Connected to Air-Handling Units:
    - a. Pressure Class: Positive or negative 4-inch wg.
    - b. Minimum SMACNA Seal Class: A.
    - c. SMACNA Leakage Class for Rectangular: 6.
    - d. SMACNA Leakage Class for Round and Flat Oval: 3.
- C. Exhaust Ducts:
  - 1. Ducts Connected to Fans Exhausting (ASHRAE 62.1, Class 1 and 2) Air:
    - a. Pressure Class: Negative 2-inch wg.
    - b. Minimum SMACNA Seal Class: C if negative pressure, and A if positive pressure.
    - c. SMACNA Leakage Class for Rectangular: 24.
    - d. SMACNA Leakage Class for Round and Flat Oval: 12.
  - 2. Ducts Connected to Fans Exhausting Laboratory and Process (ASHRAE 62.1, Class 3 and 4) Air:
    - a. Type 316, stainless-steel sheet.
      - 1) Exposed to View: No. 4 finish.
      - 2) Concealed: No. 2D finish.
    - b. Pressure Class: Positive or negative 6-inch wg.
    - c. Minimum SMACNA Seal Class: A.

PARTNERS 15-163 Hamtramck Public Schools Pool Equipment Room 233100 - 12

- d. SMACNA Leakage Class: 3.
- D. Outdoor-Air (Not Filtered, Heated, or Cooled) Ducts:
  - 1. Ducts Connected to Fan Coil Units, Furnaces, Heat Pumps, and Terminal Units:
    - a. Pressure Class: Positive or negative 2-inch wg.
    - b. Minimum SMACNA Seal Class: B.
    - c. SMACNA Leakage Class for Rectangular: 12.
    - d. SMACNA Leakage Class for Round and Flat Oval: 6.
  - 2. Ducts Connected to Air-Handling Units:
    - a. Pressure Class: Positive or negative 2-inch wg.
    - b. Minimum SMACNA Seal Class: B.
    - c. SMACNA Leakage Class for Rectangular: 12.
    - d. SMACNA Leakage Class for Round and Flat Oval: 6.
- E. Intermediate Reinforcement:
  - 1. Stainless-Steel Ducts:
    - a. Exposed to Airstream: Match duct material.
    - b. Not Exposed to Airstream: Match duct material.
- F. Elbow Configuration:
  - 1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards Metal and Flexible," Figure 4-2, "Rectangular Elbows."
    - a. Velocity 1000 fpmor Lower:
      - 1) Radius Type RE 1 with minimum 0.5 radius-to-diameter ratio.
      - 2) Mitered Type RE 4 without vanes.
    - b. Velocity 1000 to 1500 fpm:
      - 1) Radius Type RE 1 with minimum 1.0 radius-to-diameter ratio.
      - 2) Radius Type RE 3 with minimum 0.5 radius-to-diameter ratio and two vanes.
      - 3) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."
    - c. Velocity 1500 fpm or Higher:
      - 1) Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
      - 2) Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.
      - Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."
  - 2. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards Metal and Flexible," Figure 4-2, "Rectangular Elbows."
    - a. Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
    - b. Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.
    - Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."
  - 3. Round Duct: Comply with SMACNA's "HVAC Duct Construction Standards Metal and Flexible," Figure 3-4, "Round Duct Elbows."

- a. Minimum Radius-to-Diameter Ratio and Elbow Segments: Comply with SMACNA's "HVAC Duct Construction Standards Metal and Flexible," Table 3-1, "Mitered Elbows." Elbows with less than 90-degree change of direction have proportionately fewer segments.
  - 1) Velocity 1000 fpmor Lower: 0.5 radius-to-diameter ratio and three segments for 90 degree elbow.
  - 2) Velocity 1000 to 1500 fpm: 1.0 radius-to-diameter ratio and four segments for 90 degree elbow.
  - 3) Velocity 1500 fpmor Higher: 1.5 radius-to-diameter ratio and five segments for 90 degree elbow.
  - 4) Radius-to Diameter Ratio: 1.5.
- b. Round Elbows, 12 Inchesand Smaller in Diameter: Stamped or pleated.
- c. Round Elbows, 14 Inchesand Larger in Diameter: Welded.
- G. Branch Configuration:
  - 1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards Metal and Flexible," Figure 4-6, "Branch Connection."
    - a. Rectangular Main to Rectangular Branch: 45-degree entry.
    - b. Rectangular Main to Round Branch: Spin in.
      - Round and Flat Oval: Comply with SMACNA's "HVAC Duct Construction Standards -Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees." Saddle taps are permitted in existing duct.
    - c. Velocity 1000 fpmor Lower: 90-degree tap.
    - d. Velocity 1000 to 1500 fpm: Conical tap.
    - e. Velocity 1500 fpmor Higher: 45-degree lateral.

END OF SECTION

### SECTION 233300 - AIR DUCT ACCESSORIES

PART 1 GENERAL

- 1.1 SECTION INCLUDES
  - A. Air turning devices/extractors.
  - B. Duct access doors.
  - C. Duct test holes.
  - D. Flexible duct connections.

#### 1.2 REFERENCE STANDARDS

- A. NFPA 90A Standard for the Installation of Air-Conditioning and Ventilating Systems; National Fire Protection Association; 2012.
- B. SMACNA (DCS) HVAC Duct Construction Standards Metal and Flexible; Sheet Metal and Air Conditioning Contractors' National Association; 2005.

#### 1.3 SUBMITTALS

A. Product Data: Provide for shop fabricated assemblies including volume control dampers. Include electrical characteristics and connection requirements.

#### PART 2 PRODUCTS

- 2.1 AIR TURNING DEVICES/EXTRACTORS
  - A. Multi-blade device with blades aligned in short dimension; steel construction; with individually adjustable blades, mounting straps.
- 2.2 DUCT ACCESS DOORS
  - A. Fabricate in accordance with SMACNA (DCS) and as indicated.
- 2.3 DUCT TEST HOLES
  - A. Temporary Test Holes: Cut or drill in ducts as required. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.
  - B. Permanent Test Holes: Factory fabricated, air tight flanged fittings with screw cap. Provide extended neck fittings to clear insulation.

PARTNERS 15-163 Hamtramck Public Schools Pool Equipment Room 233300 - 2

### 2.4 FLEXIBLE DUCT CONNECTIONS

- A. Fabricate in accordance with SMACNA (DCS) and as indicated.
- B. Flexible Duct Connections: Fabric crimped into metal edging strip.

#### PART 3 EXECUTION

#### 3.1 INSTALLATION

- A. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA (DCS). Refer to Section 233100 for duct construction and pressure class.
- B. Provide duct access doors for inspection and cleaning before and after filters, coils, fans, automatic dampers, at fire dampers, combination fire and smoke dampers, and elsewhere as indicated. Provide minimum 8 x 8 inch size for hand access, size for shoulder access, and as indicated. Provide 4 x 4 inch for balancing dampers only. Review locations prior to fabrication.
- C. Provide duct test holes where indicated and required for testing and balancing purposes.
- D. At fans and motorized equipment associated with ducts, provide flexible duct connections immediately adjacent to the equipment.

END OF SECTION

### SECTION 233416 - CENTRIFUGAL HVAC FANS

PART 1 GENERAL

### 1.1 SECTION INCLUDES

- A. Inline centrifugal fans.
- B. Motors and drives.
- C. Fan accessories.

#### 1.2 REFERENCE STANDARDS

- A. ABMA STD 9 Load Ratings and Fatigue Life for Ball Bearings; American Bearing Manufacturers Association, Inc.; 2015.
- B. AMCA (DIR) [Directory of] Products Licensed Under AMCA International Certified Ratings Program; Air Movement and Control Association International, Inc.; http://www.amca.org/certified/search/company.aspx.
- C. AMCA 99 Standards Handbook; Air Movement and Control Association International, Inc.; 2010.
- D. AMCA 210 Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Rating; Air Movement and Control Association International, Inc.; 2007 (ANSI/AMCA 210, same as ANSI/ASHRAE 51).
- E. AMCA (DIR) [Directory of] Products Licensed Under AMCA International Certified Ratings Program; Air Movement and Control Association International, Inc.; http://www.amca.org/certified/search/company.aspx.

### 1.3 PERFORMANCE REQUIREMENTS

- A. Performance Ratings: Determined in accordance with AMCA 210 and bearing the AMCA Certified Rating Seal.
- B. Fabrication: Conform to AMCA 99.
- C. Performance Base: Sea level conditions.
- D. Static and Dynamic Balance: Eliminate vibration or noise transmission to occupied areas.

## 1.4 SUBMITTALS

A. Product Data: Provide data on centrifugal fans and accessories including fan curves with specified operating point clearly plotted, power, RPM, sound power levels for both fan inlet and outlet at rated capacity, and electrical characteristics and connection requirements.

PARTNERS 15-163 Hamtramck Public Schools Pool Equipment Room 233416 - 2

- B. Shop Drawings: Indicate assembly of centrifugal fans and accessories including fan curves with specified operating point clearly plotted, sound power levels for both fan inlet and outlet at rated capacity, and electrical characteristics and connection requirements.
- C. Manufacturer's Instructions: Include complete installation instructions.
- D. Maintenance Data: Include instructions for lubrication, motor and drive replacement, spare parts list, and wiring diagrams.
- 1.5 QUALITY ASSURANCE
  - A. Provide certified fan sound power ratings

#### 1.6 FIELD CONDITIONS

A. Permanent fans may be used for ventilation during construction only after ductwork is clean, filters are in place, bearings have been lubricated, and fan has been test run under observation.

### PART 2 PRODUCTS

#### 2.1 MANUFACTURERS

- A. ACME Engineering and Manufacturing Corporation: www.acmefan.com.
- B. Loren Cook Company: www.lorencook.com.
- C. PennBarry: www.pennbarry.com.
- D. Greenheck.
- 2.2 WHEEL AND INLET
  - A. Backward Inclined: Steel or aluminum construction with smooth curved inlet flange, heavy back plate, backwardly curved blades welded or riveted to flange and back plate; cast iron or cast steel hub riveted to back plate and keyed to shaft with set screws.
- 2.3 HOUSING
  - A. Heavy gage steel, spot welded for AMCA 99 Class I and II fans, and continuously welded for Class III, adequately braced, designed to minimize turbulence with spun inlet bell and shaped cut
  - B. Factory finish before assembly to manufacturer's standard. For fans handling air downstream of humidifiers, provide two additional coats of paint. Prime coating on aluminum parts is not required.
  - C. Provide bolted construction with horizontal flanged split housing, where indicated.

#### 2.4 BEARINGS AND DRIVES

- A. Bearings: Heavy duty pillow block type, selfgreasing ball bearings, with ABMA STD 9 life at 50,000 hours.
- B. Shafts: Hot rolled steel, ground and polished, with keyway, protectively coated with lubricating oil, and shaft guard.
- C. Drive: Cast iron or steel sheaves, dynamically balanced, keyed. Variable and adjustable pitch sheaves for motors 15 hp and under, selected so required rpm is obtained with sheaves set at mid Fixed sheave for 20 hp and over, matched belts, and drive rated as recommended by manufacturer or minimum 1.5 times nameplate rating of the motor.

### 2.5 ACCESSORIES

- A. Access Doors: Shaped to conform to scroll, with quick opening latches and gaskets.
- B. Scroll Drain: 1/2 inch steel pipe coupling welded to low point of fan scroll.

### PART 3 EXECUTION

- 3.1 INSTALLATION
  - A. Install in accordance with manufacturer's instructions.
  - B. Install flexible connections between fan inlet and discharge ductwork; refer to Section 233300. Ensure metal bands of connectors are parallel with minimum one inch flex between ductwork and fan while running.
  - C. Provide fixed sheaves required for final air balance.

#### END OF SECTION

### SECTION 233700 - AIR OUTLETS AND INLETS

PART 1 GENERAL

- 1.1 SECTION INCLUDES
  - A. Registers/grilles.

### 1.2 SUBMITTALS

- A. See Section 013000 Administrative Requirements for submittal procedures.
- B. Product Data: Provide data for equipment required for this project. Review outlets and inlets as to size, finish, and type of mounting prior to submission. Submit schedule of outlets and inlets showing type, size, location, application, and noise level.

### PART 2 PRODUCTS

#### 2.1 MANUFACTURERS

- A. Krueger: www.krueger-hvac.com.
- B. Price Industries: www.price-hvac.com.
- C. Titus: www.titus-hvac.com.
- 2.2 WALL EXHAUST AND RETURN REGISTERS/GRILLES
  - A. Type: Streamlined blades, 3/4 inch minimum depth, 3/4 inch maximum spacing, with spring or other device to set blades, vertical face.
  - B. Frame: 1-1/4 inch margin with countersunk screw mounting.
  - C. Fabrication: Aluminum extrusions, with factory baked enamel finish.

## PART 3 EXECUTION

### 3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Check location of outlets and inlets and make necessary adjustments in position to conform with architectural features, symmetry, and lighting arrangement.
- C. Install diffusers to ductwork with air tight connection.
- D. Provide balancing dampers on duct take-off to diffusers, and grilles and registers, despite whether dampers are specified as part of the diffuser, or grille and register assembly.

PARTNERS 15-163 Hamtramck Public Schools Pool Equipment Room 233700 - 2

E. Paint ductwork visible behind air outlets and inlets matte black. Refer to Section 099123. END OF SECTION

### SECTION 238101 - TERMINAL HEAT TRANSFER UNITS

PART 1 GENERAL

- 1.1 SECTION INCLUDES
  - A. Fan-coil units.
- 1.2 RELATED REQUIREMENTS
  - A. Section 232113 Hydronic Piping.
  - B. Section 232114 Hydronic Specialties.
  - C. Section 262717 Equipment Wiring: Electrical characteristics and wiring connections. Installation of room thermostats. Electrical supply to units.
- 1.3 SUBMITTALS
  - A. See Section 013000 Administrative Requirements, for submittal procedures.
  - B. Product Data: Provide typical catalog of information including arrangements.
  - C. Shop Drawings:
    - 1. Indicate cross sections of cabinets, grilles, bracing and reinforcing, and typical elevations.
    - Submit schedules of equipment and enclosures typically indicating length and number of pieces of element and enclosure, corner pieces, end caps, cap strips, access doors, pilaster covers, and comparison of specified heat required to actual heat output provided.
  - D. Manufacturer's Instructions: Indicate installation instructions and recommendations.
  - E. Project Record Documents: Record actual locations of components and locations of access doors in radiation cabinets required for access or valving.
  - F. Operation and Maintenance Data: Include manufacturers descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listings.
  - G. Warranty: Submit manufacturer's warranty and ensure forms have been completed in Owner's name and registered with manufacturer.
- 1.4 WARRANTY
  - A. See Section 017800 Closeout Submittals, for additional warranty requirements.

## PART 2 PRODUCTS

#### 2.1 FAN-COIL UNITS

- A. Coil: Integral face and bypass coil consisting of built-in multiple alternate finned heating elements and bypasses. Separate dampers shall control the airflow through these face and bypass sections. Each set of dampers shall be interlocked and controlled by a separate electric damper motor.
- B. Cabinet: Casing and discharge shall be constructed of galvannealed sheet metal.
- C. Finish: Unit casing and discharge shall be painted inside and out with an air-dried alkyd enamel finish
- D. Fans: Propeller type fan blade drive by a TECF motor, statically and dynamically balanced.
- E. Motor: Tap wound single speed permanent split capacitor with sleeve bearings, resiliently mounted.
- F. Control: Unit shall be furnished with Room with Low Limit Control having a room thermostat and overriding low limit thermostat to prevcent the unit's discharge temperature from falling below the deisred minimum.

#### PART 3 EXECUTION

#### 3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install equipment exposed to finished areas after walls and ceiling are finished and painted. Do not damage equipment or finishes.
- C. Fan-Coil Units: Install as indicated. Coordinate to assure correct recess size for recessed units.
- D. Install electric heating equipment including devices furnished by manufacturer but not factory-mounted. Furnish copy of manufacturer's wiring diagram submittal. Install electrical wiring in accordance with manufacturer's submittals and Section 262717.

### 3.2 CLEANING

- A. After construction is completed, including painting, clean exposed surfaces of units. Vacuum clean coils and inside of cabinets.
- B. Install new filters.

END OF SECTION

### SECTION 260500 - BASIC ELECTRICAL REQUIREMENTS

### PART 1 GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the contract, including General and Supplementary Conditions, Special Conditions and Division 1 specification sections, apply to work of this section.
- B. Provide all items, articles, materials, operations or methods listed, mentioned or scheduled on drawings and/or herein, including all labor, materials, equipment and incidentals necessary and required for their completion.
- C. The items in this section are supplementary to the requirements set forth in other portions of the specifications as indicated under Item "A" above.

#### 1.2 DRAWINGS

- A. The drawings show the location and general arrangement of equipment, electrical systems and related items. They shall be followed as closely as elements of the construction will permit.
- B. Examine the drawings of other trades and verify the conditions governing the work on the job site. Arrange work accordingly, providing such fittings, conduit, junction boxes and accessories as may be required to meet such conditions.
- C. Deviations from the drawings, with the exception of minor changes in routing and other such incidental changes that do not affect the functioning or serviceability of the systems, shall not be made without the written approval of the Architect/Engineer.
- D. The architectural and structural drawings take precedence in all matters pertaining to the building structure, mechanical drawings in all matters pertaining to mechanical trades and electrical drawings in all matters pertaining to electrical trades. Where there are conflicts or differences between the drawings for the various trades, report such conflicts or differences to the Architect/Engineer for resolution.

#### 1.3 INSPECTION OF SITE

- A. Visit the site, examine and verify the conditions under which the work must be conducted before submitting proposal.
- B. The submitting of a proposal implies that the contractor has visited the site and understands the conditions under which the work must be conducted.

#### 1.4 CONTRACT BREAKDOWN

A. Within two (2) weeks following award of contract, submit to the Architect/Engineer for approval a contract amount breakdown. Breakdown shall be submitted on a form similar to the form available at the Architect/Engineer's office. All requests for payment shall be based on the approved breakdown.

PARTNERS 15-163 Hamtramck Public Schools Pool Equipment Room 260500 - 2

### 1.5 TEMPORARY FACILITIES

A. Provide and remove upon completion of the project, in accordance with the general conditions, a complete temporary electrical and telephone service during construction.

#### 1.6 ALTERNATES

A. See Alternate Section and other applicable parts of the specifications.

#### 1.7 GUARANTEE

A. Contractor guarantees that the installation is free from defects and agrees to replace or repair, any part of this installation which becomes defective within a period of one year following final acceptance, unless noted otherwise, provided that such failure is due to defects in the equipment, material or installation or to follow the specifications and drawings. File with the Owner any and all guarantees from the equipment manufacturers.

#### 1.8 CODES, PERMITS AND FEES

- A. Unless otherwise indicated, all required permits, licenses, inspections, approvals and fees for electrical work shall be secured and paid for by the contractor. All work shall conform to all applicable codes, rules and regulations.
- B. Rules of local utility companies shall be complied with. Check with the utility company supplying service to the installation and determine all devices including, but not limited to, all current and potential transformers, meter boxes, C.T. cabinets and meters which will be required and include the cost of all such items in proposal.
- C. All work shall be executed in accordance with the rules and regulations set forth in local and state codes. Prepare any detailed drawings or diagrams which may be required by the governing authorities. Where the drawings and/or specifications indicate materials or construction in excess of code requirements, the drawings and/or specifications shall govern.

#### 1.9 STANDARDS OF MATERIAL AND WORKMANSHIP:

- A. All materials shall be new. The electrical and physical properties of all materials, and the design, performance characteristics, and methods of construction of all items of equipment, shall be in accordance with the latest issue of the various, applicable Standard Specifications of the following recognized authorities:
  - 1. A.N.S.I.American National Standards Institute
  - 2. A.S.T.M.American Society for Testing Materials
  - 3. I.C.E.A.Insulated Cable Engineers Association
  - 4. I.E.E.E.Institute of Electrical and Electronics Engineers
  - 5. N.E.C.National Electrical Code
  - 6. N.E.M.A.National Electrical Manufacturer's Association
  - 7. U.L.Underwriters Laboratories, Inc.

- B. Perform all work in a first class and workmanlike manner, in accordance with the latest accepted standards and practices for the Trades involved.
- C. All equipment of the same or similar systems shall be by the same manufacturer.

### 1.10 RECORD DRAWINGS

- A. Provide complete operating and maintenance instruction manuals covering all electrical equipment herein specified, together with parts lists. All literature shall be furnished in triplicate for Owner and shall be bound in book or ring binder form as directed by Architect/ Engineer.
- B. The operating and maintenance instructions shall include a brief, general description for all electrical systems including, but not limited to:
- C. Routine maintenance procedures.
- D. Trouble-shooting procedures.
- E. Shop Drawings
- F. Any equipment offered as a substitution shall be equal in quality, durability, appearance, ampacity, and efficiency through all ranges of operation, shall conform with arrangements and space limitations of the equipment shown on the plans and/or specified, shall be compatible with the other components of the system. All costs to make these items of equipment comply with these requirements including, but not limited to, conduit, wiring, bus work, enclosures and building alterations shall be included in the original bid. Similar equipment shall be by one manufacturer.

### 1.11 SHOP DRAWINGS/SUBMITTALS

- A. All shop drawings shall be submitted in groupings of similar and/or related items (lighting fixtures, switchgear, etc.). Incomplete submittal groupings will be returned unchecked.
- B. Submit for approval eight (8) copies of shop drawings for all electrical systems or equipment but not limited to the items listed below. Where items are referred to by symbolic designation on the drawings and specifications, all submittals shall bear the same designation (light fixtures). Refer to other sections of the electrical specifications for additional requirements.
  - 1. Disconnect Switches
  - 2. Wiring Devices
  - 3. Lighting Fixtures

## 1.12 MANUFACTURERS LISTED

- A. The listing of specific manufacturers does not imply acceptance of their products that do not meet the specified ratings, features and functions. Manufacturers listed are not relieved from meeting these specifications in their entirety.
- B. Products in compliance with the specification and manufactured by others not named will be considered only if pre-approved by the Engineer ten (10) days prior to bid date.

PARTNERS 15-163 Hamtramck Public Schools Pool Equipment Room 260500 - 4

# 1.13 USE OF EQUIPMENT

- A. The use of any equipment, or any part thereof for purposes other than testing even with the Owner's consent, shall not be construed to be an acceptance of the work on the part of the Owner, nor be construed to obligate the Owner in any way to accept improper work or defective materials.
- B. Do not use Owner's lamps for temporary lighting except as allowed and directed by the Owner. Equip lighting fixtures with new lamps when the project is turned over to the Owner.

#### PART 2 EXECUTION

- 2.1 INSTALLATION OF EQUIPMENT
  - A. Install all equipment in strict accordance with all directions and recommendations furnished by the manufacturer. Where such directions are in conflict with the drawings and specifications, report such conflicts to the Architect/Engineer for resolution.

## 2.2 COORDINATION

A. Install work to avoid interference with work of other trades including, but not limited to, architectural and mechanical trades. Remove and relocate any work that causes an interference at contractor's expense. Disputes regarding the cause of an interference will be resolved by the Construction Manager or Architect/Engineer.

#### 2.3 CHASES AND RECESSES

A. Provided by the architectural trades, but the contractor shall be responsible for their accurate location and size.

#### 2.4 CUTTING, PATCHING AND DAMAGE TO OTHER WORK

- A. Refer to General Conditions for requirements.
- B. All cutting, patching and repair work shall be performed by the contractor through approved, qualified subcontractors. Contractor shall include full cost of same in bid.

### 2.5 EQUIPMENT CONNECTIONS

A. Make connections to equipment, motors, lighting fixtures, and other items included in the work in accordance with the approved shop drawings and rough-in measurements furnished by the manufacturers of the particular equipment furnished. All additional connections not shown on the drawings, but called out by the equipment manufacturer's shop drawings shall be provided.

#### 2.6 ACCESS DOORS

A. Provide access doors for installation by architectural trades. In the walls, provide Milcor No. "DW" or "M" as required to make all controls, electrical boxes and other equipment installed by the contractor accessible. Minimum size 12 inches x 12 inches. In the ceiling, provide Milcor No. 3210, 3105 or 3206 for accessibility as mentioned above, 24 inches x 24 inches minimum size. The plaster or acoustical tile

insert shall be by the architectural trades. Areas with accessible ceilings (ceilings where tiles are not fastened in place and can be individually removed without removal of adjacent tiles) will not require access doors.

B. When access doors are in fire resistant wall or ceilings, they must bear the Underwriter's' Laboratories, Inc., Label, with time design rating equal to or exceeding that of the wall or ceiling unless they were a part of the tested assembly.

### 2.7 CLEANING

- A. All debris shall be removed daily as required to maintain the work area in a neat, orderly condition.
- B. Final cleanup shall include, but not be limited to, washing of fixture lenses or louvers, switchboards, substations, motor control centers, panels, etc. Fixture reflectors and lenses or louvers shall be left with no water marks or cleaning streaks.

## 2.8 PROTECTION AND HANDLING OF EQUIPMENT AND MATERIALS

- A. Equipment and materials shall be protected from theft, injury or damage.
- B. Protect conduit openings with temporary plugs or caps.
- C. Provide adequate storage for all equipment and materials delivered to the job site. Location of the space will be designated by the Construction Manager or Architect/Engineer. Equipment set in place in unprotected areas must be provided with temporary protection.

### 2.9 NAMEPLATES AND DIRECTORIES

- A. Identify switchgear, motor controls, panelboards, safety switches, etc., with manufacturer's nameplate, shop order, where applicable on composite assemblies, and designations used on the Drawings. Nameplates shall be laminated phenolic plastic, beveled edged white with engraved black letters. Except where impractical, letters and numerals shall be a minimum of 1/4 inch high. Nameplates shall be mechanically secured. Pressure sensitive nameplates are not acceptable. Panel directories shall be neatly typed, showing equipment served and location for each breaker or switch with a clear plastic protective cover.
- B. For detailed requirements refer to Section 26 0553 IDENTIFICATION FOR ELECTRICAL SYSTEMS.

#### 2.10 EXTRA WORK

A. For any extra electrical work which may be proposed, this Contractor shall furnish to the Construction Manager, an itemized breakdown of the estimated cost of the materials and labor required to complete this work. The Contractor shall proceed only after receiving a written order from the Construction Manager establishing the agreed price and describing the work to be done.

PARTNERS 15-163 Hamtramck Public Schools Pool Equipment Room 260500 - 6

## 2.11 DRAWINGS AND MEASUREMENTS

- A. These Specifications and accompanying Drawings are intended to describe and provide for finished work. They are intended to be cooperative, and what is called for by either shall be as binding as if call for by both. The Contractor will understand that the work herein described shall be complete in every detail.
- B. The Drawings are not intended to be scaled for rough-in measurements nor to serve as Shop Drawings. Field measurements necessary for ordering materials and fitting the installation to the building construction and arrangement shall be taken by the Contractor. The Contractor shall check latest Architectural drawings and locate light switches from same where door swings are different from Electrical Drawings.

END OF SECTION
## SECTION 260501 - MINOR ELECTRICAL DEMOLITION

PART 1 GENERAL

# 1.1 SECTION INCLUDES

A. Electrical demolition.

# 1.2 RELATED REQUIREMENTS

A. Section 017000 - Execution and Closeout Requirements: Additional requirements for alterations work.

# 1.3 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

#### 1.4 SUMMARY

- A. The work covered under this section consists of the furnishing of all necessary labor, supervision, materials, equipment, and services to completely execute the system of minor electrical demolition as described in this specification.
- B. The demolition documents plans and specification have been prepared from existing non-as built documents and cursory non-invasive field investigation.
- C. It is the contractors obligation to become familiar with the extent of demolition and the existing condition before submitting their bid.
- D. During demolition if the contractor discovers unforseen significant non code compliance conditions of the existing installation they shall notify the Architect and Engineer immediately in writting.
- E. During demolition the contractor shall record on the as-builts all demolished circuits numbers that can be used for new circuiting.

#### 1.5

# PART 2 PRODUCTS

# 2.1 MATERIALS AND EQUIPMENT

A. Materials and equipment for patching and extending work: As specified in individual sections.

# PART 3 EXECUTION

# 3.1 EXAMINATION

A. Verify that abandoned wiring and equipment serve only abandoned facilities.

PARTNERS 15-163 Hamtramck Public Schools Pool Equipment Room 260501 - 2

- B. Demolition drawings are based on casual field observation and existing record documents.
- C. Report discrepancies to Owner before disturbing existing installation.
- D. Beginning of demolition means installer accepts existing conditions.

#### 3.2 PREPARATION

- A. Disconnect electrical systems in walls, floors, and ceilings to be removed.
- B. Coordinate utility service outages with utility company.
- C. Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations.

#### 3.3 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

- A. Remove, relocate, and extend existing installations to accommodate new construction.
- B. Remove abandoned wiring to source of supply.
- C. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.
- D. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets that are not removed.
- E. Disconnect and remove abandoned panelboards and distribution equipment.
- F. Disconnect and remove abandoned luminaires. Remove brackets, stems, hangers, and other accessories.
- G. Repair adjacent construction and finishes damaged during demolition and extension work.
- H. Maintain access to existing electrical installations that remain active. Modify installation or provide access panel as appropriate.
- I. Extend existing installations using materials and methods compatible with existing electrical installations, or as specified.

#### 3.4 CLEANING AND REPAIR

A. See Section 017419 - Construction Waste Management and Disposal for additional requirements.

B. Panelboards: Clean exposed surfaces and check tightness of electrical connections. Replace damaged circuit breakers and provide closure plates for vacant positions. Provide typed circuit directory showing revised circuiting arrangement.

END OF SECTION