BOYNTON-WILLIAMS & ASSOCIATES

ARCHITECTURE

PLANNING

INTERIORS

PROJECT MANUAL

FOR
CANADIAN COUNTY ADMINISTRATION BUILDING REROOF & HVAC REPLACEMENT

200 N. CHOCTAW AVE.
EL RENO, OKLAHOMA 73036

- General Conditions
- Bidding Requirements
- Contract Forms
- Conditions of Contract
- Architectural Specifications
- MEP Specifications
- Attached Drawing

NORMAN

DALLAS

TULSA

900 36TH AVENUE NW

SUITE 100

NORMAN, OK 73072

405-329-0423

FAX 405-364-1439

A Professional Corporation
Member: American Institute of Architects

Issue Date
03/29/16
Project Number
N16001
Set Number

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PROJECT MANUAL
FOR
CANADIAN COUNTY ADMINISTRATION BUILDING REROOF & HVAC RENOVATION

200 N. CHOCTAW AVE.
EL RENO, OKLAHOMA 73036

Issue Date
03/29/06
Project Number
N16001

DOCUMENT 00 0103

PROJECT INFORMATION

PROJECT NAME:	CANADIAN COUNTY ADMINISTRATION BUILDING REROOF & HVAC RENOVATION
OWNER:	CANADIAN COUNTY, OKLAHOMA
PROJECT LOCATION:	200 N. CHOCTAW AVE. EL RENO, OKLAHOMA 73036
ARCHITECT:	BOYNTON WILLIAMS & ASSOCIATES, INC. 900 36TH AVENUE NW, SUITE 100 NORMAN, OKLAHOMA 73072 Phone 405-329-0423 Fax 405-364-1439
PRINCIPAL-IN-CHARGE:	CLARENCE C. WILLIAMS III, AIA
ASSOCIATE ARCHITECT-IN-CHARGE:	V. TOM RATANASIN, AIA tomr@bwaarchitects.com
ARCHITECT'S PROJECT NUMBER:	N16001

NOTE: Please transmit all project correspondence via written note, telephone, fax or E-mail through the **Associate in-charge or Project Architect**.

END OF DOCUMENT

DOCUMENT 00 0110

BWA N16001

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The following is a list of graphic documents bound separately from the Project Manual.

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END OF DOCUMENT

INSTRUCTIONS TO BIDDERS

PART 1 GENERAL

1.1 INSTRUCTIONS TO BIDDERS

A. American Institute of Architects, AIA Document A701 “Instructions to Bidders” and modifications thereto shall be Instructions to Bidders for this Project.

B. Copy of AIA Document A701 follows.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF DOCUMENT

AIA® Document A701™ – 1997

Instructions to Bidders

for the following PROJECT:
(Name and location or address):
[Insert Project Name]
[Address]
[City, ST Zip]
[Phone Number]
[Fax Number]

THE OWNER:
(Name and address):
[Insert Owner Name]
[Address]
[City, ST Zip]
[Phone Number]
[Fax Number]

THE ARCHITECT:
(Name and address):
[Insert Architect's Name]
[Address]
[City, ST Zip]
[Phone Number]
[Fax Number]

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.

TABLE OF ARTICLES

ARTICLE 1 DEFINITIONS

§ 1.1 Bidding Documents include the Bidding Requirements and the proposed Contract Documents. The Bidding Requirements consist of the **Bid Solicitation**, Instructions to Bidders, **and modifications thereto, Additional Instructions to Bidders, the Bid Form** and other sample Bidding and Contract Forms **and Documents**. 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.

1.3.1 On the day established as the Bid Date in the Bid Solicitation, Addenda may be issued by facsimile. Such Addenda shall be defined as a Fax (Facsimile) Addendum.

§ 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 **and each of his Sub-bidders** 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 **and has notified each Sub-bidder of the observations and correlations which will effect their portion of the Work.**

§ 2.1.4 The Bid is based upon the materials, equipment and systems required by the Bidding Documents without exception **and each Sub-bid upon which the Bid is in part based.**

2.2 The Bidder and each Sub-bidder, by making a Bid or a Sub-bid, also represents that the Bidder or Sub-bidder has read and understands the additional representations contained in the proposed Contract Documents and makes representations in accordance therewith.

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 **Bid Solicitation** in the number and for the deposit sum stated therein. The deposit will be refunded to Bidders who submit a bona fide Bid **at the time and place designated in the Bid Solicitation** and return the Bidding Documents **to the office of the Architect, including all Drawings, Specifications and Addenda,** in good condition within ten **(10)** days **from the Bid Date. Replacement costs for damaged or missing Drawings or pages for Specifications and Addenda will be deducted from the Bidders as outlined in the Advertisement or Invitation to Bid. Deposits will be forfeited by Bidders who do not submit a bona fide Bid or who do not return the Bidding Documents to the office of the Architect in good condition within five (5) days from the date they are received or no later than seven (7) days prior to the bid date. Bidding Documents shall be returned to the Architect's Office postage paid. The Architect will not accept delivery of Bidding Documents returned C.O.D., freight collect or other similar methods.**

3.1.1.1 A Bidder receiving a Contract Award may retain the Bidding Documents and the Bidder's deposit will be refunded.

§ 3.1.2 Bidding Documents will not be issued directly to Sub-bidders unless specifically offered in the Advertisement or Invitation to Bid, or in supplementary instructions to bidders.

§ 3.1.3 Bidders **and Sub-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.

3.1.5 Prior to acceptance of a Sub-bid, the Bidder shall insure that the Sub-bidder has read and understands all of the Bidding Documents and has made his Sub-bid in full accordance therewith.

§ 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. **The Bidder and each Sub-bidder accepts a duty, obligation and responsibility to seek clarification of any open, obvious or patent error or ambiguity in the proposed Contract Documents.**

§ 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 **five (5)** 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.

3.4.1.1 A copy of all Fax Addenda will be available to all Bidders at the Place of Bid prior to the Time of Bid as established in the Bid Solicitation.

§ 3.4.2 Copies of Addenda will be made available for inspection wherever Bidding Documents are on file for that purpose.

(Paragraph deleted)

§ 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.

3.4.5 Each Bidder shall ascertain prior to accepting a bid from a Sub-bidder that the Sub-bidder has reviewed all Addenda and that the Sub-bidder's bid has been made in accordance with all Addenda.

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."

(Paragraph deleted)

§ 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.

4.1.8 The Bidder shall make no stipulations on the Bid Form nor qualify the Bid in any other manner.

§ 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.

4.2.4 As a prerequisite for submitting a Bid, General Contractor shall submit sample copy of his Bid Bond seven (7) days prior to Bid Opening for review. Sample Bond shall identify bonding company as well as any conditions stipulated.

§ 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. **The Bidder shall assume full and sole responsibility for communications between the Bidder's office and a representative of the Bidder who hand delivers the Bid to the Place of Bid.**

§ 4.3.4 Oral, telephonic, telegraphic, facsimile or other electronically transmitted bids will not be considered.

§ 4.4 MODIFICATION OR WITHDRAWAL OF BID

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

§ 4.4.2 Prior to the time and date designated for receipt of Bids, a Bid submitted may be modified or withdrawn by notice to the party receiving Bids at the place designated for receipt of Bids. Such notice shall be in writing over the signature of the Bidder. Written confirmation over the signature of the Bidder shall be received, and date- and time-stamped by the receiving party on or before the date and time set for receipt of Bids. A change shall be so worded as not to reveal the amount of the original Bid.

§ 4.4.3 Withdrawn Bids may be resubmitted up to the date and time designated for the receipt of Bids provided that they are then fully in conformance with these Instructions to Bidders.

§ 4.4.4 Bid security, if required, shall be in an amount sufficient for the Bid as resubmitted.

ARTICLE 5 CONSIDERATION OF BIDS

§ 5.1 OPENING OF BIDS

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

§ 5.2 REJECTION OF BIDS

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

§ 5.3 ACCEPTANCE OF BID (AWARD)

§ 5.3.1 It is the intent of the Owner to award a Contract to the lowest qualified Bidder provided the Bid has been submitted in accordance with the requirements of the Bidding Documents and does not exceed the funds available. The Owner shall have the right to waive informalities and irregularities in a Bid received and to accept the Bid which, in the Owner's judgment, is in the Owner's own best interests.

§ 5.3.2 The Owner shall have the right to accept Alternates in any order or combination, unless otherwise specifically provided in the Bidding Documents, and to determine the low Bidder on the basis of the sum of the Base Bid and Alternates accepted.

ARTICLE 6 POST-BID INFORMATION

§ 6.1 CONTRACTOR'S QUALIFICATION STATEMENT

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

§ 6.2 OWNER'S FINANCIAL CAPABILITY

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

§ 6.3 SUBMITTALS

§ 6.3.1 Prior to the award of the Contract the Bidder shall, **within ten (10) calendar days** or as stipulated in the Bidding Documents, after notification of selection for the award of a Contract, furnish to the Owner through the Architect in writing:

.1 a designation of the Work to be performed with the Bidder's own forces;

.2 names of the manufacturers, products, and the suppliers of principal items or systems of materials and equipment proposed for the Work; and

.3 names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for the principal portions of the Work.

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

§ 6.3.3 Prior to the execution of the Contract, the Architect will notify the Bidder in writing if either the Owner or Architect, after due investigation, has reasonable objection to a person or entity proposed by the Bidder. If the Owner or Architect has reasonable objection to a proposed person or entity, the Bidder **shall**, 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 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 , LABOR AND MATERIAL PAYMENT (STATUTORY) AND DEFECT BONDS

§ 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.

7.2.1.1 Seven (7) days prior to scheduled Bid Opening, General Contractor shall submit sample copy of each required Bond for review. Sample Bond(s) shall identify bonding company as well as any conditions stipulated.

§ 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. **The Defect Bond shall be written on the form included in the Contract Documents and shall be written in the amount of the Contract Sum.**

§ 7.2.3 The bonds shall be dated on or after the date of the Contract.

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

ARTICLE 8 FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR

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

Additions and Deletions Report for
AIA® Document A701™ – 1997

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

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PAGE 1

(Name and location or ~~address)~~address):
[Insert Project Name]
[Address]
[City, ST Zip]
[Phone Number]
[Fax Number]

...

~~*(Name, legal status and address)*~~*(Name and address):*
[Insert Owner Name]
[Address]
[City, ST Zip]
[Phone Number]
[Fax Number]

...

~~*(Name, legal status and address)*~~*(Name and address):*
[Insert Architect's Name]
[Address]
[City, ST Zip]
[Phone Number]
[Fax Number]

...

~~TABLE OF ARTICLES~~TABLE OF ARTICLES

PAGE 2

§ 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.~~ **Bid Solicitation**, Instructions to Bidders, **and modifications thereto, Additional Instructions to Bidders, the Bid Form** and other sample Bidding and Contract Forms **and Documents.** 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.

...

1.3.1 On the day established as the Bid Date in the Bid Solicitation, Addenda may be issued by facsimile. Such Addenda shall be defined as a Fax (Facsimile) Addendum.

...

§ 2.1.1 The Bidder **and each of his Sub-bidders** 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.

...

§ 2.1.3 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.~~Documents **and has notified each Sub-bidder of the observations and correlations which will effect their portion of the Work.**

§ 2.1.4 The Bid is based upon the materials, equipment and systems required by the Bidding Documents without ~~exception.~~exception **and each Sub-bid upon which the Bid is in part based.**

2.2 The Bidder and each Sub-bidder, by making a Bid or a Sub-bid, also represents that the Bidder or Sub-bidder has read and understands the additional representations contained in the proposed Contract Documents and makes representations in accordance therewith.

PAGE 3

§ 3.1.1 Bidders may obtain complete sets of the Bidding Documents from the issuing office designated in the ~~Advertisement or Invitation to Bid~~ **Bid Solicitation** in the number and for the deposit ~~sum, if any,~~ sum 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~~ Bid **at the time and place designated in the Bid Solicitation** and return the Bidding Documents **to the office of the Architect, including all Drawings, Specifications and Addenda,** in good condition within ten **(10)** days **from the Bid Date. Replacement costs for damaged or missing Drawings or pages for Specifications and Addenda will be deducted from the Bidders as outlined in the Advertisement or Invitation to Bid. Deposits will be forfeited by Bidders who do not submit a bona fide Bid or who do not return the Bidding Documents to the office of the Architect in good condition within five (5) days from the date they are received or no later than seven (7) days prior to the bid date. Bidding Documents shall be returned to the Architect's Office postage paid. The Architect will not accept delivery of Bidding Documents returned C.O.D., freight collect or other similar methods.**

3.1.1.1 A Bidder receiving a Contract Award may retain the Bidding Documents and the Bidder's deposit will be refunded.

...

§ 3.1.3 Bidders **and Sub-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.

...

3.1.5 Prior to acceptance of a Sub-bid, the Bidder shall insure that the Sub-bidder has read and understands all of the Bidding Documents and has made his Sub-bid in full accordance therewith.

...

§ 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. **The Bidder and each Sub-bidder accepts a duty, obligation and responsibility to seek clarification of any open, obvious or patent error or ambiguity in the proposed Contract Documents.**

...

§ 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~~ **five (5)** 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.

PAGE 4

3.4.1.1 A copy of all Fax Addenda will be available to all Bidders at the Place of Bid prior to the Time of Bid as established in the Bid Solicitation.

~~§ 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.~~

3.4.5 Each Bidder shall ascertain prior to accepting a bid from a Sub-bidder that the Sub-bidder has reviewed all Addenda and that the Sub-bidder's bid has been made in accordance with all Addenda.

...

~~§ 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.~~

4.1.8 The Bidder shall make no stipulations on the Bid Form nor qualify the Bid in any other manner.

PAGE 5

4.2.4 As a prerequisite for submitting a Bid, General Contractor shall submit sample copy of his Bid Bond seven (7) days prior to Bid Opening for review. Sample Bond shall identify bonding company as well as any conditions stipulated.

...

§ 4.3.3 The Bidder shall assume full responsibility for timely delivery at the location designated for receipt of Bids. **The Bidder shall assume full and sole responsibility for communications between the Bidder's office and a representative of the Bidder who hand delivers the Bid to the Place of Bid.**

PAGE 6

§ 6.3.1 ~~The Bidder shall, as soon as practicable~~ **Prior to the award of the Contract** the Bidder shall, **within ten (10) calendar days** 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:

...

§ 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)~~ **shall,** 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.

...

~~ARTICLE 7 PERFORMANCE BOND AND PAYMENT BOND~~
ARTICLE 7 PERFORMANCE , LABOR AND MATERIAL PAYMENT (STATUTORY) AND DEFECT BONDS

PAGE 7

7.2.1.1 Seven (7) days prior to scheduled Bid Opening, General Contractor shall submit sample copy of each required Bond for review. Sample Bond(s) shall identify bonding company as well as any conditions stipulated.

§ 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. **The Defect Bond shall be written on the form included in the Contract Documents and shall be written in the amount of the Contract Sum.**

Certification of Document's Authenticity

AIA® Document D401™ – 2003

I, Jay W. Boynton, Director, hereby certify, to the best of my knowledge, information and belief, that I created the attached final document simultaneously with its associated Additions and Deletions Report and this certification at 08:28:03 on 02/22/2011 under Order No. 5406207157_1 from AIA Contract Documents software and that in preparing the attached final document I made no changes to the original text of AIA® Document A701™ – 1997, Instructions to Bidders, as published by the AIA in its software, other than those additions and deletions shown in the associated Additions and Deletions Report.

_____

(Signed)

_____

(Title)

_____

(Dated)

DOCUMENT 00 2218

ADDITIONAL INSTRUCTIONS TO BIDDERS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Definitions.
2. Qualifications of bidders.
3. Number of contracts.
4. Time for completion.
5. Interpretation or Correction of Bidding Documents.
6. Substitutions.
7. Bid forms.
8. Beginning the Work.
9. Compliance with Public Competitive Bidding Act.

B. Related Documents:
1. The Contract Documents, as defined in Document 00 7213 - General Conditions and modifications thereto, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.
   a. Document 00 2113 - Instructions to Bidders and modifications thereto: Requirements and procedures for bidding.
   b. Document 00 7213 - General Conditions: Substitution requirements.

C. Related Sections:
1. Section 01 4200 - References: Definitions.
2. Section 01 6200 - Product Options: Substitution requirements.

1.2 DEFINITIONS

A. Refer to Document 00 2113 - Instructions to Bidders, 00 7213 - General Conditions, and Section 01 4200 - References for definitions.

1.3 QUALIFICATIONS OF BIDDERS

A. Bidders must be regularly engaged in the business of Contracting for Commercial Construction as defined for building construction under Title 40, Oklahoma Statutes, Section 196.6, Paragraph A.1 and must be regularly engaged in the business or trade for Work proposed in Work Package being bid.

B. Sub-bidders must be regularly engaged in the business or trade for that portion of the Work proposed in their Sub-bid to a Bidder.

C. General Contractor shall comply with submitting sample copy of each Bond and sample copies of each Certificate of Insurance prior to Bidding Opening, for review by Owner.

1.4 NUMBER OF CONTRACTS

A. Separate Prime Contracts will be awarded for Work Packages as defined in Document 00 4113 - Work Packages Bid Forms.

B. Where the Contract Documents show various particular items of the Work to be Not Included in the Contract (noted N.I.C.), that Work will be accomplished by the Owner after the Contractor achieves the status of Substantial Completion.

C. Where the Contract Documents require Owner furnished and installed items, those items will be installed after the Contractor achieves the status of Substantial Completion.

D. Bidders must submit a Bid which covers all of the Work proposed in the Contract Documents.

1.5 TIME FOR COMPLETION

A. Each Bidder shall state in the Bid Form the number of calendar days within which he will agree to perform the Work to a Substantially Complete stage.

B. The number of calendar days for completion proposed by the Bidder will be considered in making an award of the Contract for the construction of this Project and the Owner reserves the right to make an award to other than the low Bidder if such Bidder can adequately guarantee a substantially more advantageous completion date than that offered by the low Bidder.

1.6 INTERPRETATION OR CORRECTION OF BIDDING DOCUMENTS

A. Refer to Paragraph 3.2 of Document 00 2113 - Instructions to Bidders for additional requirements.

B. Bidders shall promptly notify the Architect of any ambiguity, inconsistency or error which they may discover upon examination of the Bidding Documents. Request for clarification or interpretation of the Bidding Documents shall be made in writing on Contractor's Letterhead to the Architect.

C. Interpretations, corrections or changes of the Bidding Documents will be made by Addendum ONLY. Information transmitted in any other manner will not be binding and Bidders shall not rely upon its accuracy.

D. Addenda are written or graphic instruments issued by the Architect before the execution of the Contract which modify or interpret the Bidding Documents by addition, deletion, clarification or correction. Addenda will be issued to each Bidder receiving complete set of Bidding Documents. Each Bidder shall acknowledge receipt of addenda on the Proposal.

E. The Architect and Owner will not be responsible for any explanations or verbal interpretations of the Bidding Documents.

1.7 SUBSTITUTIONS

A. Refer to Paragraph 3.3 of Document 00 2113 - Instructions to Bidders for additional requirements.

B. Refer to Subparagraph 3.4.2 of Document 00 7213 – General Conditions for additional requirements.

C. 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.

D. Provide data on a Contractor's Substitution Request Form in compliance with the requirements specified in Section 01 6200 - Product Options.

E. The burden of proof of the merit of the proposed substitute is upon the proposer. The Architect's decision of approval or disapproval of a proposed substitution shall be final.

1.8 BID FORMS

A. Bid Form Proposal Packet: Submit Proposal Packet sealed in envelope labeled as follows.

BID DOCUMENTS
Project: _____
Attention: _____
Bidder's Name: _____

B. Contents of Bid Form Proposal packet shall include the following fully executed documents:

Bid Form - Document 00 4113 - Bid Form-Stipulated Sum.
Bid Security Form - Document 00 4313 - Bid Security Form.
Non-Collusion Affidavit - Document 00 4519 - Non-Collusion Affidavit.
Business Relationship Affidavit - Document 00 4521 - Business Relationship Affidavit.

1.9 BEGINNING THE WORK

A. If awarded the Contract, the Bidder agrees that Work will be in progress on the Project Site within ten (10) days from date of Notice to Proceed or as scheduled by Owner's Contract Coordinator.

1.10 COMPLIANCE WITH PUBLIC COMPETITIVE BID ACT

A. All Bidders and Sub-bidders must comply fully with all of the provisions of the Public Competitive Bidding Act of 1974 of the State of Oklahoma, as most recently amended.

B. The Non-Collusion and Business Relationships Affidavits required to be included with all proposals are included in the Contract Documents. These Affidavits must be executed and submitted with the bid.

PART 2 PRODUCTS: Not used.

PART 3 EXECUTION: Not used.

END OF DOCUMENT

DOCUMENT 00 2513

PRE-BID MEETING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Pre-bid meeting.
   2. Pre-bid site inspection.

B. Related Documents:
   1. The Contract Documents, as defined in Document 00 7213 - General Conditions and modifications thereto, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.
      a. Document 00 2113 - Instructions to Bidders and modifications thereto: Requirements and procedures for bidding.
      b. Document 00 2218 - Additional Instructions to Bidders: Additional bidder requirements.

C. Related Sections:
   1. Section 01 1100 - Summary: Summary of Work.
   2. Section 01 2613 - Requests for Interpretation: Procedure for bidder questions during bidding.
   3. Section 01 6200 – Product Options: Substitution requirements during bidding.

1.2 PRE-BID MEETING DATE, TIME AND LOCATION

A. Date, Time and Location: Shall be announce at the later date.

1.3 PRE-BID MEETING AND SITE INVESTIGATION

A. Pre-Bid Meeting and Site Investigation will be held to provide Bidders an opportunity to familiarize themselves with the Work and with existing conditions.

B. It is the responsibility of each prime contract Bidder to obtain knowledge of the Date, Time and Location of the Pre-Bid Meeting and to allow sufficient time to travel to Pre-Bid Meeting location and arrive minimum 20 minutes before scheduled meeting time. Bidders shall allow time for travel delays such as weather, traffic congestion, traffic accidents and detours.

D. Architect representative will conduct meeting.

E. Owner Representative will attend meeting.

F. No Information Provided By Architect, Owner or Their Representatives at the Pre-Bid Meeting and Site Inspection shall be binding, unless such information is included in an Addendum.

G. 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 on them.

H. Prime contract bidders shall certify their attendance at Pre-Bid Meeting and performance of Pre-Bid Site Investigation on the Bid Form in space provided.

I. Attendance at time and place specified is mandatory for prime contract Bidders and is a condition of contract award.
   1. Prime contract bidders shall arrive at Pre-Bid Meeting at or before scheduled time.
   2. Prime contract bidders who arrive at Pre-Bid Meeting after start of meeting will not be permitted to attend meeting and will not be permitted to submit a bid.

1.4 PRE-BID MEETING AGENDA

A. Attendance Sheet;
   1. All attendees must sign the attendance sheet provided.
   2. Legibly print name, company representing and telephone number.

B. Personal Introductions:
   1. Introduction of Owner's Representative(s) and Architect's Representative(s).
   2. Pre-bid meeting agenda overview.

C. Project Description:
   1. General description of project and what it involves.
   2. Anticipated construction schedule.

D. Bid Date, Time and Location:
   1. Indicate bid date, time and location where bids will be received as specified in the Invitation to Bid.

E. Bidding Requirements:
   1. Contractor Qualification Statements on AIA Document A305 must be submitted to the Architect for review no later than ten (10) days prior to submission of bids if one is not currently on file with the Architect as specified in the Advertisement for Bids.
   2. Bid Forms located in Project Manual along with Instructions to Bidders.
   3. Bid Proposal Packet to contain the following as specified in the Additional Instructions to Bidders:
      a. Bid Form.
      b. 5 percent Bid Bond.
      c. Business Relationship Affidavit.
      d. Non-Collusion Affidavit.
   4. Read and understand Instructions to Bidders, Supplementary Instructions to Bidders and Additional Instructions to Bidders.

F. Bonds:
   1. Based upon approved sample bonds submitted prior to Bid Opening, successful bidder is required to provide a Performance Bond, Labor and Material Payment Bond and Defect Bond.
   2. Bond Forms are included in the Project Manual in specification section entitled Bonds.

G. Insurance:
   1. Based upon approved sample Certificates of Insurance submitted prior to Bid Opening, successful bidder is required to provide Workmen's Compensation and Contractor's General Liability Insurance.
   2. Insurance amounts and requirements are included in the Project Manual in specification section entitled Insurance Requirements.

H. Alternates:
   1. Identify each alternate and discuss Base Bid requirement and discuss Alternate Bid requirement.
   2. Alternates are identified on Drawings and specified in Alternates.

I. Contractor Questions During Bidding:
   1. Minor questions that do not interpret or modify the Bidding Documents will be accepted by telephone.
   2. Questions that require an interpretation or modification of the Bidding Documents should be in writing emailed or faxed to the Architect.
   3. Answers to questions that require modification of the Bidding Documents will be in the form of an Addendum.

J. Use of Premises by Owner and Contractor:
   1. Discuss requirements for Contractor use of site while Owner operations continue.
   2. Discuss work that may interrupt Owner operations and possible requirement of Work outside of regular operational hours.
   3. Discuss locations of temporary work site fencing, Contractor storage and staging areas.
   4. Discuss provisions for Contractor parking areas and material delivery routes.
   5. Discuss locations for temporary utility hook-ups may be made and who will pay for temporary utility costs.

K. Bidding Document Review:
   1. Review and discuss what is contained in the Drawings and Specifications.

L. Architect Charges to Contractor for Additional Services: A deductive change order will be issued for Architect or Architect's Consultant additional services if the following occurs.
   1. Submittals: Architect or Architect's Consultants are required to perform a second, or more, re-submittal review because the re-submittal is incomplete or incorrect.
   2. Substantial Completion Inspection: Architect or Architect's Consultants are required to make a second, or more, re-inspection because the Work was not Substantially Complete as certified by the Contractor.
   3. Final Completion Inspection: Architect or Architect's Consultants are required to make a second, or more, re-inspection because the Work was not Final Complete as certified by the Contractor.

M. Architect Charges to Contractor for Additional Services:

N. Sales Tax:
   1. No sales tax is to be included in bid for any tangible personal property that will become a part of or incorporated into the Work, as specified in Document entitled Sales Tax Exemption/Designation of Purchasing Agent.

O. Questions and Answers:

1. Questions for meeting attendees taken and responded to by Owner Representative(s) and Architect's Representative(s).

P. Site Review:
   1. Owner's Representative(s) and Architect's Representative(s) conduct a project site walk-through with meeting attendee's.
   2. Following project site walk-through Owner's Representative(s) and Architect's Representative(s) will be available for additional Bidder questions.

Q. End of Pre-Bid Meeting.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF DOCUMENT

DOCUMENT 00 3143

PERMIT APPLICATION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Authority having jurisdiction.
2. Permits.

B. Related Documents:
1. The Contract Documents, as defined in Document 00 7213 - General Conditions and modifications thereto, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.

C. Related Sections:
1. Section 01 2600 - Contract Modification Procedures: Contract adjustments.

1.2 AUTHORITY HAVING JURISDICTION

A. Applicable Building Codes: Refer to Cover Sheet of Drawings for code listings.

B. Building Department: Performs plan review and site inspections.

Permits and Licensing
City of El Reno
117 N. Choctaw Ave.
El Reno, Oklahoma 73036
Tel: 405-262-3756

1.3 PERMITS

A. Refer to Document 00 7213 - General Conditions, Paragraph 3.7.

B. Contractor shall determine if Building Permits are required for Project, and if required, secure and pay for all required Building Permits.
1. Submit required documents to Authority Having Jurisdiction.
2. Make application for Building Permit and coordinate code review requirements and comments received from Authority Having Jurisdiction with Architect and resubmit to Authority Having Jurisdiction.
   a. Submit one (1) original copy of code review requirements and comments received from Authority Having Jurisdiction to Architect.
3. If code review requirements and comments cause Contractor to perform more or less Work, Contract Sum and Contract Time shall be adjusted as specified in Section 01 2600 – Contract Modification Procedure.
4. Make arrangements and schedule with Authority Having Jurisdiction for required inspections.
5. Upon issuance of any permit, promptly submit a copy to Architect and Owner.

C. Maintain copy of Building Permit and Approved Permit Set of Contract Documents on site. Return to Owner at Project Closeout.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF DOCUMENT

DOCUMENT 004313

BID SECURITY FORM

PART 1 GENERAL

1.1 BID SECURITY

A. Bid Security required for Projects with Bid Amounts exceeding $50,000.

B. A Bid Security in the form of a cashier's check, or certified check, or acceptable bidder's surety bond, made payable to the Owner, in an amount that is not less than 5 percent of the Bid Proposal submitted, including all alternates, shall accompany each Bid as a guarantee that:

1. The Bidder will not modify, withdraw or cancel the proposal for **30** days after the bid date,
2. The bidder, if awarded the contract, will promptly enter into a contract and execute such bonds and furnish such insurance certificates as may be required; and
3. The bidder will provide Non-Collusion and Business Relationship Affidavits.

B. Should the Bidder fail to honor these three (3) guarantees for any reason, the Owner shall total his damages and shall deduct the amount of such damages from the Bidder's Bid Security. Should the damages total less than the amount of the Bid Security, the difference shall be returned to the Bidder. However, all damages in excess of the Bid Security shall be borne by the Owner.

C. Damages may include, but shall not be limited to, reasonable compensation for the Owner's additional time spent, additional Architect's fees, costs to the Owner for delays in completion of the Work based upon the Bidders proposed Contract Time and the Contract Time as Awarded including, but not limited to, interest expense and lost revenue, the difference between the Bidder's proposed Contract Sum and the Contract Sum as awarded and costs to rebid the Project should such action become necessary. Such bid securities will be returned to the unsuccessful bidders after execution of the Contract.

1.2 BID SECURITY FORM

A. American Institute of Architects, AIA Document A310 “Bid Bond” 1970 Edition, shall be Bid Security Form for this Project.

B. Copy of AIA Document A310 follows.

C. Surety company standard Bid Security Form also acceptable as long as it contains same information as AIA Document A310.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF DOCUMENT

AIA® Document A310™ – 1970

Bid Bond

KNOW ALL MEN BY THESE PRESENTS, that we
(Here insert full name and address or legal title of Contractor)

[Insert Contractor's Name]
[Address]
[City, ST Zip]
[Phone Number]
[Fax Number]

as Principal, hereinafter called the Principal, and
(Here insert full name and address or legal title of Surety)

a corporation duly organized under the laws of the State of as Surety, hereinafter called the Surety, are held and firmly bound unto
(Here insert full name and address or legal title of Owner)

[Insert Owner's Name]
[Address]
[City, ST Zip]
[Phone Number]
[Fax Number]

as Obligee, hereinafter called the Obligee, in the sum of ($), for the payment of which sum well and truly to be made, the said Principal and the said Surety, bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has submitted a bid for
(Here insert full name, address and description of project)

[Insert Project Name]
[Location]
[City, ST Zip]
[Phone Number]
[Fax Number]

NOW, THEREFORE, if the Obligee shall accept the bid of the Principal and the Principal shall enter into a Contract with the Obligee in accordance with the terms of such bid, and give such bond or bonds as may be specified in the bidding or Contract Documents with good and sufficient surety for the faithful performance of such Contract and for the prompt payment of labor and material furnished in the prosecution thereof, or in the event of the failure of the Principal to enter such Contract and give such bond or bonds, if the Principal shall pay to the Obligee the difference not to exceed the penalty hereof between the amount specified in said bid and such larger amount for which the Obligee may in good faith contract with another party to perform the Work covered by said bid, then this obligation shall be null and void, otherwise to remain in full force and effect.

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.

Signed and sealed this day of ,

(Witness)	*(Principal)* (Seal)
	(Title)
(Witness)	*(Surety)*
	(Title) *(Seal)*

Additions and Deletions Report for
AIA® Document A310™ – 1970

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

Note: This Additions and Deletions Report is provided for information purposes only and is not incorporated into or constitute any part of the associated AIA document. This Additions and Deletions Report and its associated document were generated simultaneously by AIA software at 16:33:21 on 04/24/2009.

PAGE 1

[Insert Contractor's Name]
[Address]
[City, ST Zip]
[Phone Number]
[Fax Number]

...

(Here insert full name and address or legal title of Owner)

[Insert Owner's Name]
[Address]
[City, ST Zip]
[Phone Number]
[Fax Number]

...

[Insert Project Name]
[Location]
[City, ST Zip]
[Phone Number]
[Fax Number]

Certification of Document's Authenticity

AIA® Document D401™ – 2003

I, Jay W. Boynton, hereby certify, to the best of my knowledge, information and belief, that I created the attached final document simultaneously with its associated Additions and Deletions Report and this certification at 16:33:21 on 04/24/2009 under Order No. 1000386475_1 from AIA Contract Documents software and that in preparing the attached final document I made no changes to the original text of AIA® Document A310™ – 1970 - Bid Bond, as published by the AIA in its software, other than those additions and deletions shown in the associated Additions and Deletions Report.

_____

(Signed)

_____

(Title)

_____

(Dated)

BIDDER'S QUALIFICATIONS

PART 1 GENERAL

1.1 BIDDER'S QUALIFICATIONS

A. Owner requires that all Bidders be qualified before or at time of submission of bid. Refer to the last paragraph of Document 00 1100 - Bid Solicitation.

B. To minimize the possibility of an apparent low Bidder being rejected because Bidder is determined to be not qualified to perform the Work of this Contract, provide the following information for consideration by the Owner.
   1. Contractor's Qualification Statement: AIA Document A305. Give special attention to items 3.4, 3.5 and 3.6. Include all projects that are similar in size and scope to this Project. Submittal of an advertising brochure not permitted.
   2. Brief biography and resume of Project Manager or Superintendent proposed for this Project. Include names of all projects supervised of similar size and scope to this Project.

1. 2 PRE-BID MEETING

A. Pre-Bid Meeting will be held to ensure all Bidders fully understand the scope of the Work. Non-attendance may be considered reason for disqualification of Bidder.

B. Refer to Document 00 2513 - Pre-Bid Meeting for requirements, date, time and location of Pre-Bid Meeting.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

END OF DOCUMENT

DOCUMENT 00 4519

BWA N16001

NON-COLLUSION AFFIDAVIT

STATE OF _____)
)ss.
COUNTY OF_____)

_____, of lawful age, being first duly sworn, an oath says that _____ is the agent authorized by the Bidder to submit the attached bid. Affiant further states that the Bidder has not been a party to any collusion among Bidders in restraint of freedom of competition by agreement to Bid at a fixed price or to refrain from bidding; or with any Government or School District official or employee or representative as to quantity, quality, or price in the prospective Contract, or any other terms of said prospective Contract; or in any discussions between bidders and any Government or School District Official or employee or representative concerning exchange of money or other thing of value for special consideration in the letting of a Contract; that the Bidder/Contractor has not paid, given or donated or agreed to pay, give or donate to any officer or employee of the School District or School Board (or other entity) any money or other thing of value, either directly or indirectly in the procuring of the award of a contract pursuant to this bid.

_____

Subscribed and sworn to before me this _____ day of _____, 20____.

_____
Notary Public

_____
My commission expires:

Execute and include with Bid Form.

END OF DOCUMENT

DOCUMENT 00 4521

BWA N16001

BUSINESS RELATIONSHIP AFFIDAVIT

STATE OF _____)
)ss.
COUNTY OF_____)

_____, of lawful age, being first duly sworn, on oath says that _____is the agent authorized by the bidder to submit the attached bid. Affiant further states that the nature of any partnership, joint venture, or other business relationship presently in effect or which existed within one (1) year prior to the date of this statement with the Architect, Engineer, or other party is as follows:

_____

_____

Affiant further states that any such business relationship presently in effect or which existed within one (1) year prior to the date of this statement between any officer or director of the bidding company and any officer or director of the architectural or engineering firm or other party to the project is as follows:

_____

_____

Affiant further states that the names of all persons having any such business relationships and the positions they hold with their respective companies or firms are as follows:

_____

_____

(If none of the business relationships hereinabove mentioned exist, affiant should so state.)

_____

Subscribed and sworn to before me this _____day of _____, 20___.

_____
Notary Public

_____
My Commission expires:

Execute and include with Bid Form.

END OF DOCUMENT

DOCUMENT 00 5213

AGREEMENT-STIPULATED SUM

PART 1 GENERAL

1.1 AGREEMENT

A. American Institute of Architects, AIA Document A101, "Standard Form of Agreement Between Owner and Contractor where the Basis of Payment is a Stipulated Sum," 2007 Edition, shall be the basis of agreement for this Project.

B. Example blank form copy of AIA Document A101 follows.

1.2 AGREEMENT PREPARATION AND EXECUTION PROCEDURE

A. All signatures shall be in Blue Ink to clearly identify agreement as an original signed document.

B. Upon award of contract by the Owner, the Architect will prepare the Agreement forms and transmit three (3) copies to the Contractor for attachment of Bond Forms Insurance Certificates, Affidavits and Contractor signature.

C. Upon signature by Contractor, Contractor shall transmit the three (3) copies of the Agreement Package to the Architect for review. The Agreement Package shall include three (3) copies the following:
1. Signed Agreement form.
2. Executed, signed and sealed Performance Bond form.
3. Executed, signed and sealed Payment Bond form.
4. Executed, signed and sealed Defect Bond form.
5. Executed, signed and sealed Insurance Certificate on ACORD form 25-S.
6. Executed, signed and sealed Certificate of Insurance issued by Insurer or Insurer's Agency approved by the State of Oklahoma Insurance Department Supplemental Attachment (for ACCORD certificate of insurance 25-S).
7. Executed, signed and sealed Oklahoma Workmen's Compensation Insurance Certificate (if not included in ACORD form 25-S).
8. Executed, signed and notarized Contract Affidavit.
9. Executed, signed and notarized Tobacco-Free Affidavit.
10. Executed, signed and notarized Drug-Free Affidavit.

D. Upon receipt of the Agreement Package from the Contractor, the Architect will review the package and verify that all requirements are met and package is prepared properly.

E. If Architect determines that Agreement Package is prepared properly, Architect will transmit Agreement Package to Owner for signature.

F. Owner will sign Agreement, keep one (1) copy and return two copies to Architect.

G. Architect will transmit one (1) executed copy of Agreement Package to Contractor.

H. Upon receipt of executed Agreement Package and authorization from Owner, Architect will issue Notice to Proceed to Contractor for Owner.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF DOCUMENT

AIA® Document A101™ – 2007

Standard Form of Agreement Between Owner and Contractor *where the basis of payment is a Stipulated Sum*

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

BETWEEN the Owner:
(Name, address and other information)

[Insert Owner's Name]
[Address]
[City, St Zip]
[Phone Number]
[Fax Number]

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

[Insert Contractor's Name]
[Address]
[City, ST Zip]
[Phone Number]
[Fax Number]

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

[Insert Project Name]
[Location]
[City, ST Zip]
[Phone number]
[Fax Number]

The Architect:
(Name, address and other information)

[Insert Architect's Name]
[Address]
[City, St Zip]
[Phone Number]
[Fax Number]

The Owner and Contractor agree as follows.

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

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

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

TABLE OF ARTICLES

ARTICLE 1 THE CONTRACT DOCUMENTS

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

ARTICLE 2 THE WORK OF THIS CONTRACT

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

ARTICLE 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

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

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

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

§ 3.3 The Contractor shall achieve Substantial Completion of the entire Work not later than ( ) days from the date of commencement, or as follows:
(Insert number of calendar days. Alternatively, a calendar date may be used when coordinated with the date of commencement. If appropriate, insert requirements for earlier Substantial Completion of certain portions of the Work.)

Portion of Work	Substantial Completion Date

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

ARTICLE 4 CONTRACT SUM

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

§ 4.2 The Contract Sum is based upon the following alternates, if any, which are described in the Contract Documents and are hereby accepted by the Owner:
(State the numbers or other identification of accepted alternates. If the bidding or proposal documents permit the Owner to accept other alternates subsequent to the execution of this Agreement, attach a schedule of such other alternates showing the amount for each and the date when that amount expires.)

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

Item	Units and Limitations	Price Per Unit

§ 4.4 Allowances included in the Contract Sum, if any:
(Identify allowance and state exclusions, if any, from the allowance price.)

Item	Price

ARTICLE 5 PAYMENTS

§ 5.1 PROGRESS PAYMENTS

§ 5.1.1 Based upon Applications for Payment submitted to the Architect by the Contractor and Certificates for Payment issued by the Architect, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided below and elsewhere in the Contract Documents.

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

§ 5.1.3 Provided that an Application for Payment is received by the Architect not later than the day of a month, the Owner shall make payment of the certified amount to the Contractor not later than the day of the same month. If an Application for Payment is received by the Architect after the application date fixed above, payment shall be made by the Owner not later than ( ) days after the Architect receives the Application for Payment.
(Federal, state or local laws may require payment within a certain period of time.)

§ 5.1.4 Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Contract Sum among the various portions of the Work. The schedule of values shall be prepared in such form and supported

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

§ 5.1.5 Applications for Payment shall show the percentage of completion of each portion of the Work as of the end of the period covered by the Application for Payment.

§ 5.1.6 Subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

.1 Take that portion of the Contract Sum properly allocable to completed Work as determined by multiplying the percentage completion of each portion of the Work by the share of the Contract Sum allocated to that portion of the Work in the schedule of values, less retainage of ( ). Pending final determination of cost to the Owner of changes in the Work, amounts not in dispute shall be included as provided in Section 7.3.9 of AIA Document A201™–2007, General Conditions of the Contract for Construction;

.2 Add that portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction (or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing), less retainage of ( );

.3 Subtract the aggregate of previous payments made by the Owner; and

.4 Subtract amounts, if any, for which the Architect has withheld or nullified a Certificate for Payment as provided in Section 9.5 of AIA Document A201–2007.

§ 5.1.7 The progress payment amount determined in accordance with Section 5.1.6 shall be further modified under the following circumstances:

.1 Add, upon Substantial Completion of the Work, a sum sufficient to increase the total payments to the full amount of the Contract Sum, less such amounts as the Architect shall determine for incomplete Work, retainage applicable to such work and unsettled claims; and
(Section 9.8.5 of AIA Document A201–2007 requires release of applicable retainage upon Substantial Completion of Work with consent of surety, if any.)

.2 Add, if final completion of the Work is thereafter materially delayed through no fault of the Contractor, any additional amounts payable in accordance with Section 9.10.3 of AIA Document A201–2007.

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

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

§ 5.2 FINAL PAYMENT

§ 5.2.1 Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when

.1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Section 12.2.2 of AIA Document A201–2007, and to satisfy other requirements, if any, which extend beyond final payment; and

.2 a final Certificate for Payment has been issued by the Architect.

§ 5.2.2 The Owner's final payment to the Contractor shall be made no later than 30 days after the issuance of the Architect's final Certificate for Payment, or as follows:

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 INITIAL DECISION MAKER

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

§ 6.2 BINDING DISPUTE RESOLUTION

For any Claim subject to, but not resolved by, mediation pursuant to Section 15.3 of AIA Document A201–2007, the method of binding dispute resolution shall be as follows:
(Check the appropriate box. If the Owner and Contractor do not select a method of binding dispute resolution below, or do not subsequently agree in writing to a binding dispute resolution method other than litigation, Claims will be resolved by litigation in a court of competent jurisdiction.)

[ ] Arbitration pursuant to Section 15.4 of AIA Document A201–2007

[ ] Litigation in a court of competent jurisdiction

[ ] Other *(Specify)*

ARTICLE 7 TERMINATION OR SUSPENSION

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

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

ARTICLE 8 MISCELLANEOUS PROVISIONS

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

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

per annum

§ 8.3 The Owner's representative:
(Name, address and other information)

[Insert Owners Name]
[Insert Owner Representative Name]
[Address]
[City, St Zip]
[Phone Number]
[Fax Number]

§ 8.4 The Contractor's representative:
(Name, address and other information)

[Insert Contractor's Name]
[Insert Contractor's Representative Name]
[Address]
[City, St Zip]
[Phone Number]
[Fax Number]

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

§ 8.6 Other provisions:

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 The Contract Documents, except for Modifications issued after execution of this Agreement, are enumerated in the sections below.

§ 9.1.1 The Agreement is this executed AIA Document A101–2007, Standard Form of Agreement Between Owner and Contractor.

§ 9.1.2 The General Conditions are AIA Document A201–2007, General Conditions of the Contract for Construction.

§ 9.1.3 The Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages

§ 9.1.4 The Specifications:
(Either list the Specifications here or refer to an exhibit attached to this Agreement.)
Title of Specifications exhibit:
(Table deleted)
§ 9.1.5 The Drawings:
(Either list the Drawings here or refer to an exhibit attached to this Agreement.)
Title of Drawings exhibit:
(Table deleted)
§ 9.1.6 The Addenda, if any:

Number	Date	Pages

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

§ 9.1.7 Additional documents, if any, forming part of the Contract Documents:

.1 AIA Document E201™–2007, Digital Data Protocol Exhibit, if completed by the parties, or the following:

.2 Other documents, if any, listed below:
(List here any additional documents that are intended to form part of the Contract Documents. AIA Document A201–2007 provides that bidding requirements such as advertisement or invitation to bid,

Instructions to Bidders, sample forms and the Contractor's bid are not part of the Contract Documents unless enumerated in this Agreement. They should be listed here only if intended to be part of the Contract Documents.)

ARTICLE 10 INSURANCE AND BONDS

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

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

Type of insurance or bond	Limit of liability or bond amount ($ 0.00)

This Agreement entered into as of the day and year first written above.

OWNER *(Signature)*	**CONTRACTOR** *(Signature)*
(Printed name and title)	*(Printed name and title)*

Additions and Deletions Report for
AIA® Document A101™ – 2007

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

Note: This Additions and Deletions Report is provided for information purposes only and is not incorporated into or constitute any part of the associated AIA document. This Additions and Deletions Report and its associated document were generated simultaneously by AIA software at 16:21:59 on 04/24/2009.

PAGE 1

[Insert Owner's Name]
[Address]
[City, St Zip]
[Phone Number]
[Fax Number]

...

[Insert Contractor's Name]
[Address]
[City, ST Zip]
[Phone Number]
[Fax Number]

...

[Insert Project Name]
[Location]
[City, ST Zip]
[Phone number]
[Fax Number]

...

[Insert Architect's Name]
[Address]
[City, St Zip]
[Phone Number]
[Fax Number]

PAGE 3

§ 5.1.3 Provided that an Application for Payment is received by the Architect not later than the day of a month, the Owner shall make payment of the certified amount to the Contractor not later than the day of the same month. If an Application for Payment is received by the Architect after the application date fixed above, payment shall be made by the Owner not later than ( ) days after the Architect receives the Application for Payment.

PAGE 5

per annum

...

[Insert Owners Name]
[Insert Owner Representative Name]
[Address]
[City, St Zip]
[Phone Number]
[Fax Number]

PAGE 6

[Insert Contractor's Name]
[Insert Contractor's Representative Name]
[Address]
[City, St Zip]
[Phone Number]
[Fax Number]

...

Title of Specifications exhibit:

~~Section~~	~~Title~~	~~Date~~	~~Pages~~

...

Title of Drawings exhibit:

~~Number~~	~~Title~~	~~Date~~

Certification of Document's Authenticity

AIA® Document D401™ – 2003

I, Jay W. Boynton, hereby certify, to the best of my knowledge, information and belief, that I created the attached final document simultaneously with its associated Additions and Deletions Report and this certification at 16:21:59 on 04/24/2009 under Order No. 1000386475_1 from AIA Contract Documents software and that in preparing the attached final document I made no changes to the original text of AIA® Document A101™ – 2007 - Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum, as published by the AIA in its software, other than those additions and deletions shown in the associated Additions and Deletions Report.

_____

(Signed)

_____

(Title)

_____

(Dated)

DOCUMENT 00 5313

CONTRACT AFFIDAVIT

STATE OF_____)
)ss.
COUNTY OF_____)

_____of lawful age, being of first duly sworn, on oath says that _____is the agent authorized by Contractor to submit the attached Contract to the Board of Education, in the District as stated below, and the County as stated below, in the State of Oklahoma. Affiant further states that Contractor has not paid, given or donated or agreed to pay, give or donate to any officer or employee to the Board of Education, in the District stated below, in the County stated below, in the State of Oklahoma, any money or other thing of value, either directly or indirectly, in the procuring of the Contract.

Project Name :_____in the

District Number_____in the

County of_____in the

State of Oklahoma.

_____

Subscribed and sworn to before me this _____day of _____, 20___.

_____
Notary Public

_____
My Commission Expires:

END OF DOCUMENT

DOCUMENT 00 5315

BWA N16001

TOBACCO-FREE AFFIDAVIT

STATE OF_____)

)ss.

COUNTY OF_____)

I _____of lawful age, being of first duly sworn, on oath says that _____is the agent authorized by Contractor to submit the attached Tobacco-Free Affidavit to the Board of Education, in the District as stated below, and the County as stated below, in the State of Oklahoma. Affiant further states the following:

1. No employee working on premises under the authority of the Contractor will be permitted to use tobacco products in school facilities and on school property. The Contractor, sub-contractors and suppliers, their agents or employees, and any other persons performing any Work on behalf of the Contractor, will not use tobacco products on school property.
2. Contractor agrees to prominently display a Notice stating that school property is a tobacco-free site.

Project Name :_____in the

District Number_____in the

County of_____in the

State of Oklahoma.

_____

Subscribed and sworn to before me this _____day of _____, 20___.

_____
Notary Public

_____
My Commission Expires:

END OF DOCUMENT

DOCUMENT 00 5317

BWA N16001

DRUG-FREE AFFIDAVIT

STATE OF_____)

)ss.

COUNTY OF_____)

I _____of lawful age, being of first duly sworn, on oath says that _____is the agent authorized by Contractor to submit the attached Drug-Free Affidavit to the Board of Education, in the District as stated below, and the County as stated below, in the State of Oklahoma. Affiant further states the following:

1. No employee working on premises under the authority of the Contractor will be permitted to use a controlled substance at any time. The Contractor, sub-contractors and suppliers, their agents or employees, and any other persons performing any Work on behalf of the Contractor, will not be permitted to use a controlled substance at any time.
2. Contractor agrees to prominently display a Notice stating that school property is a drug-free site and that all persons entering school property are subject to random drug testing.
3. Contractor agrees to publish a statement notifying Contractor employees, sub-contractors and suppliers and their agents or employees that the unlawful manufacture, distribution, dispensing, possession or use of a controlled substance is prohibited in the Contractor's workplace and specifying the actions that will be taken against employees for violations of such prohibition. Contractor agrees to provide all employees engaged in performance of the contract with a copy of the statement.

Project Name :_____in the

District Number_____in the

County of_____in the

State of Oklahoma.

_____

Subscribed and sworn to before me this _____day of _____, 20___.

_____
Notary Public

_____
My Commission Expires:

END OF DOCUMENT

DOCUMENT 00 6100

BONDS

PART 1 GENERAL

1.1 SUMMARY

A. Document Includes:
1. Performance Bond.
2. Labor and material payment bond (statutory bond).
3. Defect bond.
4. Irrevocable letter of credit.
5. Defect Bond Form.

B. Related Documents:
1. The Contract Documents, as defined in Document 00 7213 - General Conditions and modifications thereto, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.
2. Document 00 7213 - General Conditions: Article 11, Paragraph 11.4, Performance Bond and Payment Bond.

1.2 SUBMITTALS

A. Non-Specified Forms: If Surety Company proposes to use a bond form other than form specified, Surety shall submit proposed form to Owner, through Contractor, for Owner review and approval before preparation of bonds for this Project. Proposed form shall contain the same requirements and responsibilities as specified forms.

B. Submittals: Submit the following as part of the Agreement Package.
1. Bonds: Submit fully executed original copies of each bond attached to each copy of Agreement between Owner and Contractor.
2. Power of Attorney. Attach an original copy of Power of Attorney to each copy of each bond.
3. Bond Rate Schedule: Attach surety's bond rate schedule applicable for Subcontractor indicating the percentage fee used to compute Project bond amounts and for computing of bond amounts for increases in Contract Sum for Change Orders.

1.3 BOND REQUIREMENTS

A. Bonds are required for Projects with contract amount exceeding $50,000.

B. Attorney-In-Fact who executes required bonds on behalf of surety shall affix a certified and current Power of Attorney to each bond.

1.4 PERFORMANCE BOND

A. Amount: Equal to 100 percent of Contract Sum.

B. Form: AIA Document A312 “Performance Bond,” 1984 Edition or other forms acceptable to Owner.

1.5 LABOR AND MATERIAL PAYMENT BOND (Statutory Bond)

A. Amount: Equal to 100 percent of Contract Sum.

B. Form: AIA Document A312 “Payment Bond,” 1984 Edition or other forms acceptable to Owner.

1.6 DEFECT BOND

A. Amount: Equal to 100 percent of Contract Sum.

B. Form: Form of this bond is attached to this Section.

1.7 IRREVOCABLE LETTER OF CREDIT

A. An Irrevocable Letter of Credit may be used if construction cost of the Project is under $100,000 in lieu of specified bonds indicated above.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF DOCUMENT

DEFECT BOND

KNOW BY ALL MEN BY THESE PRESENTS:

That _____ as Principal, and _____ a corporation organized under the laws of the State of _____, and authorized to transact business in the State in which the Work (Project) is to be performed, as Surety, are held and firmly bound unto The Owner in the sum of _____ Dollars ($_____) in lawful money of the United States of America, said sum being equal to One Hundred Percent (100%) of the Contract Sum, for the payment of which, well and truly to be made, we bind ourselves and each of us, our heirs, executors, administrators, trustees, successors, and assigns, jointly and severally, firmly by these presents.

This condition of this obligation is such that:

WHEREAS, said Principal entered into a written Contract with the Owner, dated _____, 20_____, for

_____

_____

_____

_____

_____

all in compliance with the Contract Documents therefore, made a part of said Contract and on file in the office of the Owner.

NOW, THEREFORE, if said Principal shall pay or cause to be paid to the Owner all damage, loss and expense which may result by reason of defective materials and/or workmanship in connection with said Work, occurring within a period of one (1) year from and after the date of Substantial Completion of said project; then this obligation shall be null and void, otherwise to be and remain in full force and effect.

It is further expressly agreed and understood by the parties hereto that no changes or alterations in said Contract and no deviations from the plan or mode of procedure herein fixed shall have the effect or releasing the sureties, or any of them from the obligations of this Bond.

IN WITNESS WHEREOF, the said Principal has caused these presents to be executed in its name and its corporate seal to be hereunto affixed by its duly authorized officers, and the said Surety has caused these presents to be executed in its name and its corporate seal to be hereunto affixed by its attorney-in-fact, duly authorized so to do, the day and year set forth below.

DATED this _____ day of _____, 20 ___

PRINCIPAL:

_____

By: _____
Title

ATTEST:

_____

SURETY:

_____

By:_____
Attorney-In-Fact

(Type) Name:_____

Address:_____

City: _____ State: _____

Telephone: _____

END OF DEFECT BOND

AIA® Document A312™ – 2010

Performance Bond

CONTRACTOR:
(Name, legal status and address)

SURETY:
(Name, legal status and principal place of business)

OWNER:
(Name, legal status and address)

CONSTRUCTION CONTRACT
Date:
Amount: $
Description:
(Name and location)
Generic

BOND
Date:
(Not earlier than Construction Contract Date)

Amount: $
Modifications to this Bond: ☐ None ☐ See Section 16

CONTRACTOR AS PRINCIPAL		**SURETY**	
Company:	*(Corporate Seal)*	Company:	*(Corporate Seal)*
Signature:		Signature:	
Name and Title:		Name and Title:	

(Any additional signatures appear on the last page of this Performance Bond.)

(FOR INFORMATION ONLY — Name, address and telephone)

AGENT or **BROKER:**

OWNER'S REPRESENTATIVE:
(Architect, Engineer or other party:)

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

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

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

§ 1 The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.

§ 2 If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Section 3.

§ 3 If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond shall arise after

.1 the Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice shall indicate whether the Owner is requesting a conference among the Owner, Contractor and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Section 3.1 shall be held within ten (10) business days of the Surety's receipt of the Owner's notice. If the Owner, the Contractor and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement shall not waive the Owner's right, if any, subsequently to declare a Contractor Default;

.2 the Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and

.3 the Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract.

§ 4 Failure on the part of the Owner to comply with the notice requirement in Section 3.1 shall not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.

§ 5 When the Owner has satisfied the conditions of Section 3, the Surety shall promptly and at the Surety's expense take one of the following actions:

§ 5.1 Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;

§ 5.2 Undertake to perform and complete the Construction Contract itself, through its agents or independent contractors;

§ 5.3 Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and a contractor selected with the Owner's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Section 7 in excess of the Balance of the Contract Price incurred by the Owner as a result of the Contractor Default; or

§ 5.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor and with reasonable promptness under the circumstances:

.1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, make payment to the Owner; or

.2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.

§ 6 If the Surety does not proceed as provided in Section 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Section 5.4, and the Owner refuses the payment or the Surety has denied liability, in whole or in part, without further notice the Owner shall be entitled to enforce any remedy available to the Owner.

§ 7 If the Surety elects to act under Section 5.1, 5.2 or 5.3, then the responsibilities of the Surety to the Owner shall not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety shall not be greater than those of the Owner under the Construction Contract. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication, for

.1 the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;

.2 additional legal, design professional and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Section 5; and

.3 liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.

§ 8 If the Surety elects to act under Section 5.1, 5.3 or 5.4, the Surety's liability is limited to the amount of this Bond.

§ 9 The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, successors and assigns.

§ 10 The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.

§ 11 Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and shall be instituted within two years after a declaration of Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

§ 12 Notice to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears.

§ 13 When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

§ 14 Definitions

§ 14.1 Balance of the Contract Price. The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made, including allowance to the Contractor of any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.

§ 14.2 Construction Contract. The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and changes made to the agreement and the Contract Documents.

§ 14.3 Contractor Default. Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.

§ 14.4 Owner Default. Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

§ 14.5 Contract Documents. All the documents that comprise the agreement between the Owner and Contractor.

§ 15 If this Bond is issued for an agreement between a Contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

§ 16 Modifications to this bond are as follows:

(Space is provided below for additional signatures of added parties, other than those appearing on the cover page.)

CONTRACTOR AS PRINCIPAL		**SURETY**	
Company:	*(Corporate Seal)*	Company:	*(Corporate Seal)*
Signature:		Signature:	
Name and Title:		Name and Title:	
Address:		Address:	

Additions and Deletions Report for
AIA® Document A312™ – 2010

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

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PAGE 1

Generic

Certification of Document's Authenticity

AIA® Document D401™ – 2003

I, Jay W. Boynton, hereby certify, to the best of my knowledge, information and belief, that I created the attached final document simultaneously with its associated Additions and Deletions Report and this certification at 15:34:14 on 01/31/2014 under Order No. 9723396337_1 from AIA Contract Documents software and that in preparing the attached final document I made no changes to the original text of AIA® Document A312™ – 2010, Performance Bond, as published by the AIA in its software, other than those additions and deletions shown in the associated Additions and Deletions Report.

_____

(Signed)

_____

(Title)

_____

(Dated)

AIA® Document A312™ – 2010

Payment Bond

CONTRACTOR:
(Name, legal status and address)

SURETY:
(Name, legal status and principal place of business)

OWNER:
(Name, legal status and address)

CONSTRUCTION CONTRACT
Date:
Amount: $
Description:
(Name and location)
Generic

BOND
Date:
(Not earlier than Construction Contract Date)

Amount: $
Modifications to this Bond: ☐ None ☐ See Section 18

CONTRACTOR AS PRINCIPAL		**SURETY**	
Company:	*(Corporate Seal)*	Company:	*(Corporate Seal)*
Signature:		Signature:	
Name and Title:		Name and Title:	

(Any additional signatures appear on the last page of this Payment Bond.)

(FOR INFORMATION ONLY — Name, address and telephone)

AGENT or **BROKER:**	**OWNER'S REPRESENTATIVE:** *(Architect, Engineer or other party:)*

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

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

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

§ 1 The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner to pay for labor, materials and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference, subject to the following terms.

§ 2 If the Contractor promptly makes payment of all sums due to Claimants, and defends, indemnifies and holds harmless the Owner from claims, demands, liens or suits by any person or entity seeking payment for labor, materials or equipment furnished for use in the performance of the Construction Contract, then the Surety and the Contractor shall have no obligation under this Bond.

§ 3 If there is no Owner Default under the Construction Contract, the Surety's obligation to the Owner under this Bond shall arise after the Owner has promptly notified the Contractor and the Surety (at the address described in Section 13) of claims, demands, liens or suits against the Owner or the Owner's property by any person or entity seeking payment for labor, materials or equipment furnished for use in the performance of the Construction Contract and tendered defense of such claims, demands, liens or suits to the Contractor and the Surety.

§ 4 When the Owner has satisfied the conditions in Section 3, the Surety shall promptly and at the Surety's expense defend, indemnify and hold harmless the Owner against a duly tendered claim, demand, lien or suit.

§ 5 The Surety's obligations to a Claimant under this Bond shall arise after the following:

§ 5.1 Claimants, who do not have a direct contract with the Contractor,

.1 have furnished a written notice of non-payment to the Contractor, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were, or equipment was, furnished or supplied or for whom the labor was done or performed, within ninety (90) days after having last performed labor or last furnished materials or equipment included in the Claim; and

.2 have sent a Claim to the Surety (at the address described in Section 13).

§ 5.2 Claimants, who are employed by or have a direct contract with the Contractor, have sent a Claim to the Surety (at the address described in Section 13).

§ 6 If a notice of non-payment required by Section 5.1.1 is given by the Owner to the Contractor, that is sufficient to satisfy a Claimant's obligation to furnish a written notice of non-payment under Section 5.1.1.

§ 7 When a Claimant has satisfied the conditions of Sections 5.1 or 5.2, whichever is applicable, the Surety shall promptly and at the Surety's expense take the following actions:

§ 7.1 Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and

§ 7.2 Pay or arrange for payment of any undisputed amounts.

§ 7.3 The Surety's failure to discharge its obligations under Section 7.1 or Section 7.2 shall not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a Claim, except as to undisputed amounts for which the Surety and Claimant have reached agreement. If, however, the Surety fails to discharge its obligations under Section 7.1 or Section 7.2, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.

§ 8 The Surety's total obligation shall not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Section 7.3, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.

§ 9 Amounts owed by the Owner to the Contractor under the Construction Contract shall be used for the performance of the Construction Contract and to satisfy claims, if any, under any construction performance bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfy obligations of the Contractor and Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.

§ 10 The Surety shall not be liable to the Owner, Claimants or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for the payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligation to make payments to, or give notice on behalf of, Claimants or otherwise have any obligations to Claimants under this Bond.

§ 11 The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.

§ 12 No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the state in which the project that is the subject of the Construction Contract is located or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Section 5.1.2 or 5.2, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

§ 13 Notice and Claims to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, shall be sufficient compliance as of the date received.

§ 14 When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

§ 15 Upon request by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.

§ 16 Definitions

§ 16.1 Claim. A written statement by the Claimant including at a minimum:

.1 the name of the Claimant;
.2 the name of the person for whom the labor was done, or materials or equipment furnished;
.3 a copy of the agreement or purchase order pursuant to which labor, materials or equipment was furnished for use in the performance of the Construction Contract;
.4 a brief description of the labor, materials or equipment furnished;
.5 the date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;
.6 the total amount earned by the Claimant for labor, materials or equipment furnished as of the date of the Claim;
.7 the total amount of previous payments received by the Claimant; and
.8 the total amount due and unpaid to the Claimant for labor, materials or equipment furnished as of the date of the Claim.

§ 16.2 Claimant. An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials or equipment for use in the performance of the Construction Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic's lien or similar statute against the real property upon which the Project is located. The intent of this Bond shall be to include without limitation in the terms "labor, materials or equipment" that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials or equipment were furnished.

§ 16.3 Construction Contract. The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and all changes made to the agreement and the Contract Documents.

§ 16.4 Owner Default. Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

§ 16.5 Contract Documents. All the documents that comprise the agreement between the Owner and Contractor.

§ 17 If this Bond is issued for an agreement between a Contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

§ 18 Modifications to this bond are as follows:

(Space is provided below for additional signatures of added parties, other than those appearing on the cover page.)

CONTRACTOR AS PRINCIPAL		**SURETY**	
Company:	*(Corporate Seal)*	Company:	*(Corporate Seal)*
Signature:		Signature:	
Name and Title:		Name and Title:	
Address:		Address:	

Additions and Deletions Report for
AIA® Document A312™ – 2010

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Note: This Additions and Deletions Report is provided for information purposes only and is not incorporated into or constitute any part of the associated AIA document. This Additions and Deletions Report and its associated document were generated simultaneously by AIA software at 09:33:04 on 02/06/2012.

PAGE 1

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Certification of Document's Authenticity

AIA® Document D401™ – 2003

I, , hereby certify, to the best of my knowledge, information and belief, that I created the attached final document simultaneously with its associated Additions and Deletions Report and this certification at 09:33:04 on 02/06/2012 under Order No. 4964625223_1 from AIA Contract Documents software and that in preparing the attached final document I made no changes to the original text of AIA® Document A312™ – 2010, Payment Bond, as published by the AIA in its software, other than those additions and deletions shown in the associated Additions and Deletions Report.

_____

(Signed)

_____

(Title)

_____

(Dated)

DOCUMENT 00 7213

GENERAL CONDITIONS

PART 1 GENERAL

1.1 GENERAL CONDITIONS

A. American Institute of Architects, AIA Document A201 “General Conditions of the Contract for Construction,” 2007 Edition, shall be General Conditions for this Project.
   1. Reader is encouraged to reference the accompanying “Additions and Deletions Report” for modifications made to original Document.

B. Copy of AIA Document A201 including modifications thereto follows.
   1. Within primary body of Document, language added to the standard Document is indicated in bold black test.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF DOCUMENT

AIA® Document A201™ – 2007

General Conditions of the Contract for Construction

for the following PROJECT:
(Name and location or address)
[Insert Project Name]
[Location]
[City, St, Zip]

THE OWNER:
(Name and address)
[Insert Owner's Name]
[Address]
[City, St Zip]
[Phone Number]
[Fax Number]

THE ARCHITECT:
(Name and address)
Boynton Williams & Associates
900 36th, Ave N.W. Suite 100
Norman, OK 73072
Phone Number: 405-329-0423
Fax Number:405-364-1439

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.

TABLE OF ARTICLES

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(Numbers and Topics in Bold are Section Headings)

Init.
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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 (**Conditions including modifications** 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 the Architect and any Subcontractor, Sub-subcontractor or a Material Supplier, (5)** 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.

1.1.3.1 – It is agreed that the definition of the term "Work" for the purposes of the Architect's observations of the Work shall not include temporary shoring, bracing, scaffolding, form work, safety barriers, trench bracing and other similar items referred to herein as "temporary facilities," material moving equipment to include cranes and elevators, or any other temporary structures or construction equipment or aids, for which the Contractor shall have sole responsibility

§ 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. **Portions of the Drawings may be bound into the Project Manual and identified as such or they may be bound into a separate volume titled Details and Schedules.**

§ 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.

1.1.7.1 THE PROJECT MANUAL

1.1.7.1 - The Project Manual is a volume assembled for the Work which may include the bidding requirements, sample forms, Conditions of the Contract and Specifications. Other items or requirements related to the Work or the Project may also be included in the Project Manual.

§ 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.

1.1.9 THE PROJECT SITE

The Project Site is the tract of ground upon which the Project is to be situated and is generally defined on the Plot Plan or Site Plan Drawing. The Project may be located on more than one Project Site which may be located remote from each other. The Project Site may also be confined within the walls of an existing building or buildings.

1.1.10 PRODUCT:
The term 'product' includes materials, systems, and equipment.

1.1.11 FURNISH:
The term 'furnish' means supply and deliver to Project site, ready for unloading, assembly, erection, placement of similar requirements.

1.1.12 INSTALL:
The term 'install' means to unload, unpack, assemble, erect, place, finish, protect, adjust, and clean, or similar requirements and to make final connection(s) to utilities as necessary.

1.1.13 PROVIDE:
The term 'provide' means to furnish and install.

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

§ 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade. **Organization of the Drawings and Specifications into a format for easy cross-reference by any person or entity is for the specific purpose of convenience only and such cross references shall not be considered as being full and complete. The omission of any cross reference shall not relieve the Contractor of his responsibility to perform the Work required by the Contract Documents.**

§ 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.

1.2.4 Contract Documents are complementary and do not have a system of precedence. In the event of conflicts or discrepancies among the separate parts of the Contract Documents, or within any one part of the Contract Documents, and subject to the terms of Subparagraph 3.2.1, the Architect shall, consistent with Subparagraphs 4.2.11 and 4.2.12, interpret the conflict or discrepancy based upon the Contract Documents as a whole. Should such a conflict or discrepancy occur, it is the specific intent of the Contract Documents to require the better quality or greater quantity of Work be performed and the Architects interpretation shall be consistent with this intent.

§ 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. **The capitalization of other words or terms, or the failure to capitalize any word or term, throughout the Contract Documents, shall be interpreted to have no meaning and shall be without effect on interpretations of the Contract Documents.**

§ 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.

1.6.1 Electronic files of the Contract Documents are available from the Architect to the Contactor or subcontractor upon executions of a Release Form and the payment of $300.00 per sheet Use Fee to the Architect.

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 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. **The Architect makes no representations to the accuracy or completeness of these surveys. Such surveys may contain descriptions of physical characteristics, legal limitations, utility locations, permanent benchmarks, existing structures, slopes and contours, legal descriptions and other such pertinent information. Such Owner furnished surveys may be bound with the Drawings or may be fully or partially transcribed onto the Plot Plan or Site Plan Drawings. Surveys furnished are not a part of the Contract Documents, but rather are provided for information purposes only.**

§ 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

2.2.6 The Owner's instructions to the Contractor shall be communicated through the Architect.

§ 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.

2.3.1 The Owner's right to stop the Work shall not imply that the Owner, or the Architect, has any duty, obligation or responsibility to determine either the safety of the Contractor's means, methods, techniques or sequences, including but not limited to, temporary shoring, bracing, scaffolding, form work, safety barriers, trench bracing, and other similar items, referred to herein as "temporary facilities," or their compliance with the requirements of laws, codes, regulations and safety requirements, which shall be the full and sole responsibility of the Contractor and the Contractor shall solely bear all damages or injury, including death, arising there from.

§ 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.

2.4.1 Should the Contractor fail or refuse to sign the Change Order, and should the Contractor not give written notice of his specific reasons within a seven-day period after his receipt of the Change Order, or should the Contractor not accept delivery of the Change Order, a Construction Change Directive for a like amount shall be issued in compliance with Paragraph 7.3 CONSTRUCTION CHANGE DIRECTIVES.

ARTICLE 3 CONTRACTOR

§ 3.1 GENERAL

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

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

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

3.1.4 The successful Bidder (Contractor) shall secure Contract Documents as outlined in Clauses 3.1.4.1 and 3.1.4.2.

3.1.4.1 After Bidding and Award of Contract, electronic copies of Contract Documents will be made available to Contractor for Contractor's use during the progress of the Work. Refer to Division 1.

3.1.4.2 Contractor may purchase printed copies of Contract Documents from the Reproduction Vendor at cost determined by Vendor.

§ 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.

3.2.1.1 Prior to submission of his bid, the Contractor has a duty, obligation and responsibility to seek clarification of open, obvious or patent error or ambiguity in the proposed Contract Documents.

3.2.1.2 The Contractor has a duty, responsibility and obligation to fully disclose relevant requirements contained in the Agreement and in the Contract Documents to any entity from which bids or prices are solicited for any portion of the Work, both before and after the Bid Date as established in the Invitation to Bid. This requirement shall not be waived for unsolicited bids or prices.

3.2.1.3 During his careful study as required in Subparagraph 3.2.1, the Contractor shall note all typographical and spelling errors in the Construction Documents. Any such errors which produce a phrase or sentence in compliance with both well known technical and trade meanings and common English usage shall not be deemed a typographical or spelling error. All other such typographical or spelling errors will produce phrases or sentences which are inconsistent with well known technical and trade meanings or common English usage. The Contractor shall report all such errors to the Architect in compliance with Subparagraph 3.2.1.

3.2.1.4 Field measurements shall include, but shall not be limited to, grades, lines, levels and dimensions. Should the Contractor fail to notify the Architect of any discovered error, inconsistency or omission, the Contractor's liability shall be as described in Subparagraph 3.2.1.

§ 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.

3.2.2.1 The Owner shall be entitled to deduct from the Contract Sum amounts paid to the Architect for the Architect to evaluate and respond to the Contractor's Requests for Interpretation of the Contract Documents, where such information was available to the Contractor from a careful study and comparison of the Contract Documents, field conditions, other Owner-provided information, Contractor-prepared coordination drawings, or prior Project correspondence or documentation.

§ 3.2.3 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, **temporary facilities and safety precautions and programs** sequences and procedures and for coordinating all portions of the Work under the Contract, . If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences or procedures, the Contractor shall evaluate the jobsite safety thereof and, except as stated below, shall be fully and solely responsible for the jobsite safety of such means, methods, techniques, sequences or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely written notice to the Owner and Architect and shall not proceed with that portion of the Work without further written instructions from the Architect. If the Contractor is then instructed to proceed with the required means, methods, techniques, sequences or procedures without acceptance of changes proposed by the Contractor, the Owner shall be solely responsible for any loss or damage arising solely from those Owner-required means, methods, techniques, sequences or procedures.

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

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

§ 3.4 LABOR AND MATERIALS

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

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

3.4.2.1 During Bidding and after the Contract has been executed, the Owner and Architect will consider a formal request for the substitution of products in place of those specified only under the conditions set forth in Division 1 - General Requirements of the Specifications.

3.4.2.2 By making requests for substitutions, the Contractor:

.1 Represents that the Contractor has investigated the proposed substitute product and has determined that it is equal or superior in all respects to that specified;

.2 Represents that the Contractor will provide the same warranty for the substitution that the Contractor would for that specified;

.3 Certifies that the cost data presented is complete and includes all related costs under this Contract except the Architects redesign costs, and waives all claims for additional costs related to the substitution which subsequently become apparent; and

.4 Coordinate the installation of the accepted substitute, making such changes as may be required for the Work to be complete in all respects.

.5 Verified substitution does not impact other items, if so, he has so indicated.

§ 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.

3.4.4 The Owner shall be entitled to deduct from the Contract Sum amounts paid to the Architect to evaluate the Contractor's proposed substitutions and to make agreed-upon changes in the Drawings and Specifications made necessary by the Owner's acceptance of such substitutions.

§ 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. **Compliance with one or more specific laws, ordinances, rules, regulations and lawful orders of public authorities may be brought to the Contractors specific attention elsewhere in the Contract Documents. The inclusion or omission of any law, ordinance, rule, regulation or lawful order of a public authority shall not relieve the Contractor of his duty, obligation and responsibility for compliance with all laws, ordinances, rules, regulations and lawful orders of public authorities.**

§ 3.7.3 If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, **standards**, 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. **Claims for additional cost will not be approved by the Owner for changes required to comply with applicable laws, ordinances, statutes, standards, building codes, rules and regulations for those portions of the Work for which the Contractor is required by**

the Contract for Construction to have knowledge of the applicable laws, ordinances, statues, standards, building codes, rules and regulations.

3.7.3.1 **In general, it is not the Contractor's responsibility to ascertain that the Contract Documents are in accordance with applicable laws, ordinances, statutes, standards, building codes, rules and regulations. However, building trades licensed by regulatory authority shall be held responsible for full and complete knowledge of applicable laws, ordinances, statues, standards, building codes, rules and regulations as they apply to their own licensed trade. Where the Contract Documents specifically direct that portions of the Work be completed in compliance with certain or applicable laws, ordinances, statues, standards, building codes, rules and regulations, it is the Contractor's duty, obligation and responsibility to diligently and carefully research and study, and to acquire full knowledge of, such laws, ordinances, statutes, standards, building codes, rules and regulations. If the Contractor observes that portions of the Contract Documents are at variance from applicable laws, ordinances, statues, standards, building codes, rules and regulations, or is informed of such variance by any public authority or other entity, the Contractor shall promptly notify the Architect in writing, and necessary changes shall be accomplished by appropriate Modification. Nothing in these requirements shall relieve the Contractor of his responsibility for compliance with the requirements of the Contract Documents where those requirements exceed those of the applicable laws, ordinances, statutes, standards, building codes, rules and regulations.**

3.7.3.2 **Applicable laws, ordinances, statutes, standards, building codes, rules and regulations are defined as those laws, ordinances, statutes, standards, building codes, rules and regulations which are in effect and the basis of the approval of the Construction Documents by the Authority Having Jurisdiction. Should applicable law, ordinance, statute, standard, building code, rule or regulation, or interpretation thereof, change during the progress of the Work, and should such change require the Contractor to perform either more or less Work, the Contract Sum and Contract Time shall be appropriately adjusted in compliance with the requirements of ARTICLE 7, CHANGES IN THE WORK.**

§ 3.7.4 Concealed or Unknown Conditions. If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature, that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 21 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend an equitable adjustment in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor in writing, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may proceed as provided in Article 15.

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

§ 3.8 ALLOWANCES

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

§ 3.8.2 Unless otherwise provided in the Contract Documents,

.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 **full time** during performance of the Work. **The Superintendent / Foreman shall not have other project(s) responsibilities and shall devote all of his efforts towards this Project.** The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

3.9.1.1: The following requirements shall be made part of the contract between the Owner and General Contractor, the General Contractor and each sub-contractor, vendor, and material supplier providing job-site services.

.1 One (1) supervisory person (Project Manager, Superintendent, or Craft Foreman) shall be provided for each trade on-site.

.2 Said Supervisory person shall be fluent in the English language; both written and spoken.

.3 Said person shall be designated in writing prior to commencement of the project Work.

.4 Said designated person may only be changed upon written approval of the Architect.

§ 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.

3.9.3.1 Once a Superintendent has been assigned by the Contractor and has attended the Pre-Construction meeting, he shall not be removed from the Project at the convenience of the Contractor. The Contractor shall provide written notice to the Architect, a minimum of 30 days prior to the removal of a Superintendent, which shall include justification for removal. Failure to properly notify the Architect will result in damages being charged to the Contractor. The damages will consist of the additional services required by the Architect to verify proper coordination to complete the Work within the Contract Time.

§ 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 and keep current, for the Architect's review, a schedule of submittals which is fully coordinated with both the Contractor's construction schedule and the Architect's current workload and which allows the Architect reasonable time to review submittals.**

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

3.10.4 Nothing in the requirement to submit construction schedules, or to revise such schedules, or any review of such schedules by the Owner or Architect, shall give rise to a duty, obligation or responsibility of the Owner or Architect to the Contractor, Subcontractor, Sub-subcontractor, Material Supplier, or any other entity involved in the Work, to insure completion of the Work within the Contract Time. It is the sole duty, responsibility and obligation of the Contractor to complete the Work within the Contract Time.

§ 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.

3.12.4.1 Once reviewed and approved by Contractor, Contractor may assemble Shop Drawings, Product Data, Samples and similar Submittals into Broad Grouping of the Work known as "Submittal Packages."

3.12.4.2 Submittals contained within Submittal Package shall be identified by Section number with separate transmittal and sequential Submittal number.

§ 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.

3.12.5.1 In evidence of Contractor's review of Shop Drawings, Product Data, Samples and similar submittals, Contractor shall mark the submittal as being reviewed and approved prior to submitting to Architect for his review and action. Failure of the Contractor to review Submittals shall result in Submittal being returned as "Not Reviewed" by Architect.

§ 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.

3.12.8.1 The above phrase "specifically informed the Architect in writing of such deviation" shall be defined as a letter submitted with the Shop Drawing, Product Data, Sample or similar submittal which contains the following statement: "Your attention is directed to the following deviations from the Requirements of the Contract Documents" followed by a detailed written listing of such deviations.

3.12.8.2 Any portion of the Work which fails to conform to the requirements of the Contract Documents shall be corrected in compliance with Article 12 UNCOVERING AND CORRECTION OF WORK and the Architect's approval of Shop Drawings, Product Data, Samples or similar submittals shall not relieve the Contractor of his duty, obligation and responsibility to make any such required corrections.

§ 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.

3.12.9.1 The above phrase "specific attention, in writing" shall be defined as a letter submitted with the Shop Drawings, Product Data, Sample or similar submittal which shall contain the following statement: "Your attention is directed to the following revisions which are in addition to those revisions that you requested" followed by a detailed written listing of all such revisions.

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

§ 3.13 USE OF SITE

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

§ 3.14 CUTTING AND PATCHING

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

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

§ 3.15 CLEANING UP

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

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

§ 3.16 ACCESS TO WORK

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

§ 3.17 ROYALTIES, PATENTS AND COPYRIGHTS

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

§ 3.18 INDEMNIFICATION

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

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

3.19 COMMUNICATIONS

3.19.1 The Contractor shall forward all communications to the Owner through the Architect who will forward to the Owner.

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, **temporary facilities,** 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.

4.2.2.1 It is understood that the Architect's observations of the Work shall be conducted on a sampling basis and that the observed samples of the Work, at the time observed, may not be representative of all Work by the Contractor in terms of quality and quantity.

4.2.2.2 Nothing in the Agreement shall be construed to mean or to imply:

- **.1 That the Architect has any duty, obligation or responsibility to observe the Work of individual Subcontractor, Sub-subcontractor, Tradesman, Material Supplier or other person or entity during the progress of that Subcontractor's, Sub-Subcontractors, Tradesman, Material Suppliers or other persons or entities Work.**
- **.2 That the Architect has any duty, obligation or responsibility to observe, note and report to the Contractor every discrepancy, error, instance of Work of poor quality and variances from the requirements of the Contract Documents which may be present during any period of observation of the Work. The Architect's failure to observe, note and report to the Contractor any discrepancy, error, instance of Work of poor quality or variance from the requirements of the Contract Documents shall not relieve the Contractor of his obligation to perform the Work in accordance with the Contract Documents.**
- **.3 That the Architect has any duty, obligation or responsibility to observe, note and report to the Contractor any discrepancy, error, instance of Work of poor quality or variance from the requirements of the Contract Documents at any specific time or period during the progress of the Work. Work shall be corrected under the requirements of Article 12 UNCOVERING AND CORRECTION OF WORK without respect to the time or period when the Work requiring correction was discovered and reported to the Contractor.**
- **.4 That the Architect has any duty, obligation or responsibility to protect the Contractor or any Subcontractor, Sub-Subcontractor, Material Supplier or other person or entity involved in the Work against their own construction errors or other**

variance from the requirements of the Contract Documents during his observations of the Work.

.5 That the Architect has any duty, obligation or responsibility to verify the accuracy of Documents and Samples at the Project Site as defined in Subparagraph 3.11.

.6 That the Architect has any duty, obligation or responsibility to observe those portions of the Work excluded from the definition of the term "Work" in Clause 1.1.3.

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

§ 4.2.4 COMMUNICATIONS FACILITATING CONTRACT ADMINISTRATION

. The Owner and Contractor shall 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 **confirm to the Owner** the amounts due the Contractor and will issue **a Recommendation** 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.

4.2.6.1 The Architect shall not have the authority to reject the Contractor's temporary facilities, construction means, methods, techniques, sequences or procedures or safety precautions and programs.

4.2.6.2 The Architect shall not have the authority to stop the Work for any reason. The exercise of the Architect's authority to reject Work under Subparagraph 4.2.6 shall in no case be interpreted as an order to stop 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 **within the constraints of the Contractor's approved schedule of submittals and the Architect's current workload**. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5 and 3.12. The Architect's review shall not constitute approval of safety precautions , of any construction means, methods, techniques, sequences or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

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

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

§ 4.2.10 If the Owner and Architect agree, the Architect will provide one or more project representatives to assist in carrying out the Architect's responsibilities at the site. The duties, responsibilities and limitations of authority of such project representatives shall be as set forth in an exhibit to be incorporated in the Contract Documents.

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

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

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

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

ARTICLE 5 SUBCONTRACTORS

§ 5.1 DEFINITIONS

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

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

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

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

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

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

Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

5.2.3.1 The exercise of the Owner's and Architect's authority to make, or not to make, reasonable objection to any proposed person or entity shall not relieve the Contractor of his duty, obligation and responsibility to complete Work in full compliance with the requirements of the Contract Documents and shall not be construed to mean the approval or rejection of any particular process or material.

§ 5.2.4 The Contractor shall not **change** a Subcontractor, person or entity previously selected without first notifying the Owner **through the** Architect **of the proposed change in writing and allowing the Owner or Architect reasonable time, after due investigation, to raise a** reasonable objection to such substitution.

§ 5.3 SUBCONTRACTUAL RELATIONS

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

5.3.1 The Contractor shall indemnify and hold harmless the Owner, Architect, Architect's Consultants and Agents and employees of them from and against claims, damages, losses and expenses, including, but not limited to, attorneys fees, arising out of the Contractor's failure to bind a Subcontractor or Subcontractors to the terms of the Contract Documents or the Contractor's failure to insure that Subcontractors bind each and every Sub-Subcontractor to the terms of the Contract Documents.

§ 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.

5.5 SUPERINTENDENT

5.5.1 Each Subcontractor and Sub-subcontractor shall employ or name a competent Superintendent or Foreman and necessary assistants who shall be in attendance at the Project Site during the performance of the Subcontractors or Sub-subcontractors portion of the Work.

5.5.2 The Superintendent or foreman shall represent the Subcontractor or Sub-subcontractor, and communications given to the Superintendent or Foreman shall be as binding as if given to the Subcontractor or Sub-subcontractor direct.

5.5.3 Important communications shall be confirmed in writing. Other communications shall be similarly confirmed on written request in each case.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

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

§ 6.1.1 The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and to award separate contracts in connection with other portions of the Project or other construction or operations on the site under Conditions of the Contract identical or substantially similar to these including those portions related to insurance and waiver of subrogation. If the Contractor claims that delay or additional cost is involved because of such action by the Owner, the Contractor shall make such Claim as provided in Article 15.

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

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

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

§ 6.2 MUTUAL RESPONSIBILITY

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

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a separate contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly report to the Architect apparent discrepancies or defects in such other construction that would render it unsuitable for such proper execution and results. Failure of the Contractor so to report shall constitute an acknowledgment that the Owner's or separate contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work, except as to defects not then reasonably discoverable.

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

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

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

6.2.6 Should a Claim against the Owner be filed by a Separate Contractor alleging damage caused by the Contractor, the Owner shall notify the Contractor of such claim. The Contractor shall defend the Owner in all Claim proceedings at the Owner's expense. Should an award or judgment against the Owner be secured by the Separate Contractor, the Contractor shall pay or satisfy said award or judgment and shall reimburse the Owner for attorney's fees, arbitration costs, court costs, additional architectural fees, and other costs which the Owner has incurred.

§ 6.3 OWNER'S RIGHT TO CLEAN UP

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

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 GENERAL

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

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

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

§ 7.2 CHANGE ORDERS

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

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

§ 7.3 CONSTRUCTION CHANGE DIRECTIVES

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

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

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

.1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
.2 Unit prices stated in the Contract Documents or subsequently agreed upon;
.3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or
.4 As provided in Section 7.3.7.

§ 7.3.4 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed in a proposed Change Order or Construction Change Directive so that

application of such unit prices to quantities of Work proposed will cause substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

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

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

§ 7.3.7 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the method and the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, **overhead and profit included in the total cost to the Owner of a change in the Work shall be based upon schedule as specified in Section 01 2600 - Contract Modification Procedures.**

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§ 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.

7.3.11 Prior to final payment, all Construction Change Directives issued during the progress of the Work shall be converted into Change Orders and signed by the Contractor.

§ 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.

7.5. EXPEDITION

7.5.1 The Contractor shall not proceed with Changes in the Work authorized under Paragraphs 7.2 or 7.3 until receipt of the appropriate signed documents.

7.5.2 It is recognized that under certain circumstances, changes in the Work, if not processed expeditiously, may delay or endanger the Work. Upon certification by the Architect that unacceptable delay may be caused, or that the Work may be endangered, the Owner may authorize the Contractor to

immediately proceed with a Change in the Work. All such authorizations will contain an estimated change in the Contract Sum and an estimated change in the Contract Time. The Contract Sum and an estimated change in the Contract Time. The Contractor shall proceed promptly with the Change in the Work upon receipt of such authorization. Final determination of the changes in the Contract Sum and Contract Time shall be made in a reasonable time and the authorization shall be converted into a Change Order or a Construction Change Directive.

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.

8.1.4.1 Calendar day shall be defined as a continuous twenty-four hour period beginning at 12:00 o'clock midnight.

8.1.4.2 Working day, if used, shall be defined as a Calendar Day, exclusive of Saturdays, Sundays and Federal Holidays when weather or other conditions beyond the Contractor's control do not prevent the completion of at least four hours of work on the principal unit of work underway between the hours of 7:00 o'clock AM and 6:00 o'clock PM.

§ 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; 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.

§ 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.

9.3.1.3 Until Substantial Completion, the Owner will pay ninety-five (95%) percent of the amount due the Contractor on account of progress payments unless otherwise provided by statute. The remaining five (5%) percent shall constitute "Retainage" and will be paid as part of the Final Application for Payment.

§ 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. . **Payments will not be made on account of materials and equipment stored off the Project Site.**

9.3.2.1 The Owner reserves the right to require the Contractor to submit invoices for materials and equipment stored on the Project Site but not yet incorporated into the Work if the Contractor makes Application for Payment for such on site stored materials and equipment.

§ 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.

9.3.4 On each and every Application and Certificate for Payment upon which the Contractor applies for payment for materials stored on the Project Site but not yet incorporated into the Work, the Contractor shall include a statement as follows:

> **"At time of payment, for value received, the Contractor and applicable Subcontractors, Sub-Subcontractors and Material Suppliers, jointly and severally, hereby sell, assign or transfer unto the Owner the property described as stored materials on this Application and Certificate for Payment and do hereby warrant the Title to said property and do hereby certify that said property is free of all liens and encumbrances."**

9.3.4.1 Should this statement not be included with the Application and Certificate for Payment, the statement shall be included by reference with the same force and effect as if it had been written thereon.

§ 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, **temporary facilities**, sequences or procedures, (3) reviewed copies of requisitions received from Subcontractors and material suppliers and other data requested by the Owner to substantiate the Contractor's right to payment, or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 9.5 DECISIONS TO WITHHOLD CERTIFICATION

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

.1 defective Work not remedied;

.2 third party claims filed or reasonable evidence indicating probable filing of such claims unless security acceptable to the Owner is provided by the Contractor;

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

.4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;

.5 damage to the Owner or a separate contractor;

.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.

9.5.3.1 **The Owner shall have the right to act as agent for the Contractor in disbursing such funds as have been withheld pursuant to Paragraph 9.5.1 to the party or parties entitled to payment therefrom. The Owner shall render the Contractor an accounting of funds so disbursed.**

§ 9.6 PROGRESS PAYMENTS

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

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

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

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

§ 9.6.5 Contractor payments to material and equipment suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

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

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

§ 9.7 FAILURE OF PAYMENT

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

9.8.1.1 Inspections required by Federal, State or Local Regulatory Authorities shall be complete prior to the issuance of the Certificate of Substantial Completion. When so required, by Regulatory Authority, the Contractor shall also obtain and submit to the Architect a Use or Occupancy Permit prior to the issuance of the Certificate of Substantial Completion. It is the Contractor's responsibility to determine or ascertain what inspections are required, to schedule such inspections, and to notify the Architect of the time and date of such inspections a minimum of seven (7) days prior to the inspection date.

9.8.1.2 Should any regulatory inspection disclose any Work that is not in compliance with the Contract Documents, the Contractor shall, prior to the issuance of the Certificate of Substantial Completion, complete or correct such Work promptly. The Contractor shall then schedule

another inspection by the appropriate Regulatory Authority having jurisdiction and notify the Architect of the time and date of such re-inspection.

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, **and after all regulatory inspections are complete and, if required, a Use or Occupancy Permit is obtained**, 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.

9.8.3.1 The Architect will not make an inspection to determine Substantial Completion prior to the Contractor providing evidence that all Federal, State and Local Regulatory Authorities have inspected the proposed and issued their Use or Occupancy Permits.

§ 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.

9.8.6 Unless otherwise agreed upon in writing, the issuance of a Certificate of Substantial Completion shall not constitute acceptance of Work not in compliance with the requirements of the Contact Documents.

§ 9.9 PARTIAL OCCUPANCY OR USE

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

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

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

§ 9.10 FINAL COMPLETION AND FINAL PAYMENT

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

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

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

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

.1 liens, Claims, security interests or encumbrances arising out of the Contract and unsettled;

.2 failure of the Work to comply with the requirements of the Contract Documents; or

.3 terms of special warranties required by the Contract Documents.

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

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 SAFETY PRECAUTIONS AND PROGRAMS

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

§ 10.2 SAFETY OF PERSONS AND PROPERTY

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

.1 employees on the Work and other persons who may be affected thereby;

.2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody or control of the Contractor or the Contractor's Subcontractors or Sub-subcontractors; and

.3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

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

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

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

10.2.4.1 **When use or storage of explosives or other hazardous materials or equipment are necessary, the Contractor shall give the Owner, through the Architect, reasonable advance notice prior to using or storing such hazardous materials.**

§ 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.

10.2.7.1 The Contractor shall be solely responsible for providing necessary bracing, shoring and tying of structures, decks and framing and for other temporary facilities. The Contractor shall adequately brace, shore or otherwise support elements of the Work to prevent any structural failure which could result in damage to the Work, property or injury or death to persons.

§ 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.

10.2.9 The Contractor shall be solely responsible for the adequacy and safety of hoisting equipment and scaffolding.

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

§ 10.3.2 Upon receipt of the Contractor's written notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of such material or substance or who are to perform the task of removal or safe containment of such material or substance. The Contractor and the Architect will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased in the amount of the Contractor's reasonable additional costs of shut-down, delay and start-up.

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

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

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

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

§ 10.4 EMERGENCIES

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

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 CONTRACTOR'S LIABILITY INSURANCE

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

.1 Claims under workers' compensation, disability benefit and other similar employee benefit acts that are applicable to the Work to be performed;

.2 Claims for damages because of bodily injury, occupational sickness or disease, or death of the Contractor's employees;

.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 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. **If this insurance is written on a Comprehensive General Liability policy form, the Certificates of Insurance shall be ACORD form 25-S, completed and supplemented in accordance with Supplemental Attachment for ACORD Certificate of Insurance 25-S.** These certificates and the insurance policies required by this Section 11.1 shall contain a provision that coverages afforded under the policies will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner. An additional certificate evidencing continuation of liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment as required by Section 9.10.2 and thereafter upon renewal or replacement of such coverage until the expiration of the time required by Section 11.1.2. Information concerning reduction of coverage on account of revised limits or claims paid under the General Aggregate, or both, shall be furnished by the Contractor with reasonable promptness.

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

§ 11.2 OWNER'S LIABILITY INSURANCE

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

§ 11.3 PROPERTY INSURANCE

§ 11.3.1 **The Contractor** 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. **The form of policy for the coverage shall be Completed Value. If the Owner is damaged by the failure of the Contractor to purchase and maintain such insurance, then the Contractor shall bear all reasonable costs properly attributable thereto.**

§ 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.

(Paragraph deleted)
§ 11.3.1.2.

§ 11.3.1.3 .

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

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

Contractor 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 .

§ 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 Contractor shall file with the Owner a certified copy of each policy that includes insurance coverage's required by this Paragraph 11.3.**

§ 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 **Contractor** as fiduciary. The Owner or Contractor, as appropriate, shall require of the Architect, Architect's consultants, separate contractors described in Article 6, if any, and the subcontractors, 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.

11.3.7.1 The Owner and Contractor intend that all policies provided in response to the property insurance provisions of the Agreement shall protect all of the parties insured and shall provide primary coverage for losses and damages caused by the perils covered thereby. Accordingly, such policies

shall contain provisions to the effect that in the event of payment of any loss or damage the insurer will have no rights of recovery against any of the parties named as insured or additional insured.

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

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

§ 11.4 **PERFORMANCE BOND, LABOR AND MATERIAL PAYMENT BOND (STATUTORY BOND) AND DEFECT BOND**

§ 11.4.1 The Owner shall require the Contractor to furnish **Performance, Labor and Material Payment (Statutory) and Defect** 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.

11.4.1.1 The Contractor shall furnish Performance, Labor and Material Payment (Statutory) and Defect Bonds in amounts equal to one hundred (100%) percent of the Contract Sum. Bonds shall be in a form as directed by the Owner elsewhere in the Contract Documents.

11.4.1.2 The Contractor shall deliver the required bonds to the Owner at the time of signing the Agreement.

11.4.1.3 The Contractor shall require the Attorney-in-Fact who executes the required bonds on behalf of the surety to affix thereto a certified and current Power of Attorney.

11.4.1.4 Refer to Document 00 6100 – Bonds for additional information.

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

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 UNCOVERING OF WORK

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

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

§ 12.2 CORRECTION OF WORK

§ 12.2.1 BEFORE OR AFTER SUBSTANTIAL COMPLETION

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

§ 12.2.2 AFTER SUBSTANTIAL COMPLETION

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

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

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

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

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

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

§ 12.3 ACCEPTANCE OF NONCONFORMING WORK

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

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 GOVERNING LAW

The Contract shall be governed by the law of the place where the Project is located.

§ 13.2 SUCCESSORS AND ASSIGNS

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

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

§ 13.3 WRITTEN NOTICE

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

§ 13.4 RIGHTS AND REMEDIES

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

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

§ 13.5 TESTS AND INSPECTIONS

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

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

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

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

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

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

§ 13.6 INTEREST

. Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at the rate of 1 percent APR per month.

§ 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.

13.8 OVERTIME WORK

13.8.1 Overtime Work as defined by Federal and State Statue required to complete the Work in the Contract Time shall be included in the Contract Sum and the Contractor shall work overtime as required to complete the Work within the Contract Time. The Contract Sum shall not be adjusted for overtime work required to complete the Work in the Contract Time.

13.8.2 The Owner may order, in writing, additional Overtime Work to be performed. The Owner shall bear costs of such Overtime Work and the Contact Sum shall be adjusted as provided in ARTICLE 7 - CHANGES IN THE WORK.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 TERMINATION BY THE CONTRACTOR

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

.1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;

.2 An act of government, such as a declaration of national emergency that requires all Work to be stopped;

.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.

.5 **is adjudged bankrupt, or if he makes a general assignment for the benefit of his creditors, or if a receiver is appointed on account of his insolvency.**

§ 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.

§ 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.

15.1.3.1 The Contractor shall diligently and carefully research and study weather records for the Project Site for the purpose of determining the anticipated number of adverse weather days which may be encountered during the progress of the Work. An adverse weather day is defined as a day for which the temperature falls below 32 degrees (32°) Fahrenheit or precipitation of 0.50 inches or more occurs. This data shall be included with any claim submitted under Clause 15.1.5.

15.1.3.2 Through submission of his bid, the Contractor warrants that his proposed Contract Time was prepared with full allowance for the anticipated number of adverse weather days.

15.1.3.2 Throughout the progress of the Work, the Contractor shall maintain accurate records on a calendar-day basis of actual adverse weather days, to include weekends and holidays. These records shall be included with any claim submitted under Subparagraph 15.1.2.

§ 15.1.4 CLAIMS FOR ADDITIONAL COST

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

§ 15.1.5 CLAIMS FOR ADDITIONAL TIME

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

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

§ 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 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

(Paragraphs deleted)

§ 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.

(Paragraphs deleted)

§ 15.4.4 CONSOLIDATION OR JOINDER

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

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

End of Document

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[Insert Project Name]
[Location]
[City, St, Zip]

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~~*(Name, legal status*~~ *(Name and address)*
[Insert Owner's Name]
[Address]
[City, St Zip]
[Phone Number]
[Fax Number]

~~*(Name, legal status and address)*~~*(Name and address)*
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Tulsa, OK 74114
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Fax Number:918-491-2209

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1.1.1, 2.3, 3.9, 7, 8.2.2, 11.4.9, 12.1, 12.2, 13.5.2, 14.3.1, 15.1.2

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~~ **(Conditions including modifications** 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.

...

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 the Architect and any Subcontractor, Sub-subcontractor or a Material Supplier, (5)** 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.

...

1.1.3.1 – It is agreed that the definition of the term "Work" for the purposes of the Architect's observations of the Work shall not include temporary shoring, bracing, scaffolding, form work, safety barriers, trench bracing and other similar items referred to herein as "temporary facilities," material moving equipment to include cranes and elevators, or any other temporary structures or construction equipment or aids, for which the Contractor shall have sole responsibility

...

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. **Portions of the Drawings may be bound into the Project Manual and identified as such or they may be bound into a separate volume titled Details and Schedules.**

...

1.1.7.1 THE PROJECT MANUAL

1.1.7.1 - The Project Manual is a volume assembled for the Work which may include the bidding requirements, sample forms, Conditions of the Contract and Specifications. Other items or requirements related to the Work or the Project may also be included in the Project Manual.

§ 1.1.8 ~~INITIAL DECISION MAKER~~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.

1.1.9 THE PROJECT SITE

The Project Site is the tract of ground upon which the Project is to be situated and is generally defined on the Plot Plan or Site Plan Drawing. The Project may be located on more than one Project Site which may be located remote from each other. The Project Site may also be confined within the walls of an existing building or buildings.

1.1.10 PRODUCT:
The term 'product' includes materials, systems, and equipment.

1.1.11 FURNISH:
The term 'furnish' means supply and deliver to Project site, ready for unloading, assembly, erection, placement of similar requirements.

1.1.12 INSTALL:
The term 'install' means to unload, unpack, assemble, erect, place, finish, protect, adjust, and clean, or similar requirements and to make final connection(s) to utilities as necessary.

1.1.13 PROVIDE:
The term 'provide' means to furnish and install.

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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. **Organization of the Drawings and Specifications into a format for easy cross-reference by any person or entity is for the specific purpose of convenience only and such cross references shall not be considered as being full and complete. The omission of any cross reference shall not relieve the Contractor of his responsibility to perform the Work required by the Contract Documents.**

...

1.2.4 Contract Documents are complementary and do not have a system of precedence. In the event of conflicts or discrepancies among the separate parts of the Contract Documents, or within any one part of the Contract Documents, and subject to the terms of Subparagraph 3.2.1, the Architect shall, consistent with Subparagraphs 4.2.11 and 4.2.12, interpret the conflict or discrepancy based upon the Contract Documents as a whole. Should such a conflict or discrepancy occur, it is the specific intent of the Contract Documents to require the better quality or greater quantity of Work be performed and the Architects interpretation shall be consistent with this intent.

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. **The capitalization of other words or terms, or the failure to capitalize any word or term, throughout the Contract Documents, shall be interpreted to have no meaning and shall be without effect on interpretations of the Contract Documents.**

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1.6.1 Electronic files of the Contract Documents are available from the Architect to the Contactor or subcontractor upon executions of a Release Form and the payment of $300.00 per sheet Use Fee to the Architect.

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§ 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. **The Architect makes no representations to the accuracy or completeness of these surveys. Such surveys may contain descriptions of physical characteristics, legal limitations, utility locations, permanent**

benchmarks, existing structures, slopes and contours, legal descriptions and other such pertinent information. Such Owner furnished surveys may be bound with the Drawings or may be fully or partially transcribed onto the Plot Plan or Site Plan Drawings. Surveys furnished are not a part of the Contract Documents, but rather are provided for information purposes only.

...

§ 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.~~

2.2.6 The Owner's instructions to the Contractor shall be communicated through the Architect.

...

2.3.1 The Owner's right to stop the Work shall not imply that the Owner, or the Architect, has any duty, obligation or responsibility to determine either the safety of the Contractor's means, methods, techniques or sequences, including but not limited to, temporary shoring, bracing, scaffolding, form work, safety barriers, trench bracing, and other similar items, referred to herein as "temporary facilities," or their compliance with the requirements of laws, codes, regulations and safety requirements, which shall be the full and sole responsibility of the Contractor and the Contractor shall solely bear all damages or injury, including death, arising there from.

...

2.4.1 Should the Contractor fail or refuse to sign the Change Order, and should the Contractor not give written notice of his specific reasons within a seven-day period after his receipt of the Change Order, or should the Contractor not accept delivery of the Change Order, a Construction Change Directive for a like amount shall be issued in compliance with Paragraph 7.3 CONSTRUCTION CHANGE DIRECTIVES.

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3.1.4 The successful Bidder (Contractor) shall secure Contract Documents as outlined in Clauses 3.1.4.1 and 3.1.4.2.

3.1.4.1 After Bidding and Award of Contract, electronic copies of Contract Documents will be made available to Contractor for Contractor's use during the progress of the Work. Refer to Division 1.

3.1.4.2 Contractor may purchase printed copies of Contract Documents from the Reproduction Vendor at cost determined by Vendor.

...

3.2.1.1 Prior to submission of his bid, the Contractor has a duty, obligation and responsibility to seek clarification of open, obvious or patent error or ambiguity in the proposed Contract Documents.

3.2.1.2 The Contractor has a duty, responsibility and obligation to fully disclose relevant requirements contained in the Agreement and in the Contract Documents to any entity from which bids or prices are solicited for any portion of the Work, both before and after the Bid Date as established in the Invitation to Bid. This requirement shall not be waived for unsolicited bids or prices.

3.2.1.3 During his careful study as required in Subparagraph 3.2.1, the Contractor shall note all typographical and spelling errors in the Construction Documents. Any such errors which produce a phrase or sentence in compliance with both well known technical and trade meanings and common English usage shall not be deemed a typographical or spelling error. All other such typographical or spelling errors will produce phrases or sentences which are inconsistent with well known technical and trade meanings or common English usage. The Contractor shall report all such errors to the Architect in compliance with Subparagraph 3.2.1.

3.2.1.4 Field measurements shall include, but shall not be limited to, grades, lines, levels and dimensions. Should the Contractor fail to notify the Architect of any discovered error, inconsistency or omission, the Contractor's liability shall be as described in Subparagraph 3.2.1.

3.2.2.1 The Owner shall be entitled to deduct from the Contract Sum amounts paid to the Architect for the Architect to evaluate and respond to the Contractor's Requests for Interpretation of the Contract Documents, where such information was available to the Contractor from a careful study and comparison of the Contract Documents, field conditions, other Owner-provided information, Contractor-prepared coordination drawings, or prior Project correspondence or documentation.

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

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3.4.2.1 During Bidding and after the Contract has been executed, the Owner and Architect will consider a formal request for the substitution of products in place of those specified only under the conditions set forth in Division 1 - General Requirements of the Specifications.

3.4.2.2 By making requests for substitutions, the Contractor:

.1 Represents that the Contractor has investigated the proposed substitute product and has determined that it is equal or superior in all respects to that specified;

.2 Represents that the Contractor will provide the same warranty for the substitution that the Contractor would for that specified;

.3 Certifies that the cost data presented is complete and includes all related costs under this Contract except the Architects redesign costs, and waives all claims for additional costs related to the substitution which subsequently become apparent; and

.4 Coordinate the installation of the accepted substitute, making such changes as may be required for the Work to be complete in all respects.

.5 Verified substitution does not impact other items, if so, he has so indicated.

3.4.4 The Owner shall be entitled to deduct from the Contract Sum amounts paid to the Architect to evaluate the Contractor's proposed substitutions and to make agreed-upon changes in the Drawings and Specifications made necessary by the Owner's acceptance of such substitutions.

...

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

...

§ 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. Compliance with one or more specific laws, ordinances, rules, regulations and lawful orders of public authorities may be brought to the Contractors specific attention elsewhere in the Contract Documents. The inclusion or omission of any law, ordinance, rule, regulation or lawful order of a public authority shall not relieve the Contractor of his duty, obligation and responsibility for compliance with all laws, ordinances, rules, regulations and lawful orders of public authorities.

§ 3.7.3 If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, standards, 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. Claims for additional cost will not be approved by the Owner for changes required to comply with applicable laws, ordinances, statutes, standards, building codes, rules and regulations for those portions of the Work for which the Contractor is required by the Contract for Construction to have knowledge of the applicable laws, ordinances, statues, standards, building codes, rules and regulations.

3.7.3.1 In general, it is not the Contractor's responsibility to ascertain that the Contract Documents are in accordance with applicable laws, ordinances, statutes, standards, building codes, rules and regulations. However, building trades licensed by regulatory authority shall be held responsible for full and complete knowledge of applicable laws, ordinances, statues, standards, building codes, rules and regulations as they apply to their own licensed trade. Where the Contract Documents specifically direct that portions of the Work be completed in compliance with certain or applicable laws, ordinances, statues, standards, building codes, rules and regulations, it is the Contractor's duty, obligation and responsibility to diligently and carefully research and study, and to acquire full knowledge of, such laws, ordinances, statutes, standards, building codes, rules and regulations. If the Contractor observes that portions of the Contract Documents are at variance from applicable laws, ordinances, statues, standards, building codes, rules and regulations, or is informed of such variance by any public authority or other entity, the Contractor shall promptly notify the Architect in writing, and necessary changes shall be accomplished by appropriate Modification. Nothing in these requirements shall relieve the Contractor of his responsibility for compliance with the requirements of the Contract Documents where those requirements exceed those of the applicable laws, ordinances, statutes, standards, building codes, rules and regulations.

3.7.3.2 Applicable laws, ordinances, statutes, standards, building codes, rules and regulations are defined as those laws, ordinances, statutes, standards, building codes, rules and regulations which are in effect and the basis of the approval of the Construction Documents by the Authority Having Jurisdiction. Should applicable law, ordinance, statute, standard, building code, rule or regulation, or interpretation thereof, change during the progress of the Work, and should such

change require the Contractor to perform either more or less Work, the Contract Sum and Contract Time shall be appropriately adjusted in compliance with the requirements of ARTICLE 7, CHANGES IN THE WORK.

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.1 ~~Allowances~~ allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;

...

.3 ~~Whenever~~ 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.

...

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site **full time** during performance of the Work. **The Superintendent / Foreman shall not have other project(s) responsibilities and shall devote all of his efforts towards this Project.** The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

3.9.1.1: The following requirements shall be made part of the contract between the Owner and General Contractor, the General Contractor and each sub-contractor, vendor, and material supplier providing job-site services.

.1 One (1) supervisory person (Project Manager, Superintendent, or Craft Foreman) shall be provided for each trade on-site.

.2 Said Supervisory person shall be fluent in the English language; both written and spoken.

.3 Said person shall be designated in writing prior to commencement of the project Work.

.4 Said designated person may only be changed upon written approval of the Architect.

...

3.9.3.1 Once a Superintendent has been assigned by the Contractor and has attended the Pre-Construction meeting, he shall not be removed from the Project at the convenience of the Contractor. The Contractor shall provide written notice to the Architect, a minimum of 30 days prior to the removal of a Superintendent, which shall include justification for removal. Failure to properly notify the Architect will result in damages being charged to the Contractor. The damages will consist of the additional services required by the Architect to verify proper coordination to complete the Work within the Contract Time.

...

§ 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~~ **and keep current, for the Architect's review, a schedule of submittals which is fully coordinated with both the Contractor's construction schedule and the Architect's current workload and which allows 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.**

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3.10.4 Nothing in the requirement to submit construction schedules, or to revise such schedules, or any review of such schedules by the Owner or Architect, shall give rise to a duty, obligation or responsibility of the Owner or Architect to the Contractor, Subcontractor, Sub-subcontractor, Material Supplier, or any other entity involved in the Work, to insure completion of the Work within the Contract Time. It is the sole duty, responsibility and obligation of the Contractor to complete the Work within the Contract Time.

...

3.12.4.1 Once reviewed and approved by Contractor, Contractor may assemble Shop Drawings, Product Data, Samples and similar Submittals into Broad Grouping of the Work known as "Submittal Packages."

3.12.4.2 Submittals contained within Submittal Package shall be identified by Section number with separate transmittal and sequential Submittal number.

3.12.5.1 In evidence of Contractor's review of Shop Drawings, Product Data, Samples and similar submittals, Contractor shall mark the submittal as being reviewed and approved prior to submitting to Architect for his review and action. Failure of the Contractor to review Submittals shall result in Submittal being returned as "Not Reviewed" by Architect.

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3.12.8.1 The above phrase "specifically informed the Architect in writing of such deviation" shall be defined as a letter submitted with the Shop Drawing, Product Data, Sample or similar submittal which contains the following statement: "Your attention is directed to the following deviations from the Requirements of the Contract Documents" followed by a detailed written listing of such deviations.

3.12.8.2 Any portion of the Work which fails to conform to the requirements of the Contract Documents shall be corrected in compliance with Article 12 UNCOVERING AND CORRECTION OF WORK and the Architect's approval of Shop Drawings, Product Data, Samples or similar submittals shall not relieve the Contractor of his duty, obligation and responsibility to make any such required corrections.

3.12.9.1 The above phrase "specific attention, in writing" shall be defined as a letter submitted with the Shop Drawings, Product Data, Sample or similar submittal which shall contain the following statement: "Your attention is directed to the following revisions which are in addition to those revisions that you requested" followed by a detailed written listing of all such revisions.

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§ 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~~ which would otherwise exist as to a party or person described in this Section 3.18.

...

3.19 COMMUNICATIONS

3.19.1 The Contractor shall forward all communications to the Owner through the Architect who will forward to the Owner.

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§ 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~~ 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, temporary facilities, 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.

4.2.2.1 It is understood that the Architect's observations of the Work shall be conducted on a sampling basis and that the observed samples of the Work, at the time observed, may not be representative of all Work by the Contractor in terms of quality and quantity.

4.2.2.2 Nothing in the Agreement shall be construed to mean or to imply:

.1 That the Architect has any duty, obligation or responsibility to observe the Work of individual Subcontractor, Sub-subcontractor, Tradesman, Material Supplier or other person or entity during the progress of that Subcontractor's, Sub-Subcontractors, Tradesman, Material Suppliers or other persons or entities Work.

.2 That the Architect has any duty, obligation or responsibility to observe, note and report to the Contractor every discrepancy, error, instance of Work of poor quality and variances from the requirements of the Contract Documents which may be present during any period of observation of the Work. The Architect's failure to observe, note and report to the Contractor any discrepancy, error, instance of Work of poor quality or variance from the requirements of the Contract Documents shall not relieve the Contractor of his obligation to perform the Work in accordance with the Contract Documents.

.3 That the Architect has any duty, obligation or responsibility to observe, note and report to the Contractor any discrepancy, error, instance of Work of poor quality or variance from the requirements of the Contract Documents at any specific time or period during the progress of the Work. Work shall be corrected under the requirements of Article 12 UNCOVERING AND CORRECTION OF WORK without respect to the time or period when the Work requiring correction was discovered and reported to the Contractor.

.4 That the Architect has any duty, obligation or responsibility to protect the Contractor or any Subcontractor, Sub-Subcontractor, Material Supplier or other person or entity involved in the Work against their own construction errors or other variance from the requirements of the Contract Documents during his observations of the Work.

.5 That the Architect has any duty, obligation or responsibility to verify the accuracy of Documents and Samples at the Project Site as defined in Subparagraph 3.11.

.6 That the Architect has any duty, obligation or responsibility to observe those portions of the Work excluded from the definition of the term "Work" in Clause 1.1.3.

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~~Except as otherwise provided in the Contract Documents or when direct communications have been specially authorized, the Owner and Contractor shall endeavor to~~ **. The Owner and Contractor shall 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~~ **confirm to the Owner** the amounts due the Contractor and will issue ~~Certificates~~ **a Recommendation** for Payment in such amounts.

...

4.2.6.1 The Architect shall not have the authority to reject the Contractor's temporary facilities, construction means, methods, techniques, sequences or procedures or safety precautions and programs.

4.2.6.2 The Architect shall not have the authority to stop the Work for any reason. The exercise of the Architect's authority to reject Work under Subparagraph 4.2.6 shall in no case be interpreted as an order to stop 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 **within the constraints of the Contractor's approved schedule of submittals and the Architect's current workload.** Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5 and 3.12. The Architect's review shall not constitute approval of safety precautions ~~or, unless otherwise specifically stated by the Architect,~~ , of any construction means, methods, techniques, sequences or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

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§ 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~~ 14 day period shall constitute notice of no reasonable objection.

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5.2.3.1 The exercise of the Owner's and Architect's authority to make, or not to make, reasonable objection to any proposed person or entity shall not relieve the Contractor of his duty, obligation and responsibility to complete Work in full compliance with the requirements of the Contract Documents and shall not be construed to mean the approval or rejection of any particular process or material.

§ 5.2.4 The Contractor shall not ~~substitute~~ **change** a Subcontractor, person or entity previously selected ~~if the Owner or Architect makes~~ without first notifying the Owner **through the** Architect **of the proposed change in writing and**

allowing the Owner or Architect reasonable time, after due investigation, to raise a reasonable objection to such substitution.

...

5.3.1 The Contractor shall indemnify and hold harmless the Owner, Architect, Architect's Consultants and Agents and employees of them from and against claims, damages, losses and expenses, including, but not limited to, attorneys fees, arising out of the Contractor's failure to bind a Subcontractor or Subcontractors to the terms of the Contract Documents or the Contractor's failure to insure that Subcontractors bind each and every Sub-Subcontractor to the terms of the Contract Documents.

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5.5 SUPERINTENDENT

5.5.1 Each Subcontractor and Sub-subcontractor shall employ or name a competent Superintendent or Foreman and necessary assistants who shall be in attendance at the Project Site during the performance of the Subcontractors or Sub-subcontractors portion of the Work.

5.5.2 The Superintendent or foreman shall represent the Subcontractor or Sub-subcontractor, and communications given to the Superintendent or Foreman shall be as binding as if given to the Subcontractor or Sub-subcontractor direct.

5.5.3 Important communications shall be confirmed in writing. Other communications shall be similarly confirmed on written request in each case.

...

§ 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~~ or, separate contractors as provided in Section 10.2.5.

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6.2.6 Should a Claim against the Owner be filed by a Separate Contractor alleging damage caused by the Contractor, the Owner shall notify the Contractor of such claim. The Contractor shall defend the Owner in all Claim proceedings at the Owner's expense. Should an award or judgment against the Owner be secured by the Separate Contractor, the Contractor shall pay or satisfy said award or judgment and shall reimburse the Owner for attorney's fees, arbitration costs, court costs, additional architectural fees, and other costs which the Owner has incurred.

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§ 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:~~ overhead and profit included in the total cost to the Owner of a change in the Work shall be based upon schedule as specified in Section 01 2600 - Contract Modification Procedures.

~~.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.~~.

...

7.3.11 Prior to final payment, all Construction Change Directives issued during the progress of the Work shall be converted into Change Orders and signed by the Contractor.

...

7.5. EXPEDITION

7.5.1 The Contractor shall not proceed with Changes in the Work authorized under Paragraphs 7.2 or 7.3 until receipt of the appropriate signed documents.

7.5.2 It is recognized that under certain circumstances, changes in the Work, if not processed expeditiously, may delay or endanger the Work. Upon certification by the Architect that unacceptable delay may be caused, or that the Work may be endangered, the Owner may authorize the Contractor to immediately proceed with a Change in the Work. All such authorizations will contain an estimated change in the Contract Sum and an estimated change in the Contract Time. The Contract Sum and an estimated change in the Contract Time. The Contractor shall proceed promptly with the Change in the Work upon receipt of such authorization. Final determination of the changes in the Contract Sum and Contract Time shall be made in a reasonable time and the authorization shall be converted into a Change Order or a Construction Change Directive.

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8.1.4.1 Calendar day shall be defined as a continuous twenty-four hour period beginning at 12:00 o'clock midnight.

8.1.4.2 Working day, if used, shall be defined as a Calendar Day, exclusive of Saturdays, Sundays and Federal Holidays when weather or other conditions beyond the Contractor's control do not prevent the completion of at least four hours of work on the principal unit of work underway between the hours of 7:00 o'clock AM and 6:00 o'clock PM.

...

§ 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;~~ Owner; 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.

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§ 9.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section ~~9.2,~~ 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.

...

9.3.1.3 Until Substantial Completion, the Owner will pay ninety-five (95%) percent of the amount due the Contractor on account of progress payments unless otherwise provided by statute. The remaining five (5%) percent shall constitute "Retainage" and will be paid as part of the Final Application for Payment.

§ 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.~~ **Payments will not be made on account of materials and equipment stored off the Project Site.**

9.3.2.1 The Owner reserves the right to require the Contractor to submit invoices for materials and equipment stored on the Project Site but not yet incorporated into the Work if the Contractor makes Application for Payment for such on site stored materials and equipment.

...

9.3.4 On each and every Application and Certificate for Payment upon which the Contractor applies for payment for materials stored on the Project Site but not yet incorporated into the Work, the Contractor shall include a statement as follows:

> **"At time of payment, for value received, the Contractor and applicable Subcontractors, Sub-Subcontractors and Material Suppliers, jointly and severally, hereby sell, assign or transfer unto the Owner the property described as stored materials on this Application and Certificate for Payment and do hereby warrant the Title to said property and do hereby certify that said property is free of all liens and encumbrances."**

9.3.4.1 Should this statement not be included with the Application and Certificate for Payment, the statement shall be included by reference with the same force and effect as if it had been written thereon.

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§ 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, **temporary facilities,** 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.

...

9.5.3.1 The Owner shall have the right to act as agent for the Contractor in disbursing such funds as have been withheld pursuant to Paragraph 9.5.1 to the party or parties entitled to payment therefrom. The Owner shall render the Contractor an accounting of funds so disbursed.

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9.8.1.1 Inspections required by Federal, State or Local Regulatory Authorities shall be complete prior to the issuance of the Certificate of Substantial Completion. When so required, by Regulatory Authority, the Contractor shall also obtain and submit to the Architect a Use or Occupancy Permit prior to the issuance of the Certificate of Substantial Completion. It is the Contractor's responsibility to determine or ascertain what inspections are required, to schedule such inspections, and to notify the Architect of the time and date of such inspections a minimum of seven (7) days prior to the inspection date.

9.8.1.2 Should any regulatory inspection disclose any Work that is not in compliance with the Contract Documents, the Contractor shall, prior to the issuance of the Certificate of Substantial Completion, complete or correct such Work promptly. The Contractor shall then schedule another inspection by the appropriate Regulatory Authority having jurisdiction and notify the Architect of the time and date of such re-inspection.

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, **and after all regulatory inspections are complete and, if required, a Use or Occupancy Permit is obtained,** 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.

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9.8.3.1 The Architect will not make an inspection to determine Substantial Completion prior to the Contractor providing evidence that all Federal, State and Local Regulatory Authorities have inspected the proposed and issued their Use or Occupancy Permits.

...

9.8.6 Unless otherwise agreed upon in writing, the issuance of a Certificate of Substantial Completion shall not constitute acceptance of Work not in compliance with the requirements of the Contact Documents.

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10.2.4.1 When use or storage of explosives or other hazardous materials or equipment are necessary, the Contractor shall give the Owner, through the Architect, reasonable advance notice prior to using or storing such hazardous materials.

...

10.2.7.1 The Contractor shall be solely responsible for providing necessary bracing, shoring and tying of structures, decks and framing and for other temporary facilities. The Contractor shall adequately brace, shore or otherwise support elements of the Work to prevent any structural failure which could result in damage to the Work, property or injury or death to persons.

...

10.2.9 **The Contractor shall be solely responsible for the adequacy and safety of hoisting equipment and scaffolding.**

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§ 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. **If this insurance is written on a Comprehensive General Liability policy form, the Certificates of Insurance shall be ACORD form 25-S, completed and supplemented in accordance with Supplemental Attachment for ACORD Certificate of Insurance 25-S.** 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~~ Consultants as additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's completed operations.

...

§ 11.3.1 ~~Unless otherwise provided, the Owner~~ **The Contractor** 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. **The form of policy for the coverage shall be Completed Value. If the Owner is damaged by the failure of the Contractor to purchase and maintain such insurance, then the Contractor shall bear all reasonable costs properly attributable thereto.**

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~~§ 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.~~

§ 11.3.1.2.

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

...

~~The Owner~~ **Contractor** 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.

...

§ 11.3.4 ~~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.~~.

...

§ 11.3.6 **Before an exposure to loss may occur, the** ~~Owner~~ **Contractor shall file with the** ~~Contractor a~~ **Owner a certified 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.~~**coverage's required by this Paragraph 11.3.**

...

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~~ **Contractor** as fiduciary. The Owner or Contractor, as appropriate, shall require of the Architect, Architect's consultants, separate contractors described in Article 6, if any, and the subcontractors, 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.

11.3.7.1 The Owner and Contractor intend that all policies provided in response to the property insurance provisions of the Agreement shall protect all of the parties insured and shall provide primary coverage for losses and damages caused by the perils covered thereby. Accordingly, such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurer will have no rights of recovery against any of the parties named as insured or additional insured.

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

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

§ 11.4 ~~PERFORMANCE BOND AND PAYMENT BOND~~**PERFORMANCE BOND, LABOR AND MATERIAL PAYMENT BOND (STATUTORY BOND) AND DEFECT BOND**

§ 11.4.1 The Owner shall ~~have the right to~~ require the Contractor to furnish **Performance, Labor and Material Payment (Statutory) and Defect** 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.

11.4.1.1 The Contractor shall furnish Performance, Labor and Material Payment (Statutory) and Defect Bonds in amounts equal to one hundred (100%) percent of the Contract Sum. Bonds shall be in a form as directed by the Owner elsewhere in the Contract Documents.

11.4.1.2 The Contractor shall deliver the required bonds to the Owner at the time of signing the Agreement.

11.4.1.3 The Contractor shall require the Attorney-in-Fact who executes the required bonds on behalf of the surety to affix thereto a certified and current Power of Attorney.

11.4.1.4 Refer to Document 00 6100 – Bonds for additional information.

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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.~~located.

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. 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.~~**the rate of 1 percent APR per month.**

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13.8 OVERTIME WORK

13.8.1 Overtime Work as defined by Federal and State Statue required to complete the Work in the Contract Time shall be included in the Contract Sum and the Contractor shall work overtime as required to complete the Work within the Contract Time. The Contract Sum shall not be adjusted for overtime work required to complete the Work in the Contract Time.

13.8.2 The Owner may order, in writing, additional Overtime Work to be performed. The Owner shall bear costs of such Overtime Work and the Contact Sum shall be adjusted as provided in ARTICLE 7 - CHANGES IN THE WORK.

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.5 is adjudged bankrupt, or if he makes a general assignment for the benefit of his creditors, or if a receiver is appointed on account of his insolvency.

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15.1.3.1 The Contractor shall diligently and carefully research and study weather records for the Project Site for the purpose of determining the anticipated number of adverse weather days which may be

encountered during the progress of the Work. An adverse weather day is defined as a day for which the temperature falls below 32 degrees (32°) Fahrenheit or precipitation of 0.50 inches or more occurs. This data shall be included with any claim submitted under Clause 15.1.5.

15.1.3.2 Through submission of his bid, the Contractor warrants that his proposed Contract Time was prepared with full allowance for the anticipated number of adverse weather days.

15.1.3.2 Throughout the progress of the Work, the Contractor shall maintain accurate records on a calendar-day basis of actual adverse weather days, to include weekends and holidays. These records shall be included with any claim submitted under Subparagraph 15.1.2.

...

§ 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.

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

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

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

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~~**§ 15.3 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.~~

...

End of Document

Certification of Document's Authenticity

AIA® Document D401™ – 2003

I, Jay W. Boynton, AIA, Manager, hereby certify, to the best of my knowledge, information and belief, that I created the attached final document simultaneously with its associated Additions and Deletions Report and this certification at 13:30:01 on 12/17/2012 under Order No. 1825590006_1 from AIA Contract Documents software and that in preparing the attached final document I made no changes to the original text of AIA® Document A201™ – 2007, General Conditions of the Contract for Construction, as published by the AIA in its software, other than those additions and deletions shown in the associated Additions and Deletions Report.

_____

(Signed)

_____

(Title)

_____

(Dated)

DOCUMENT 00 7316

INSURANCE REQUIREMENTS

PART 1 GENERAL

1.1 SUMMARY

A. Document Includes:
1. Workers compensation insurance.
2. Preparation of Certificates of Insurance.
3. Contractor's general liability insurance.
4. Owner's liability insurance.
5. Property insurance.
6. Notice of cancellation.
7. Certificate of Insurance issued by Insurer or Insurer's Agency approved by the State of Oklahoma Insurance Department.

B. Related Documents and Sections:
1. The Contract Documents, as defined in Document 00 7213 - General Conditions and modifications thereto, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.
2. Document 00 5213 - Agreement-Stipulated Sum: Certificates of insurance as part of Agreement Package.
3. Section 0 1 7700 - Closeout Procedures: Contract Closeout Package.

1.2 DEFINITIONS

A. Broad Form Property Damage: An endorsement to a General Liability policy that deletes the exclusion referring to property in the care, custody, or control of the insured and replaces it with a less restrictive exclusion.

B. Builder's All-Risk (Builder's Risk) Property Insurance: Indemnifies for loss of or damage to a building under construction. Insurance is normally written for a specified amount on the building and applies only in the course of construction.

C. Independent Contractor's Protective (Owners and Contractors Protective Liability Insurance): Protects an insured against losses caused by the negligence of a contractor or subcontractor that Contractor hires.

D. Premises and Operations Liability Insurance: Liability coverage for exposures arising out of an insured's premises and business operations.

E. Products and Completed Operations Insurance: Liability coverage for an insured against claims arising out of products sold, manufactured, handled, or distributed, or operations which are complete. Claims are covered only after a product has been sold and possession relinquished, or operations have been completed or abandoned by the named insured.

F. Waivers of Subrogation: Named insured's intentional relinquishing of any right to recover damages from another party who may be responsible.

1.3 SUBMITTALS

A. Contractor Review of Certificates: Contractor shall review each Certificate of Insurance to verify that Contractor Insurance Provider has correctly provided all specified insurance coverage and the correct coverage amounts before submitting with the Agreement Package. If Contractor finds that Insurance Provider has submitted incomplete or incorrect Certificates of Insurance, Contractor shall immediately contact Insurance Provider, advise what items are incomplete or incorrect, and have Insurance Provider immediately issue corrected Certificates of Insurance.

B. Certificate Submittal: Submit three (3) fully executed Certificates of Insurance ACORD form 25-S, State Workers Compensation Insurance Certificate and Certificate of Insurance attached to the Agreement between Owner and Contractor as part of the Agreement Package as specified in Document 00 5213 - Agreement-Stipulated Sum.
   1. If Contractor Worker's Compensation Insurance is not included on ACORD 25-S Certificate of Insurance, Contractor shall provide a separate State Workers Compensation Insurance Certificate from a Workers Compensation Insurance company lawfully authorized to provide Workers Compensation Insurance in the State of Oklahoma.
   2. Worker's Compensation Insurance Certificate shall indicate that minimum of 30 days written Notification of Cancellation shall be provided to Owner. Ten (10) days written Notification of Cancellation not acceptable.

C. Certificate Form: Submit on form indicated in Document 00 7213 - General Conditions, Subparagraph 11.1.3.
   1. Attach Certificate of Insurance to each certificate.

D. Filing of Certified Policy Copies: Contractor shall file with the Owner, through the Architect, a certified copy of each policy that includes insurance coverages required by Document 00 7213 - General Conditions, Article 11.4 no later than the Date of Notice to Proceed.

E. Final Completion Submittal: Submit three (3) fully executed Certificates of Insurance on ACORD 25-S form with attached Certificate of Insurance to each certificate. Indicate Products and Completed Operations Insurance coverage for one (1) year from Date of Final Completion as part of the Contract Closeout Package specified in Section 01 7700 - Closeout Procedures.

1.4 INCOMPLETE OR INCORRECT CERTIFICATES OF INSURANCE

A. Incomplete Submittals: Processing will stop for Certificates of Insurance received by Architect that do not include all required items. Architect will contact Contractor and advise Contractor of missing items. Contractor is responsible for sending Architect items missing from the Certificates of Insurance. Processing on Certificates of Insurance related items will not start until Certificates of Insurance are complete.

B. Incorrect Submittals: Certificates of Insurance that are incorrectly submitted or have incorrect coverage will be returned to Contractor for correction.

C. Contractor is responsible for Certificates of Insurance related items being stopped due to submittal of incomplete or incorrect Certificates of Insurance.

1.5 PREPARATION OF CERTIFICATES OF INSURANCE

A. Upon receipt of Notice of Award of Contract, Contractor shall contact insurance provider to provide coverage as specified in this Document. Contractor shall send copies of the following to insurance provider so that insurance provider will know exactly what coverage is required.
   1. General Conditions Article 11 - Insurance and Bond
   2. Document 00 7316- Insurance Requirements.
   3. Three (3) copies of Certificate of Insurance issued by Insurer or Insurer's Agency approved by the State of Oklahoma Insurance Department.

B. Certificate Holder Box:
   1. List the Owner as the Certificate Holder on ACORD 25-S form.
   2. List the Owner as the Certificate Holder on separate Worker Compensation Insurance certificate form.
   3. Architect is not the Certificate Holder.

C. Description of Operations Box: Include the following in this box on ACORD 25-S form.
   1. List the Project Title and Project Address.
   2. Include Waiver of Subrogation text as follows "Waiver of Subrogation is provided in favor of the Architect, its consultants, separate contractors and the Owner, its sub-subcontractors, agents and employees."
   3. Any other descriptions or endorsements.

D. Coverages Box: Clearly indicate specified coverages on ACORD 25-S form by separately listing each coverage specified to allow Owner and Architect to quickly verify that all coverages and coverage amounts are included.
   1. General Liability Box: List the following as a line item indicating coverage is included.
      a. Premises-Operations
      b. Independent Contractor's Protective.
      c. Products and Completed Operations coverage for one (1) year from date of Final Payment.
      d. Broad Form Property Damage.
      e. Indicate coverage amounts in corresponding limits box for each item exactly as indicated in this Section:
         1) Bodily Injury.
         2) Property Damage.
         3) Property Damage Liability.
         4) Contractual Liability.
         5) Personal Injury.
         6) General Liability.
   2. Automobile Liability Box: List the following as a line item indicating coverage is included and coverage amounts in corresponding limits box for each item exactly as indicated in this Section.
      a. Bodily Injury Each Person.
      b. Bodily Injury Each Occurrence.
      c. Property Damage Each Occurrence.
   3. Workers Compensation and Employee Liability Box: List the following as a line item indicating coverage is included and coverage amounts in corresponding limits box for each item exactly as indicated in this Section or a separate certificate from a separate company providing Workers Compensation Insurance.
      a. Applicable Federal.
      b. Applicable State.
      c. Employer's Liability.

4. Other Box: List the following as a line item indicating coverage is included and coverage amounts in corresponding limits box.
    a. Builders All-Risk Insurance.

E. Certificate of Insurance issued by Insurer or Insurer's Agency approved by the State of Oklahoma Insurance Department defining and defining the following:
1. Certification shall include the following under General Liability:
    a. Include General Aggregate for Project.
    b. Coverages:
        1) Premises Operations.
        2) Explosion, Collapse, and Underground Hazards
        3) Personal Injury Coverage
        4) Products Coverage
        5) Completed Operations
        6) Contractual Coverage for the Insured's obligations
    c. Claims-Made Basis is not applicable.
2. Worker's Compensation is not applicable.
3. Final Payment Information:
    a. This Certificate shall not be furnished in connection with Contractor's request for final payment.
    b. Completed Operations coverage for Project shall continue for the balance of the policy period.
4. Termination Provisions: Each policy listed on Certification shall be endorsed to provide holder with 30 day notice of cancellation or termination.
5. Other Provisions: Insurance Provider may list any other insurance provisions applicable to Project. Coverages not listed in the General Liability heading can be listed under this heading.

1.6 WORKERS COMPENSATION INSURANCE

A. Refer to Document 00 7213 - General Conditions: Contractor shall purchase from and maintain in a company lawfully authorized to do business in jurisdiction in which the Project is located Workers Compensation Insurance with specified coverage amounts.

B. Coverage Amounts:
1. Applicable Federal: Statutory.
2. Applicable State: Statutory.
3. Employer's Liability: $500,000.

1.7 CONTRACTOR'S GENERAL LIABILITY INSURANCE

A. Refer to Document 00 7213 - General Conditions:. Contractor shall purchase from and maintain in a company lawfully authorized to do business in jurisdiction in which the Project is located General Liability Insurance with specified coverages and coverage amounts.

B. Coverage Includes:
1. Premises-Operations.
2. Independent Contractor's Protective.
3. Products and Completed Operations.
    a. Maintain coverage for one (1) year after final payment (extends beyond Contractor warranty period).
4. Broad Form Property Damage.
    a. Blasting or explosion.

b. Collapse of structural injury to any building or structure due to excavating, drilling, pile driving, coffer-dam or caisson work.
c. Moving, shoring, underpinning, razing, or demolition of any building or structure.
d. Removal or rebuilding of structural support of items indicated above while such operations are being performed by the Contractor.

C. Coverage Amounts:
1. Bodily Injury:
a. Each Occurrence: $500,000.
b. Aggregate: $1,000,000.
2. Property Damage:
a. Each Occurrence: $500,000.
b. Aggregate: $1,000,000.
3. Property Damage Liability, include for the following hazards:
a. X – Explosion.
b. C – Collapse.
c. U – Underground.
4. Contractual Liability (Hold Harmless Coverage):
a. Bodily Injury:
1) Each Occurrence: $1,000,000.
b. Property Damage:
1) Each Occurrence: $500,000.
2) Aggregate: $1,000,000.
5. Personal Injury (with Employment Exclusion deleted, if applicable):
a. Aggregate: $1,000,000.
6. General Liability:
a. If policy includes a General Aggregate:
1) Such General Aggregate shall be not less than $1,000,000.
2) Policy shall be endorsed to have General Aggregate apply to this project only.
7. Automobile Liability:
a. Bodily Injury Each Person: $1,000,000.
b. Bodily Injury Each Occurrence: (CSL) or its equivalent
c. Property Damage Each Occurrence: $500,000

1.8 OWNER'S LIABILITY INSURANCE

A. Refer to Document 00 7213 - General Conditions: Owner shall be responsible for purchasing and maintaining Owner's usual liability insurance.

1.9 PROPERTY INSURANCE - BUILDERS RISK

A. Refer to Document 00 7213 - General Conditions: Contractor shall purchase Property Insurance from and maintain in a company lawfully authorized to do business in jurisdiction where Project is located.

B. The Contractor shall purchase with the following modifications:
1. Upon all new Work at the site to the full insurable value thereof. This insurance shall include the interests of the Owner, the Contractor, Subcontractors and Sub-subcontractors in the Work and shall insure against the perils of fire, water and extended coverage and "ALL RISK" per General Conditions.
a. Coverage includes physical loss or damage including, without duplication of coverage, theft, vandalism, malicious mischief, collapse, earthquake, flood,

windstorm, false work, 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.

b. Insurance shall cover portions of Work stored off-site and also portions of Work in transit.

2. Insurance carried shall be in the amount of 100 percent of the contract cost plus 3 percent to cover additional cost (fees) incurred by the Architect.

C. Waivers of Subrogation: Refer to Document 00 7213 - General Conditions.

1.10 NOTICE OF CANCELLATION

A. All Certificates of Insurance, which are required by this Section shall be furnished by Contractor, shall include a minimum of 30 days Notice of Cancellation to be provided to the Owner clause.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF DOCUMENT

DOCUMENT 00 7375

FELONY COMPLIANCE

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. State Law criminal background requirements for all persons working on school premises.
2. Documentation of compliance submittals to Owner.
3. Felony and Sex Offenders Affidavit, located at end of Document (for use if School does not have a prepared form).

B. Related Documents:
1. The Contract Documents, as defined in Document 00 7213 - General Conditions and modifications thereto, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.

1.2 SUBMITTALS

A. Upon receipt of Notice of Award of Contract, contact School District Superintendent's Office to obtain copies of forms for certification of compliance with specified state law and School requirements and procedures for compliance with specified state law.
1. If School does not have a form, use form at end of this Document.

B. Certify to School District that all Contractor personnel, all subcontractor personnel and all personnel of suppliers or vendors entering school premises comply with specified state law regarding criminal background.

C. Submit completed certification of compliance documentation to School Superintendent before starting Work on school premises.

1.3 APPLICABLE OKLAHOMA STATE STATUTE

A. Effective March 12, 2009 persons (company, partnership, contractor, sub-contractor, service provider, vendor) shall be in compliance with *Oklahoma School Code,* Title 70-6-101.48.

B. No person or business having a contract with a school or school district to perform work on a full-time or part-time basis that would otherwise be performed by school district employees shall allow employee to work on school premises if the employee has been convicted in this state, the United States or another state of any felony offense unless not less than ten (10) years has elapsed since date of criminal conviction or employee has received a presidential or gubernatorial pardon for the criminal offense.

C. Every person or business performing services not subject to subsection A of this section on the property of a school or school district shall at the time of contracting be required to sign a statement declaring that no employee working on school premises under authority of the

business is currently registered or required to register under provisions of the Oklahoma Sex Offenders Registration Act or the Mary Rippy Violent Crime Offenders Registration Act.

1. Compliance with this statute shall be required of the person or private business, and there shall be no obligation placed upon a school district to ascertain the truthfulness of the affidavit.

D. A person or business having a written contract with a school or school district to perform work on a full-time or part-time basis that would otherwise be performed by school district employees may conduct a felony search of employees of the person or entity who would be assigned that work through a request to the State Board of Education in the same manner as a felony search is afforded school districts by Section 5-142 of this title.

1. Upon conviction for any violation of the provisions of this subsection, the violator shall be guilty of a misdemeanor and punished to the full extent of the law.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF DOCUMENT

FELONY AND SEX OFFENDERS AFFIDAVIT
Contractor

STATE OF OKLAHOMA)
)ss.
COUNTY OF_____)

The undersigned, under penalties of perjury, certifies to the **Canadian County** as follows:

1. The undersigned is the duly authorized representative of a business ("entity") having a contract with the District, to perform Work at _____ on a full time basis, which work would not otherwise be performed by District employees.

2. The undersigned hereby certifies that the undersigned will not allow any employee of the undersigned or of the entity, or of any subcontractor, to perform Work on District premises on a full-time basis that would otherwise be performed by District employees if such employee is convicted in the State, United States, or another state of any felony offence.

3. No employee of the undersigned, or entity, who performs any Work on District property is currently registered under the Oklahoma Sex Offenders Registration Act. or the Mary Rippy Violent Crime Offenders Registration Act.

4. The undersigned, or entity: _____ has or _____ has not conducted a felony record search of employees who would be assigned to work on a part-time or full-time basis on District property.

5. This Affidavit is intended to comply with Oklahoma State Statutes, Title 70, Section 6-101.48

6. It is our understanding that failure to comply with this affidavit will result in immediate cancellation of the contract with the District.

EXECUTED AND DELIVERED this _____ day of _____, 20___ .

_____
(company name)

BY: _____
(authorized signature)

Subscribed and sworn to before me this _____day of _____, 20___.

_____ Affix Seal
Notary Public

_____
My Commission expires:

FELONY AND SEX OFFENDERS AFFIDAVIT
Subcontractors

STATE OF OKLAHOMA)
)ss.
COUNTY OF_____)

The undersigned, under penalties of perjury, certifies to the **Canadian County** as follows:

1. The undersigned is the duly authorized representative of a business ("entity") having a contract with _____ , the General Contractor who has a contract with the District, to perform Work at _____ on a full time basis, which Work would not otherwise be performed by District employees.
2. The undersigned hereby certifies that the undersigned will not allow any employee of the undersigned or of the entity, or of any subcontractor, to perform Work on District premises on a full-time basis that would otherwise be performed by District employees if such employee is convicted in the State, United States, or another state of any felony offence.
3. No employee of the undersigned, or entity, who performs any Work on District property is currently registered under the Oklahoma Sex Offenders Registration Act. or the Mary Rippy Violent Crime Offenders Registration Act.
4. The undersigned, or entity: _____ has or _____ has not conducted a felony record search of employees who would be assigned to work on a part-time or full-time basis on District property.
5. This Affidavit is intended to comply with Oklahoma State Statutes, Title 70, Section 6-101.48.
6. It is our understanding that failure to comply with this affidavit will result in immediate cancellation of the contract with _____ .

EXECUTED AND DELIVERED this _____ day of _____, 20___ .

_____
(company name)

BY: _____
(authorized signature)

Subscribed and sworn to before me this _____day of _____, 20___.

_____ Affix Seal
Notary Public

_____
My Commission expires:

END OF NOTIFICATION

DETERMINATION AND EXTENSION OF CONTRACT TIME

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Procedures for determination and extension of Contract Time.

B. Related Documents:
1. The Contract Documents, as defined in Document 00 7213 - General Conditions and modifications thereto, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.
. Document 00 5213 - Agreement-Stipulated Sum: Article 3, Date of Commencement and Substantial Completion.

C. Related Sections:
1. Section 01 7700 - Closeout Procedures: Substantial Completion and Final Completion procedures.

1.2 REFERENCES

A. Oklahoma Department of Transportation (ODOT):
1. ODOT - State of Oklahoma Department of Transportation Standard Specification for Highway Construction, Subsection 108.07 - Determination and Extension of Contract Time.
2. Subsection 108.07 Link: http://fhwapap04.fhwa.dot.gov

1.3 DEFINITIONS

A. Contract Time: Defined in Document 00 7213 - General Conditions.

B. Excusable (Non-compensable Delay): Defined in ODOT, Subsection 108.07.a.

C. Normal Adverse Weather: Adverse weather which, regardless of its severity, is to be expected for that particular place at that particular time of the year. Refer to ODOT, Subsection 108.07, Table A.

D. Unusually Severe Weather: Defined in ODOT, Subsection 108.07.b.

E. Weather Related Conditions: Conditions persist as the result of Unusually Severe Weather that prevents the Contractor from conducting Work critical to the project schedule including, but not limited to, the following:
1 Conditions that prevent access to the Site or to the Work for trades critical to the project schedule.

1.4 EXTENSION OF TIME

A. Unusually Severe Weather: Extension of time for unusually severe weather will be determined on a monthly basis and will include only those actual adverse weather days in excess of the normal adverse weather days included in the Contract Time.

B. Compensable Delay: Contract time allowed for performance of the Work may be extended for delays caused by Owner and/or Architect. Compensation may be paid only when completion of the delayed Work element prevents that start of Work on a successive Work element and will adversely impact on Project completion. Float time in the scheduling of successive Work elements is a shared commodity and no compensation will be paid to the Contractor by the Owner for the use of float time.

C. Extension of Time: When found justified by the Architect, Contract Time will be extended by Change Order as specified in Document 00 7213 - General Conditions, Paragraph 8.3.
   1. Weather Related Conditions: Contractor may request an extension of Time within time limits defined by providing the following:
      a. Contractor immediately notifies the Owner and Architect in writing of Conditions and the critical Work affected.
      b. Contractor notifies Owner and Architect of anticipated delay(s) resulting from Conditions.
      c. Contractor identifies specific actions planned as well as actions being taken to compensate for Conditions.

1.5 ACTUAL ADVERSE WEATHER DAYS

A. ODOT Field Division: This project is located in **LINCOLN County** which is in **ODOT Field Division 3.**

B. Actual Adverse Weather days are those days meeting one or more of the criteria 1, 2 3 or 4 identified in ODOT, Subsection108.07.b.

C. Time extensions for days meeting more than one criterion will take into consideration only that criterion having the greatest impact.

D. Those actual adverse weather days covered by criteria 1, 2 or 3 that are in excess of the days in ODOT, Subsection 108.07, Table A will be allowed without regard to when they occur (except prior to mobilization or during suspension for other reasons) or their impact on Contract completion.

E. Those actual adverse weather days covered by criterion four (4) will be subject to the limitations noted.

1.6 NORMAL ADVERSE WEATHER DAYS BY ODOT DIVISION - TABLE A

A. The normal adverse weather days included in the Contract time are based on historical records of temperature and precipitation for the eight ODOT Field Divisions as indicated in Table A.

B. Refer to ODOT, Subsection 108.07 for Table A data for normal adverse weather days included in Contract Time for January through December for each ODOT Field Division.

1. 7 NOTIFICATION OF DELAY

A. Within five (5) calendar days of the occurrence of a delay to the prosecution of the Work, the Contractor shall notify the Architect in writing of such a delay and indicated that a request for delay consideration will be filed with the Architect.

B. In the case of Weather Related Conditions, notification shall include digital photographs of the Condition preventing Work in addition to the following:
   1. Detailed explanation of anticipated related damages, if any.
   2. Trades affected by the delay.
   3. Current construction schedule with critical trades identified.

1.8 PROCEDURES FOLLOWING NOTIFICATION OF DELAY

A. After notifying the Architect of the request for delay consideration, the Contractor shall deep daily records of all non-salaried labor, material costs, and equipment expenses for all operations that are affected by the delay.

B. The Contractor shall maintain a daily record of each operation affected by the delay and the location of the operations affected. Contractor shall also prepare and submit written reports to the Architect containing the following information each Monday:
   1. Number of days behind schedule.
   2. A summary of all operations that have been delayed, or will be delayed.
   3. In the case of compensable delay, the Contractor shall explain how the Architect's and/or Owner's act or omission delay each operation, and estimate the amount of time required to complete the Project.

C. Delay costs allegedly incurred prior to notifying the Architect that operations have been delayed will not be permitted.

1.9 PROCEDURES FOLLOWING COMPLETION OF WORK ALLEGED TO BE DELAYED

A. Within (15) calendar days of Substantial Completion, or phase of Work allegedly delayed, the Contractor shall submit a report to the Architect containing the following information:
   1. A description of the operations that were delayed and the documentation and explanation of the reason for the delay, including all reports prepared for the Contractor by consultants, if utilized.
   2. Chart or other graphic depiction of how the operations were delayed.
   3. An item by item measurement and explanation of extra costs requested for reimbursement due to the delay.

B. The Architect will review the data contained in the Contractor's report and the Project Field Superintendent's daily project log, records and inspection reports available.

C. A written decision of the Architect will be issued to the Contractor which will contain notification of any additional time which may be approved.

D. In the case of compensable delays, if the Architect determines that the Architect and/or Owner is responsible for delays to the Contractor's operation, the Architect's written decision will identify the nature and extent of any delay and the compensation which may be due to the Contractor.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF DOCUMENT

SALES TAX EXEMPTION / DESIGNATION OF PURCHASING AGENT

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Sales tax exemption notification.
2. Contractor procedure for obtaining sales tax exemption.
3. Procedure for purchases.
4. Sales Tax Agency Agreement located at end of Document.

B. Related Documents:
1. The Contract Documents, as defined in Document 00 7213 - General Conditions and modifications thereto, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.

1.2 SALES TAX EXEMPTION NOTIFICATION (68 OS 1356)

A. State and Municipal sales tax shall not be included in Bids submitted for tangible personal property required for this Project in accordance with 68 OS 1356 of the Oklahoma Statutes that reads in summary as follows:
1. In order to qualify for any exemption authorized by Section 1356 of Title 60 of the Oklahoma Statutes, at the time of sale, the person to whom the sale is made may be required to furnish the vendor proof of eligibility for such exemption.
2. All vendors shall honor the proof of eligibility for sales tax exemption as authorized by this section and sales to a person providing such proof shall be exempt from the tax levied.
3. There are hereby specifically exempted from the tax levied:
   a. Sale of tangible personal property to any public school district or to any person with whom the public school district has duly entered into a public contract. Any person making purchases on behalf of such subdivision or agency of this state shall certify, in writing, on the copy of the invoice or sales ticket to be retained by the vendor that the purchases are made for and on behalf of such public school district and set out the name of such public school district.
   b. Sales of tangible personal property to a public school district pursuant to a lease-purchase agreement executed between the vendor and public school district.

B. All contracts with Subcontractors shall include the following provision:

"All tangible personal property and materials are being purchased by Contractor or Subcontractor for and on behalf of the School District and title to the materials and property shall pass directly from the vendor to the School District."

C. All tangible personal property sold or leased direct to School District by vendor is exempt from State and Municipal sales tax.

D. Contractor shall be responsible for care and safekeeping of all tangible personal property delivered to Project Site, even though title to property has passed to School District. This shall include responsibility to properly secure tangible personal property, to replace any tangible personal property lost or stolen or which, through any means disappears from the Project Site, and further the obligation to pay any deductible required to be paid under any insurance policy that may cover the loss if such insurance is in effect, and the responsibility to meet any requirements imposed by insurance company carrying insurance on property insofar as the care, safekeeping and protection of the property is concerned.

E. The Contractor, upon award of Contract, shall prepare the attached Sales Tax Agency Agreement form, or other agreement form for this purpose provided by the School District, and contact the School District to obtain signatures and execute the Agreement. The attached Sales Tax Agency Agreement authorizes Contractor to be Purchasing Agent for the School District on the Project.

1.3 CONTRACTOR PROCEDURE FOR OBTAINING SALES TAX EXEMPTION

A. Obtaining execution of the Sales Tax Agency Agreement at the start of Project is entirely the responsibility of the Contractor. Contractor shall make all arrangements with School District for executing the Sales Tax Agency Agreement.

B. Contractor shall obtain original signed copies of the executed Sales Tax Agency Agreement in the number necessary for identifying Subcontractor and Sub-subcontractor that will be eligible for Sales Tax Exemption for this Project.

C. Contractor may bring Sales Tax Agency Agreement to the Pre-Construction Meeting to obtain School District Signature and execute Agreement. Contractor shall contact School District and make prior arrangements with School District. Architect does not prepare forms or obtain signatures for Contractor.

D. After execution of the Sales Tax Agency Agreement, Contractor forwards executed Agreement along with cover letter on Contractor Letterhead, indicating that Subcontractor or Sub-subcontractor are authorized by Contractor to purchase material and equipment for the Project as a part of their subcontract, to the appropriate Subcontractors and Sub-subcontractors, as necessary, for their use.

1.5 PROCEDURE FOR PURCHASES

A. Contractor, Subcontractor or Sub-subcontractor identifies themselves to vendor Contractor, Subcontractor, or Sub-Subcontractor is making purchase of tangible personal property from as a Designated Purchasing Agent pursuant to a contract for construction of this Project with the School District.

B. Contractor, Subcontractor or Sub-Subcontractor provides a copy of an original signed and executed Sales Tax Agency Agreement to vendor upon request.

C. Contractor, Subcontractor or Sub-subcontractor certifies, in writing, on copy of invoice or sales ticket retained by vendor that purchases are made for and on behalf of School District as specified in the executed Sales Tax Agency Agreement.

D. In order for any individual invoice from vendor to qualify for tax exemption, it shall reflect upon it's face, the following:

1. The purchase order was submitted by Contractor as agent for School District, not by Contractor individually.
2. The Project Site where material and equipment was delivered and that material and equipment was, in fact, delivered to Project Site belonging to School District.
3. That from a description of building material or equipment same as appears on purchase order, it is clearly evident that such material and equipment became a part of the construction of the Project.
4. Title to such material and equipment passed from vendor directly to School District.

1.6 PREPARATION, MAINTENANCE AND SUBMITTAL OF RECORD OF PURCHASE ORDERS

A. Contractor, each Subcontractor and each Sub-subcontractor shall maintain a record for all purchase orders issued under this tax exemption and be prepared to provide a current accurate copy of record to School District upon request at any time.

B. The purpose of maintaining and submitting a Purchase Order Record is for School District records to monitor Contractor tax exempt expenditures and to assure expenditures were in accordance with Oklahoma Statute 68 OS 1356 should a question arise.

C. Each Subcontractor and each Sub-subcontractor shall submit a complete accurate record for each purchase orders issued under this tax exemption by Subcontractor and Sub-subcontractor to Contractor at a date designated by Contractor before Substantial Completion. Sub-subcontractors shall submit their purchase order record to Contractor through their respective Sub-subcontractor.

D. Contractor, Subcontractor and Sub-subcontractor shall maintain copies of all purchase orders and their corresponding vendor invoices for the Project and be prepared to provide copies of the purchase orders and vendor invoices upon request of the Owner.

E. Contractor shall submit complete accurate Purchase Order Record as a Closeout Submittal. Refer to Section 01 7700 - Closeout Procedures and Section 01 7800 - Closeout Submittals.

1.7 DESIGNATION OF PURCHASING AGENT FOR OWNER

A. Sales Tax Agency Agreement form follows. Contractor and Owner shall execute this Agreement at the start of the Project.

B. Text of Sales Tax Agency Agreement is suggested by Oklahoma State Department of Education in their 2004 publication "The ABC's of Building a School." Individual School Districts may choose to use different agreement text or a different agreement form altogether. Verify with School District.

C. All signatures on Sales Tax Agency Agreement shall be in Blue Ink to clearly identify Agreement as an original signed document.

END OF DOCUMENT

SALES TAX AGENCY AGREEMENT

This is an Agency Agreement made and entered into as of the _____ day of _____, 20__ , between **CANADIAN COUNTY, OKLAHOMA**, a political subdivision of the State of Oklahoma (hereinafter referred to as "Owner"), and _____ (hereinafter referred to as "Contractor").

RECITALS:

1. Owner has solicited bids for the construction of Canadian County Administration Building Reroof and HVAC Renovation in **CANADIAN County, Oklahoma**; and such facilities as are necessary and appropriate for the operation thereof; which Project, on or before completion shall be owned by the Owner.

2. Contractor has been awarded the contract for construction of the Project.

3. Owner desires to purchase all materials, supplies, and equipment for the Project in its own name and to take immediate title to all materials, supplies, and equipment, and to have Contractor, as General Contractor for the Project, perform portions of such purchasing duties.

NOW THEREFORE, in consideration of the premises and in order to constitute and appoint Contractor as agent of Owner for the purchase of equipment and materials for the Project,
IT IS AGREED AS FOLLOWS:

1. Owner, as Principal, hereby constitutes and appoints Contractor as Owner's Agent, for it and in its name, to acquire materials and equipment for use in constructing the Project.

2. Title to all materials and equipment purchased by Contractor, Subcontractors or Sub-subcontractors as agent for Owner will pass directly from the seller thereof to Owner.

3. Contractor acknowledges that it is an agent for Owner and agrees to act as agent for Owner in connection with the acquisition of materials and equipment for the Project in the manner above described.

4. The relationship of principal and agent created by this Agreement shall continue until terminated by either party by notice in writing to the other. The parties hereto agree that all sellers or vendors of materials and equipment for the Project shall be entitled to rely upon the existence of the Agreement until they have received written notice of revocation.

5. Contractor agrees that it will not purchase any material or equipment pursuant ot this Agreement except that authorized and intended for inclusion in the Project.

6. In executing purchase orders for equipment and materials for the Project, Contractor, Subcontractors and Sub-subcontractors shall include in each purchase order a statement, to be approved as to form by Owner, that Contractor is acting as Owner's Agent, individually and without power of re-designation, for the purchase of the equipment and materials covered by the purchase order.

7. All equipment and materials purchased by Contractor under this Agreement shall be delivered to Owner at the Project job-site.

8. Only equipment and materials to be incorporated in the Project shall be purchased by Contractor as Owner's agent under this Agreement and not equipment and materials will be

purchased except the items required by the Contract Documents for the Project. Contractor will not purchase, as agent hereunder, any equipment or materials to be used only incidentally in connection with the Project. Nothing contained herein shall alter the obligation and responsibility of Contractor under the contract between Owner and Contractor for the construction of the Project.

9. All reimbursement by Owner to Contractor for materials and equipment purchased by Contractor as Owner's agent hereunder shall be deemed to be a part payment on the Project Contract Sum.

10. Contractor shall not be entitled to any compensation for its services as Owner's agent hereunder.

11. Contractor will maintain a complete accurate current register or record of each purchase order issued by Contractor, each Subcontractor and each Sub-subcontractor for materials and equipment purchased by Contractor as Owner's agent hereunder for the Project and shall submit a copy of the complete accurate register and record for Contractor, each Subcontractor, and each Sub-subcontractor as a Closeout Submittal as specified in the Contract Documents.

IN WITNESS WHEREOF, the parties have executed this Agency Agreement as of the date first above written.

CANADIAN COUNTY, OKLAHOMA

ATTEST:

_____ By _____
Clerk County Commissioner Chairman

(SEAL)

ATTEST: _____
Contractor Full Corporate Name

_____ By _____
Secretary President

SUMMARY

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Definitions.
2. Contract description.
3. Work covered by Contract Documents.
4. Review of Contract Documents and field conditions by Contractor.
5. Post Bid and Post Notice-to-Proceed Contractor Submittals and Actions.
6. Construction documents issued to Contractor.
7. Work by Owner.
8. Contractor use of site and premises.
9. Work sequence.
10. Owner occupancy.
11. Codes and standards.
12. Permits and inspections by Authority Having Jurisdiction.
13. Safety.
14. Project management and project coordination.
15. Contractor quality control and Contractor test and inspection reports.
16. Color samples for selection.
17. Specification format and content.
18. Drawing format and content.
19. Availability of and obtaining standard forms.

B. Related Documents:
1. The Contract Documents, as defined in Document 00 7213 - General Conditions and modifications thereto, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.
2. Document 00 5213 - Agreement-Stipulated Sum: Contract requirements.

C. Related Sections:
1. Section 01 2600 - Contract Modification Procedures: Contract adjustments.
2. Section 01 2973 - Schedule of Values: Requirements for preparation and submittal of Schedule of Values.
3. Section 01 4200 - References: Definitions.
4. Section 01 6200 - Product Options: CSI Form 1.5A.

1.2 DEFINITIONS

A. Refer to Document 00 7213 - General Conditions and Section 01 4200 - References for definitions.

1.3 CONTRACT DESCRIPTION

A. Contract Type: Multiple prime contracts based on a Stipulated Price as described in Document 00 5213 - Agreement-Stipulated Sum.

1.4 WORK COVERED BY CONTRACT DOCUMENTS

A. The Contract Documents are directed to the Contractor. The Contractor shall fully execute the Work described in the Contract Documents, except to the extent specifically indicated in the Contract Documents to be the responsibility of others. Refer to Article 2 of Document 00 5213 - Agreement-Stipulated Sum.

B. Provide and pay for all materials, labor, services, equipment, licenses, permits, taxes and other items necessary for the execution, installation and completion of Work indicated in Contract Documents.

C. Description of Work:

Bid Package - A

- Remove and replace existing EPDM roofing system with new 60 mil. TPO w/ new rigid insulation and tapered insulation

Bid Package - B

- Replace existing fan coil units.
- Existing 2 pipe system will be modified to a 4 pipe system.
- New outside air units will be provided to condition outside air.
- Pumps and piping will be modified to convert system to 4 pipe.
- Some piping will need to be replaced.
- Existing chiller and boilers will remain.
- A new building automation system will be added.
- Provide 2-new additional roof drains and drain pipes
- Provide structural support for 2- MAU where required.
- Construct mechanical chests where required.
- Remove and replace existing ceiling panels as required. Replace with new where damages occur.

D. Work Location: Canadian County Administration Building
200 N. Choctaw Avenue
El Reno, Oklahoma 73036

1.5 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

A. Contractor shall thoroughly and completely field investigate, measure, and verify all existing site and building conditions and compare with Contract Documents.

B. All existing conditions and measurements shall be indicated on Contractor's Shop Drawings and Submittals to Architect for review.

C. Document 00 2113 - Instructions to Bidders:

D. Document 00 7213 – General Conditions:

1.6 POST BID AND POST NOTICE-TO-PROCEED CONTRACTOR SUBMITTALS AND ACTIONS

A. Post Bid Submittals: Contractor shall submit the following to Architect, in writing, within five (5) calendar days from date of Notice-of-Award of Contract as specified in Document 00 2113 - Instructions to Bidders.
   1. Work to Be Performed by Contractor:
      a. Provide designation of Work to be performed by Contractor's own forces.
      b. Submit on Contractor letterhead, signed by Contractor.
   2. Subcontractors and Major Suppliers List: Provide names of manufacturers, products, and suppliers of principal items or systems of materials and equipment proposed for Work.
      a. Submit on Major Subcontractors and Major Material Suppliers List CSI Form 1.5A located at end of Section 01 6200 - Product Options.
      b. Architect and Owner will review Subcontractor List to determine if Architect or Owner have objection to a Subcontractor.
      c. Before execution of Agreement Between Owner and Contractor, Architect will notify Bidder in writing if either Owner or Architect have objection to a Subcontractor.
         1) If Owner and Architect object to a Subcontractor, Bidder may either (1) withdraw Bid or (2) submit an acceptable substitute Subcontractor with an adjustment in Base Bid or Alternate Bid to cover difference in cost of Subcontractor substitution.
         2) Owner may accept adjusted Base Bid or disqualify Bidder.
         3) In these cases Bid Security will not be forfeited.
      d. If Contractor fails to submit Major Subcontractors and Major Suppliers List before execution of Agreement Between Owner and Contractor and subsequently submits list after execution of Agreement Between Owner and Contractor and Owner or Architect have objection to a Subcontractor, Contractor shall submit a substitute Subcontractor acceptable to Owner and Architect with no adjustment in Contract Sum. The responsibility for results of Contractor failure to comply with Bidding Document requirements and the subsequent results rest entirely with Contractor.
   3. Names of Persons or Entities proposed for the principal portions of Work.
      a. Submit on Contractor Letterhead, signed by Contractor.

B. Post Notice-To-Proceed Submittals: Contractor shall submit the following to Architect within 10 days from date of Notice-to-Proceed.
   1. Schedule of Values: Submit a Schedule of Values as specified in Section 01 2973 - Schedule of Values.
      a. Submit three (3) copies on AIA Form G703 - Application and Certificate for Payment Continuation Sheet itemizing all Contract costs.
      b. Provide Material and Labor individual Section Breakdown for Sections listed in Section 01 2973 - Schedule of Values
   2. Construction Schedule: Submit a Construction Schedule as specified in Section 01 3216 - Construction Progress Schedule.
   3. Schedule of Submittals: Submit a Schedule of Submittals as specified in Section 01 3300 - Submittal Procedures.
      a. Review entire Project Manual to determine what each Document or Section requires to be submitted.
      b. List all items that require submittal for review by Architect and date Contractor anticipates submittal being transmitted to Architect.

c. Indicate type of submittal; product data, shop drawing, sample, certificate, or other submittal.

C. Requests for Substitutions: Submit requests for substitutions as specified in Section 01 6213 - Product Substitution Procedures.
1. Submit proposed substitutions to Architect maximum 60 days after date of Notice to Proceed.
2. Requests received after 60 days after date of Notice to Proceed may be considered or rejected at the discretion of the Architect.

D. Contractor Mobilization: shall be in place no later than (10) days after date of Notice to Proceed.
1. Provide Construction Fence around designated staging area.

E. Failure of Contractor to submit complete and accurate Post Bid and Post Notice-to-Proceed submittal within specified time and/or failure to commence Contractor Mobilization within specified time will cause processing of Contractor Payment Request Packages to stop. Payment processing will not start until all Post Bid and Post Notice-to-Proceed submittals have be submitted, reviewed and accepted by Architect and/or Contractor Mobilization requirements have been completed and in place.

1.7 CONSTRUCTION DOCUMENTS ISSUED TO CONTRACTOR

A. After the bids are received and Award of Contract, electronic copies of the Contract Documents will be made available to the successful Contractor for Contractor's use during the progress of the Work.
1. Owner will not provide printed copies of Contract Documents for Contractor's use.
2. Contractor may purchase printed copies Contract Documents from the Reproduction Vendor at cost determined by Vendor.

1.8 CONTRACTOR'S USE OF SITE AND PREMISES

A. Construction Operations: Limited to areas permitted by law, ordinances, permits and as indicated on Drawings.

B. Arrange use of site and premises to allow:
1. Owner occupancy.
2. Work by others.

C. Coordinate use of site and premises with Owner or Owner's Representative. Refer to Document 00 7213 - General Conditions, Article 6 "Construction by Owner or by Separate Contractors" for requirements and procedures for Contractor conduct and mutual responsibility where separate contractors are working on the same or adjacent project sites.

D. Limited construction vehicle access and construction parking during Owner's hours of operation. Construction vehicle access and contractor parking will be as directed by Owner.

E. Provide temporary construction fence around storage and staging areas. Exact location of fence will be as directed by Owner.

F. Assume full responsibility for protection and safekeeping of Products under this Contract, stored on site.

G. Move any stored Products, under Contractor's control, which interfere with operations of Owner or separate contractor.
   1. Existing building spaces may not be used for storage.

H. Obtain and pay for the use of additional storage or work areas needed for operations.

I. Emergency Building Exits during Construction: Keep all exits required by code open during construction period.

J. Enforce requirements of Contract Documents regarding signs, advertisements and fires for Subcontractors, Sub-subcontractors, Material Suppliers and other entities involved in Work. No signs permitted other than project identification sign specified in Section 01 5800 - Project Identification.

K. If Project Site has existing Owner facilities, or Owner has existing facilities on an adjacent site, the following requirements apply.
   1. Use of existing facilities by Contractor, all Subcontractors, Sub-subcontractors, Material Suppliers and all other entities and workers involved in Work, are not permitted to use existing facilities on site including, but shall not be limited to, restroom facilities, parking lots, telephones, snack bars and dining facilities, recreation facilities, television facilities and all utilities unless specifically allowed by written agreement with Owner.
   2. Entry into existing facilities not permitted unless such entry is necessary for completion of Work.
   3. If Work requires that certain operations be performed in Owner existing facilities, all operations shall be scheduled to minimize interruptions in operations of Owner. Notify Owner in advance of dates and times when work is scheduled in Owner's existing facilities.
   4. If Work requires interruption of utilities servicing existing facilities or operations of Owner, the following requirements apply.
      a. Notify Owner, or Owner's Representative, minimum Two (2) days before the planned date for utility interruption.
      b. Obtain approval for utility interruption from Owner, or Owner's Representative, 24 hours before scheduled utility interruption. If scheduled utility interruption is delayed, postponed or rescheduled, immediately notify Owner, or Owner's Representative.
      c. During the utility interruption, maintain communications with Owner, or Owner's Representative, and report progress of Work. If delay in completing utility interruption occurs during utility interruption, immediately notify Owner, or Owner's Representative, and notify of revised schedule for completion of utility interruption.
      d. Notify Owner, or Owner's Representative, immediately when utility is returned to full operation.
      e. Schedule utility interruptions to minimize inconvenience to Owner or Owner's operations. Owner may require that interruption occur after business hours, in the evening, at night, or on weekends or holidays.

L. Keep Project Site free from accumulations of waste materials or rubbish. At periodic intervals determined by progress of Work, remove waste and rubbish from Project Site. At completion of Project, remove all waste, rubbish, temporary facilities, project signs, tools, equipment, machinery, materials and all other Contractor items.

M. DO NOT INTERRUPT OWNER FACILITY OPERATIONS. Work under this Contract that will interrupt or impede the daily operation of Owner Facilities must be scheduled outside of Owner Facility operation hours. Discuss and obtain Owner Representative approval for work that may interrupt Owner Facility operations in advance at Contractor and Owner Progress Meeting.

1.9 WORK SEQUENCE

A. Construct Work continuously from Notice to Proceed until Substantial Completion.

B. Construct Work and have Work Substantially Complete and ready for Substantial Completion Inspection on or before the Date of Substantial Completion established in the Notice to Proceed.
   1. Submit all Contract Closeout Package items within two (2) weeks of Substantial Completion Inspection.

C. Complete all Substantial Completion Inspection punchlist items ready for Final Completion Inspection no later than 30 days after date of Substantial Completion Inspection.

D. Contract Time delays are not permitted except as specified in Section 00 7385 - Determination and Extension of Contract Time.

1.10 OWNER OCCUPANCY

A. Owner will occupy Project Site during the entire period of construction for the conduct of normal operations.

B. Cooperate with Owner's Representative to minimize conflict, and to facilitate Owner's operations.

C. Schedule Work to accommodate Owner occupancy.

1.11 CODES AND STANDARDS

A. All products, materials and construction quality shall comply with all applicable codes, specifications, local ordinances, industry standards and utility company regulations. In no case shall work, products, or materials of a lower quality to those specified be provided in this Project, even if permitted by code.

B. In cases of difference between building codes, specifications, state laws, local ordinances, industry standards, and utility company regulations and Contract Documents, the most stringent shall govern.

C. Non-Compliance: If Contractor performs work that does not comply with requirements of applicable building codes, state laws, local ordinances, industry standards, and utility regulations, Contractor shall bear all costs arising in correcting deficiencies.

1.12 PERMITS AND INSPECTIONS BY LOCAL AUTHORITY HAVING JURISDICTION

A. Refer to Document 00 3143 - Permit Application for permitting requirements.

B. Contractor is responsible for scheduling inspections. Any delay in Project caused by Contractor failing to schedule or pass inspections is Contractor's responsibility.

C. Inspections by Local Authority Having Jurisdiction:
   1. Do not enclose or cover any items required to be inspected by Authority Having Jurisdiction until they are inspected and approved by Authority Having Jurisdiction.
   2. If Project does not have an Authority Having Jurisdiction, contact Architect and Engineer (if applicable) minimum three (3) days before Work is ready for inspection or tests.
   3. Notify Authority Having Jurisdiction minimum number of days in advance of inspection as required by Authority Having Jurisdiction to schedule inspection. Verify with Authority Having Jurisdiction representative.
   4. Reinspections: Whenever inspection finds that inspected item does not pass, make required corrections and schedule a re-inspection.
   5. Reports: Prepare and submit inspection reports indicating results of inspections made as specified in Section 01 4500 - Quality Control.

1.13 SAFETY

A. Refer to Document 00 7213 – General Conditions.

B. Conduct all operations and all aspects of Work in safest possible manner. Comply with all Federal, State and Local Law and Regulations and accepted safe practices for use and storage of flammable, hazardous, toxic and dangerous materials, products or techniques and the health and safety of all Workers.
   1. Take extra precautions to insure safety of all occupants when Work requires entry into existing facilities of Owner.
   2. All fines levied for non-compliance shall be paid by Contractor.

C. Perform all work in conformance with Occupational Safety and Health Administration regulations contained in U.S. Department of Labor, Standard 29 CFR, Part 1926 “Safety and Health Regulations for Construction”

D. Contractor shall develop, implement and enforce a Contractor Site Safety Program in conformance with requirements of "Manual of Accident Prevention in Construction" published by Associated General Contractors of America.

E. Subcontractor Superintendents or Foremen: Each Subcontractor shall have a Superintendent or Foreman at Project site that is proficient in speaking the American English Language at all times when that Subcontractor’s workers are working at Project Site. This is a site safety issue and requires clear communication between all persons at Project Site.
   1. It is the responsibility of the Contractor’s Project Field Superintendent to check for compliance by each Subcontractor on-site periodically each workday.
   2. Contractor Project Field Superintendent shall note in Project Field Superintendent’s Daily Log each Subcontractor’s compliance or non-compliance with this requirement and corrective measure instructions given by Contractor Project Field Superintendent to Subcontractor.

1.14 CONTRACTOR QUALITY CONTROL AND CONTRACTOR TEST AND INSPECTION REPORTS

A. Refer to Section 01 4500 - Quality Control.

B. Contractor shall maintain quality control over Contractor personnel, subcontractors, sub-subcontractors, suppliers, manufacturers, products, services, site conditions and workmanship to produce Work of specified quality.

C. Contractor shall inspect all Work and perform all Tests and Inspections specified in each individual Specification Section and prepare Contractor Test and Inspection Reports for each test and inspection made and forward to Architect.

D. Contractor shall continuously inspect Work performed by Contractor personnel, subcontractors and sub-sub-contractors and maintain a Non-Compliance Check-Off List for Work that does not comply with Contract Documents.

1.15 COLOR SAMPLES FOR SELECTION

A. If color selections are required, those color selections for finish materials will be made by Architect from the range of manufacturer's standard color samples submitted to Architect by material manufacturers through Contractor as specified in Specification Section 01 3300 - Submittal Procedures.

B. Failure of Contractor to submit samples within specified time will delay payment application processing until all samples are received.

C. Submit all color samples for selection of finish colors within 14 days after date of Notice to Proceed. Approved samples may be returned in the form of a Color Board or Material Selection Notebook. Maintain approved finish color selections at Project Site.

1.16 SPECIFICATION FORMAT AND CONTENT

A. Refer to Document 00 7213 – General Conditions.

B. Specification Format: Specifications are organized into Divisions and Sections based on Construction Specifications Institute (CSI) MasterFormat numbering system.
   1. Specifications may be written in an abbreviated, or streamline outline, format and may include incomplete sentences. The omission of modifying words or phrases such as "the Contractor shall", "in conformity therewith", "shall be", "as noted on the Drawings", "a", "the", "an", and "all" are intentional. Any such omitted word or phrase shall be supplied by inference in the same manner as they are in Drawing notes. The fact that any such word or phrase is present in one statement but is absent from another shall be interpreted to have no meaning and shall be without effect on interpretations of the Contract Documents.
   2. Titles to Divisions, Sections and Paragraphs in the Specifications are intended for convenience only and shall not be deemed to be a complete and correct list, or complete segregation, of the various portions of the Work. Neither Owner nor Architect assume responsibility, either direct or implied, for omissions or duplications by the Contractor, or by any Subcontractor, Sub-subcontractor or Material Supplier, or any other entity, based upon the arrangement of the Specifications.

C. Specification Content: This Specification uses certain conventions in use of language and intended meaning of certain terms, words, and phrases when used in particular situations or circumstances. These conventions are explained as follows:

1. Abbreviated Language: Language used in Specifications and other Contract Documents is abbreviated type. Words and meanings shall be interpreted as appropriate. Words that are implied, but not stated shall be interpolated as the sense required. Singular words will be interpreted as plural and plural words interpreted as singular where applicable and context of Contract Documents so indicates.
2. Imperative and streamlined language is used generally in Specifications. Requirements expressed in imperative mood are to be performed by Contractor. At certain locations in text, for clarity, subjective language is used to describe responsibilities that must be fulfilled indirectly by Contractor, or by others when so noted.
    a. The words "shall be" shall be included by inference wherever a colon (:) is used within a sentence or phrase.

1.17 DRAWING FORMAT AND CONTENT

A. Division of Drawings into numbered or lettered groupings is intended for convenience only and shall not be deemed to be a complete and correct list, or complete segregation, of the various portions of Work. Owner and Architect do not assume responsibility, either direct or implied, for omissions or duplications by Contractor, or by any Subcontractor, Sub-subcontractor or Material Supplier, or any other entity, based upon arrangement of Drawings.
    1. Drawings have been divided into groupings based upon the general class of the various portions of the Work.
    2. Through submission of bid, Contractor attests and warrants that Contractor and Subcontractors, Sub-subcontractors, Material Suppliers and other entities proposed to perform portions of Work have diligently and carefully studied Drawings and other Contract Documents and have fully compared requirements of the Contract Documents taken as a whole with requirements of a specific Drawing or grouping of Drawings.

B. The following subparagraph shall be included by reference as a note on each and every Drawing and shall have the same effect as if it had actually been written thereon.
    1. Other Drawings, to include Drawings in different groupings, may contain requirements which may seriously impact that portion of the Work described hereon. Examine and carefully study all of the Contract Documents.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01 2300

ALTERNATES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Alternate submission procedures.
2. Schedule of Alternates.

B. Related Documents:
1. The Contract Documents, as defined in Document 00 7213 - General Conditions and modifications thereto, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.
2. Document 00 2113 - Instructions to Bidders: Bidding requirements for alternates.
3. Document 00 5213 - Agreement-Stipulated Sum: Alternates.

C. Related Sections:
1. Section 01 3216 - Construction Progress Schedule: Work schedule affected by Alternates.
2. Section 01 6200 - Product Options: Product options and substitutions.

1.2 DEFINITIONS

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

1.3 SUBMISSION REQUIREMENTS

A. Each bidder shall submit bid on all alternates.

B. Alternates quoted on Bid Forms will be reviewed and accepted or rejected at Owner's option. Accepted alternates will be identified in Document 00 5213 - Agreement-Stipulated Sum.

C. Coordinate related work and modify surrounding work to integrate Work of each alternate.
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 mentioned as part of Alternate.

1.4 SCHEDULE OF ALTERNATES

BASE BID PACKAGE - A

ALTERNATE NO. 1: (Bid package – A)

Include 2" diameter hail damage coverage to the required twenty (20) years No Dollar amount Limit (NDL) warranty.

BASE BID PACKAGE – B **(n/a)**

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01 2600

CONTRACT MODIFICATION PROCEDURES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Documentation of change in Contract Sum/Price and Contract Time.
2. Architect's Supplementary Instructions.
3. Proposal Request.
4. Construction Change Directive.
5. Contractor Change Order Request.
6. Stipulated sum Change Order.
7. Time and material Change Order.
8. Permitted costs used for Change Orders.
9. Contractor overhead, profit, bonds and insurance used for Change Orders.
10. Execution of Change Orders.
11. Correlation of Contractor submittals.
12. CSI Form 13.6A - Change Order Request (Proposal).
13. CSI Form 13.6D - Proposal Worksheet Summary.
14. CSI Form 13.6C - Proposal Worksheet Detail.

B. Related Documents:
1. The Contract Documents, as defined in Document 00 7213 - General Conditions and modifications thereto, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.

C. Related Sections:
1. Section 01 6213 - Product Substitution Procedures: Requirements for Contractor requests for substitution.
2. Section 01 7800 - Closeout Submittals: Project record documents.

1.2 SUBMITTALS

A. Submit name of individual authorized to receive change documents, and be responsible for informing others in Contractor's employ or Subcontractors of changes to Work.

B. Transmit each Contractor Proposal Package to Architect with AIA Document G810 - Transmittal Letter or other Architect approved transmittal form or letter containing the same information as AIA Document G810.
1. Deliver submittal in person or by courier, overnight delivery service or U.S. Mail postpaid.
2. Do not Fax formal submittal. Contractor may fax a copy of package to Architect indicating that formal Contractor Proposal Package is being sent and when it should arrive.

1.3 DOCUMENTATION OF CHANGE IN CONTRACT SUM/PRICE AND CONTRACT TIME

A. Maintain detailed records of work completed on a time and material basis. Provide full information required for evaluation of proposed changes, and to substantiate costs of changes in Work.

B. Document each quotation for a change in cost or time with sufficient data to allow evaluation of quotation. Clearly and legibly type all items included on the following forms:
   1. Submit Contractor Change Order Request Proposal on CSI Form 13.6A.
   2. Submit Contractor Change Order Proposal Worksheet Summary on CSI Form 13.6D.
   3. Submit Contractor Change Order Proposal Worksheet Detail on CSI Form 13.6C.

C. Provide additional data to support computations:
   1. Quantities of products, labor, and equipment.
   2. Taxes, insurance, and bonds.
   3. Overhead and profit.
   4. Justification for change in Contract Time.
   5. Credit for deletions from Contract, similarly documented.

D. Support each claim for additional costs or Change Order Request (Proposal), with additional information:
   1. Origin and date of claim.
   2. Dates and times work was performed, and by whom.
   3. Time records and wage rates paid.
   4. Invoices and receipts for products, equipment, and subcontracts, similarly documented.

1.4 ARCHITECT'S SUPPLEMENTARY INSTRUCTIONS

A. Architect will advise of minor changes in Work not involving an adjustment to Contract Sum/Price or Contract Time by issuing supplemental instructions on AIA Document G710 - Architect's Supplementary Instructions.

B. Upon receipt of Architect issued AIA Document G710, Contractor shall carry out Work in accordance with instructions in accordance with Contract Documents without change in Contract Sum or Contract Time.

1.5 PROPOSAL REQUEST

A. Architect may issue a Proposal Request which includes a detailed description of a proposed change with supplementary or revised Drawings and Specifications, a change in Contract Time for executing change and period of time during which requested price will be considered valid by issuing request on AIA Document G709 - Proposal Request.

B. Upon receipt of Architect issued AIA Document G709, Contractor shall prepare and submit an itemized proposal for changes in Contract Sum and Contract Time for proposed modifications to Contract Documents accordance with description within number of days indicated on document.
   1. If Contractor cannot complete itemized proposal within time requested by Architect, notify Architect in writing of date Contractor will be able to submit proposal along with reason for additional time required.
   2. Document each quotation for a change in cost or time with sufficient data to allow evaluation of quotation.

C. Contents of Contractor Proposal Package shall include 3 executed copies fo the following:

1. Transmittal - AIA Document G810.
2. Change Order Request (Proposal) Form - CSI Form 13.6A.
3. Proposal Worksheet Summary - CSI Form 13.6D.
4. Proposal Worksheet Detail - CSI Form 13.6C.
5. Attached additional support data.

1.6 CONSTRUCTION CHANGE DIRECTIVE

A. Architect may issue a document, signed by Owner, instructing Contractor to proceed with a change in Work, for subsequent inclusion in a Change Order by issuing a directive on AIA Document G714 - Construction Change Directive.

B. Construction Change Directive will describe changes in Work, and will designate method of determining any change in Contract Sum or Contract Time.

C. Upon receipt of Architect and Owner issued Construction Change Directive, Contractor shall promptly execute change in Work in accordance with directive in accordance with Contract Documents.
   1. Contractor shall sign all copies of Construction Change Directive forms, keep one copy for Contractor and return remaining copies to Architect.

D. Upon completion of the Work, document each quotation for a change in cost or time with sufficient data to allow evaluation of quotation in a Contrator Proposal Package.

E. Contents of Contractor Proposal Package shall include 3 executed copies fo the following:
   1. Transmittal - AIA Document G810.
   2. Change Order Request (Proposal) Form - CSI Form 13.6A.
   3. Proposal Worksheet Summary - CSI Form 13.6D.
   4. Proposal Worksheet Detail - CSI Form 13.6C.
   5. Attached additional support data.

1.7 CONTRACTOR CHANGE ORDER REQUEST

A. Contractor may propose a change by submitting a Change Order Request (Proposal) to Architect, describing proposed change and its full effect on Work, with a statement describing reason for change, and effect on Contract Sum/Price and Contract Time with full documentation and a statement describing effect on Work by separate or other contractors.

B. Document each quotation for a change in cost or time with sufficient data to allow evaluation of quotation.

C. Contents of Contractor Proposal Package shall include three (3) executed copies of the following:
   1. Transmittal - AIA Document G810.
   2. Change Order Request (Proposal) Form - CSI Form 13.6A.
   3. Proposal Worksheet Summary - CSI Form 13.6C.
   4. Proposal Worksheet Detail - CSI Form 13.6D.
   5. Attached additional support data.

1.8 STIPULATED SUM CHANGE ORDER

A. Architect may issue a document, signed by the Owner and Architect, instructing Contractor to make a change in Work based on Proposal Request and Contractor's fixed price

quotation or Contractor's request for a Change Order with Contractor's fixed price quotation as approved by Owner by issuing a Change Order on AIA Document G701 - Change Order.

B. Change Order will describe changes in Work, and will designate any change to the original contract sum, net change by previously authorized Change Orders, any change of contract sum due to Change Order, any change to contract time and any change to Date of Substantial Completion.

C. Change Order may include attached Change Order Narrative, Drawings, Sketches and Specification Sections as necessary.

D. Change Order will include documentation from Contractor for change in cost or time with necessary supporting data.

1.9 TIME AND MATERIAL CHANGE ORDER

A. Submit itemized account and supporting data after completion of change, within time limits indicated in the Conditions of the Contract.

B. Architect will determine change allowable in Contract Sum/Price and Contract Time as provided in Contract Documents.

C. Maintain detailed records of work done on Time and Material basis.

D. Provide full information required for evaluation of proposed changes, and to substantiate costs for changes in Work.

1.10 PERMITTED COSTS USED FOR CHANGE ORDERS

A. Method for adjustment in Contract Sum shall be determined by Architect on basis of reasonable expenditures and savings of those performing Work attributable to the change.

B. Permitted Costs for Change Orders are limited to the following. No other costs are permitted.
   1. Costs of labor, including social security, 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 hand tools, whether rented from Contractor or others. Machinery must be directly attributable to the change. Cost for equipment already on site shall not be included.
   4. Costs of premiums for all bonds and insurance, permit fees, and sales, use or similar taxes related to Work.
   5. Additional costs of supervision and field office personnel directly attributable to the change.

C. Itemization of Change Costs:
   1. In order to facilitate checking quotations for change costs, all proposals shall be accompanied by a complete itemization of costs including labor, materials and subcontracts. No exception.
   2. All labor and materials shall be itemized.
   3. Where major cost items are subcontracts, subcontracts shall be itemized.

1.11 CONTRACTOR OVERHEAD, PROFIT, BONDS AND INSURANCE USED FOR CHANGE ORDERS

A. Combined Overhead and Profit: Combined overhead and profit included in total cost to Owner of a change in Work shall be based on the following schedule. Contractor shall use the following percentages when preparing a Change Order Request.
   1. Contractor:
      a. Work Performed Entirely by Contractor's Own Forces: Combined overhead and profit of 10 percent of cost.
      b. Work Performed by Contractor's Subcontractors: Combined overhead and profit of 5 percent of amount due Subcontractors.
   2. Subcontractors:
      a. For Each Subcontractor Involved, Work Performed Entirely by Subcontractor's Own Forces: Combined overhead and profit of 10 percent of cost.
      b. For Each Subcontractor Involved , Work Performed by Subcontractor's Sub-Subcontractors: Combined overhead and profit of 5 percent of amount due Sub-Subcontractor.
   3. Sub-Subcontractors: Do not include overhead and profit for Sub-Subcontractors.

B. Bonds, Insurance and Taxes
   1. Contractor: Cost of bonds, insurance and taxes are separate from overhead and profit. Provide separate line items for bonds, insurance and taxes in Contractor Itemization following line item for Contractor overhead and profit as indicated on CSI Form 13.6D - Proposal Worksheet Summary.
   2. Subcontractor: Do not include bonds or insurance for Subcontractors.
   3. Sub-Subcontractors: Do not include bonds or insurance for Sub-Subcontractors.

C. Bonds and Insurance Rates for this Project: Provide documentation from Contractor's Insurance Provider and Bonding Company of bond and insurance rates Contractor is being charged for Bonds and Insurance for this Project as part of the Contractor Proposal Package.

1.12 EXECUTION OF CHANGE ORDERS

A. Architect will issue three (3) copies of Change Orders for signatures of parties as provided in the Conditions of the Contract.

B. Upon receipt of Architect and Owner issued Change Order; Contractor shall promptly execute Change Order.
   1. Contractor shall sign all copies of Change Order forms, keep one copy for Contractor and return remaining copies to Architect.

1.13 CORRELATION OF CONTRACTOR SUBMITTALS

A. Promptly revise Schedule of Values and Application for Payment forms to record each authorized Contract Modification as a separate line item and adjust Contract Sum/Price.

B. Promptly revise Construction Schedule to reflect any change in Contract Time, revise sub-schedules to adjust times for other items of work affected by change, and resubmit.

C. Promptly enter changes in Project Record Documents as specified in Section 01 7800 - Closeout Submittals.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

Advancement of Construction Technology

CHANGE ORDER REQUEST (PROPOSAL)

Project: _____ Change Order Request Number: _____

_____ From (Contractor): _____

To: _____ Date: _____

_____ A/E Project Number: _____

Re: _____ Contract For: _____

This Change Order Request (C.O.R.) contains an itemized quotation for changes in the Contract Sum or Contract Time in response to proposed modifications to the Contract Documents based on Proposal Request No. _____ .

Description of Proposed Change:

Attached supporting information from: ☐ Subcontractor ☐ Supplier ☐ _____ ☐ _____

Reason For Change:

Does Proposed Change involve a change in Contract Sum? ☐ No ☐ Yes [Increase] [Decrease] $ _____
Does Proposed Change involve a change in Contract Time? ☐ No ☐ Yes [Increase] [Decrease] _____ days.

Attached pages: ☐ Proposal Worksheet Summary: _____
☐ Proposal Worksheet Detail(s): _____

Signed by: Date:

Copies: ☐ Owner ☐ Consultants ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ File

July 1994
CSI Form 13.6A

Advancement of Construction Technology

PROPOSAL WORKSHEET DETAIL

Project: _____ Change Order Request Number: _____

To: _____ From: _____

Re: _____ Date: _____

Proposal Request Number: _____ A/E Project Number: _____

SHADED AREAS FOR A/E USE

ADDITIONS

	Ref. No.	Item Description	Quantity		UNIT PRICES Materials		Labor		SUBTOTALS Materials		Labor		TOTAL	
1									$ -		$ -		$ -	
2									$ -		$ -		$ -	
3									$ -		$ -		$ -	
4									$ -		$ -		$ -	
		Subtotal (Enter this number on Worksheet Summary.)			$ -		$ -		$ -		$ -		$ -	

DEDUCTIONS

	Ref. No.	Item Description	Quantity		UNIT PRICES Materials		Labor		SUBTOTALS Materials		Labor		TOTAL	
1									$ -		$ -		$ -	
2									$ -		$ -		$ -	
3									$ -		$ -		$ -	
4									$ -		$ -		$ -	
		Subtotal (Enter this number on Worksheet Summary.)			$ -		$ -		$ -		$ -		$ -	

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PROPOSAL WORKSHEET SUMMARY

Project: _____ Change Order Request Number: _____

To: _____ From: _____

Re: _____ Date: _____

Proposal Request Number: _____ A/E Project Number: _____

Complete and attach Proposal Worksheet Detail for each element of Work. Enter Worksheet Information below.

ADDITIONS:

	Sheet	Description	Material	Labor	Subtotal
1					$ -
2					$ -
3					$ -
4					$ -
5					$ -
6					$ -
7					$ -
		Subtotal	$ -	$ -	$ -

DEDUCTIONS:

	Sheet	Description	Material	Labor	Subtotal
1					$ -
2					$ -
3					$ -
4					$ -
5					$ -
6					$ -
7					$ -
		Subtotal	$ -	$ -	$ -

Subcontractor's Net:	
Subcontractor's OH&P:	
Subcontractor's Bond:	
Subcontractor's Total:	$ -
Subcontractor's Net:	
Contractor's OH&P:	
Contractor's Bond:	
Insurance:	
Tax:	
WORKSHEET TOTAL:	$ -

SECTION 01 2613

REQUESTS FOR INTERPRETATION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Requirements and procedures for Contractor requests to Architect for interpretation and clarification of Contract Documents.
2. CSI Form 13.2A - Request for Interpretation.
3. CSI Form 13.2B - Request for Interpretation Log.

B. Related Documents:
1. The Contract Documents, as defined in Document 00 7213 - General Conditions and modifications thereto, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.

C. Related Sections:
1. Section 01 2900 - Payment Procedures: Payment Request Package requirements.
2. Section 01 4500 - Quality Control: Contractor quality control requirements.

1.2 DEFINITIONS

A. RFI: Requests for Interpretation (RFI), is a formal process used during construction to facilitate communication between Contractor and Architect with regard to requests for interpretation and clarification of the intent of Contract Documents.

1.3 PROCEDURE DURING BIDDING

A. DO NOT use Requests for Interpretation form for questions during bidding. Submit questions during bidding, in writing on bidder's letterhead, to the Architect. TELEPHONE CALLS ARE DISCOURAGED.

B. Identify each question by referencing a Specification Section, Drawing Number and Detail Number.

C. Submit questions NO LATER than five (5) working days before date bids are received.

D. Refer to Document 00 2113 - Instructions to Bidders and Document 00 2213 - Supplementary Instructions to Bidders for additional requirements.

1.4 PROCEDURE AFTER AWARD OF CONTRACT

A. Refer to Document 00 7213 – General Conditions.

B. Conditions Requiring Interpretation and Clarification of Contract Documents: Submit a Request for Interpretation to Architect. E-MAIL RFI FORM TO ARCHITECT. (If Contractor does not have E-Mail capability, RFI Form may be Faxed, upon approval of Architect, as discussed at the Pre-Construction Meeting).
   1. Submit Requests for Interpretation from Contractor's office or field office only. Requests for Interpretation submitted directly from subcontractors or suppliers will not be accepted.
   2. Generate Requests for Interpretation by one source per project and number accordingly.
   3. Submit one request for interpretation per form.
   4. Maintain current RFI Log as specified in this Section.

C. Architect will review formal requests from Contractor within 24 to 48 hours (depending on complexity of request) and Contractor will be notified in writing of decisions made, via the RFI Form, within a maximum of 15 days after receipt of request.
   1. If necessary, Architect may contact Contractor by telephone for clarification of RFI.
   2. Architect response shall not be considered as a Change Order or Construction Change Directive, nor does it authorize changes in Contract Sum or Contract Time.

1.5 RFI FORM

A. Submit requests for interpretation on attached Request for Interpretation form, or Architect approved equivalent, attached at end of this Section. Architect will not respond to requests for interpretation unless this format is utilized. (RFI Form is available to Contractor as a live Microsoft Word Document. Make request to Architect at Pre-Construction Meeting to receive a live electronic copy of form).
   1. Upon receipt of Notice to Proceed, submit Contractor proposed alternate RFI Form to Architect for review and approval.
   2. Alternate RFI form shall contain the same information and text as the attached RFI form.

B. Where submittal form does not provide space needed for complete information, additional sheets may be attached.

1.6 RFI LOG

A. Maintain a request for interpretation log on attached Request for Interpretation Log form, or Architect approved equivalent, attached at end of this Section. (RFI Log Form is available to Contractor as a live Microsoft Word Document. Make request to Architect at Pre-Construction Meeting to receive a live electronic copy of form).

B. Provide current RFI Log at Monthly Progress Meetings held at Project Site for review.

C. Include current RFI Log as part of each Payment Request Package as specified in Section 01 2900 - Payment Procedures.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

Advancement of Construction Technology

REQUEST FOR INTERPRETATION

Project: _____ R.F.I. Number: _____

_____ From: _____

To: _____ Date: _____

_____ A/E Project Number: _____

Re: _____ Contract For: _____

Specification Section: Paragraph: Drawing Reference: Detail:

Request:

Signed by: Date:

Response:

☐ Attachments

Response From: To: Date Rec'd: Date Ret= d:

Signed by: Date:

Copies: ☐ Owner ☐ Consultants ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ File

Advancement of Construction Technology

REQUEST FOR INTERPRETATION LOG

Project: _____ A/E Project Number: _____

Owner: _____ Contractor: _____

R.F.I. NO.	DATE REC□D	BRIEF DESCRIPTION OF INFORMATION REQUESTED	DATE OF RESPONSE	R.F.P. NO.

SECTION 01 2900

PAYMENT PROCEDURES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Schedule of values.
2. Procedures for preparation and submittal of applications for payment.
3. Payments at Substantial Completion.
4. Affidavit of Payment of Debts and Claims and Release of Liens form.
5. Non-Kickback Statement.
6. BWA Document 702 - Application for Payment Form.
7. BWA Document 703 - Application for Payment - Continuation Sheet Form.
8. CSI Form 2.5A - Stored Material Summary.

B. Related Documents:
1. The Contract Documents, as defined in Document 00 7213 - General Conditions and modifications thereto, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.
2. Document 00 5213 - Agreement-Stipulated Sum: Document executed between Owner and Contractor.
3. Document 00 7385 - Determination and Extension of Contract Time: Request for Contract Time Extension.

C. Related Sections:
1. Section 01 2600 - Contract Modification Procedures: Procedures for changes to the Work.
2. Section 01 2973 - Schedule of Values: Procedures for schedule of values.
3. Section 01 3300 - Submittal Procedures: Procedures for submittals.
4. Section 01 7700 - Closeout Procedures: Final payment.

1.2 SCHEDULE OF VALUES

A. Refer to Section 01 2973 - Schedule of Values.

1.3 FORMAT

A. Forms:
1. Application for Payment: BWA Document 702 - Application for Payment at end of Section.
2. Application for Payment - Continuation Form: BWA Document 703 - Continuation Sheet.
3. An electronic copy of the Application for Payment and Application for Payment – Continuation Sheet forms will be provided to the contractor.
   a. Contractor shall only use electronic forms provided.
   b. Only Application for Payment Form provided shall be used.
   c. Application for Payment Forms not provided shall not be used.

4. Submit only typewritten forms. Handwritten forms will not be permitted.

B. Application for Payment - Continuation Form: Header titles for each column shown as follows shall be used. See attached Application for Payment - Continuation Form.
1. (A) - Item Number.
2. (B) - Description of Work.
3. (C) - Scheduled Values.
4. (D) – Work Completed: (F) from Previous Applications.
5. (E) – Work Completed: Work in Place this Application.
6. (F) – Work Completed: Total Work in Place to Date (D + E)
7. (G) – Stored Materials: (I) from Previous Applications Less Materials Used this Period.
8. (H) – Stored Materials: New This Application.
9. (I) – Stored Materials Total Stored Materials (G + H).
10. (J) – Total Completed and Stored to Date.
11. (K) – Percent Completed and Stored to Date (J / C)
12. (L) – Balance to Finish (C – G)
13. (M) – Retainage: (J x 0.05)

1.4 PREPARATION OF APPLICATIONS

A. All signatures shall be in Blue Ink to clearly identify each document as an original signed document.

B. Prepare as specified in Document 00 7213 - General Conditions.

C. Include statement on application as specified in Document 00 7213 – General Conditions for materials stored on the Project Site but not yet incorporated into Work.

D. Do not include request for payment for materials stored off Project Site. Architect will not approve and Owner will not pay for any materials stored off Project Site.

E. Execute certification by signature of Contractor or Contractor authorized officer.

F. Prepare application on same form and in same format as approved Schedule of Values.
1. Use data from approved Schedule of Values.
2. Provide dollar value in each column for each line item for portion of work performed.
3. Provide an overall project summary percentage complete and payment amount for each Application for Payment as specified in Section 01 2900 - Payment Procedures.

G. List each authorized Change Order as an extension on BWA Document 703 - Application for Payment - Continuation Sheet, listing Change Order number and dollar amount as for an original item of Work.

H. Starting with second Application for Payment, include an executed and notarized Affidavit of Payment of Debts and Claims and Release of Liens with each Application for Payment.
1. Submittal of Affidavit required by Contractor and each Subcontractor, Sub-subcontractor and material supplier who performed work covered by the Application of the payment period immediately preceeding the Application being submitted.
2. Contractor is responsible to secure and submit proper Affidavits.
3. Required Affidavit is attached at end of this Section.
4. Non-Kickback Statement form attached at end of this Section.

I. Prepare Application for Final Payment as specified in Document 00 5213 - Agreement-Stipulated Sum, Document 00 7213 - General Conditions, and Section 01 7300 - Execution.

1.5 SUBMITTAL PROCEDURES

A. Submit Application for Payment to Architect. Regardless of Contractor standard billing process, Contractor shall organize and setup billing process for THIS PROJECT as required to allow time to obtain subcontractor invoices, prepare required documents, prepare Application for Payment forms, and mail Payment Application Package to Architect.
   1. Submit Application on or before the **end** of the month. No exception permitted.
   2. Provided Application for Payment is received by Architect as specified, Owner will make payment to Contractor on or before the 15th of the following month. If Application for Payment is received by Architect after specified date, payment will be made by Owner no later than 60 days after Architect receives Application for Payment.
   3. Contractor submittal on or before stipulated date is critical for receiving required approvals, processing and payment by Owner.
   4. By failing to submit on or before stipulated date, Contractor expressly assumes risk of all delays to payment and waives all claims for damages or additional payment for any such delays to payment.

B. Submit three (3) executed and notarized original copies of each Application for Payment with original seals and signatures.

C. Submit updated construction schedule with each Application for Payment.

D. Submit Applications at intervals stipulated in Document 00 5213 - Agreement-Stipulated Sum.

E. Transmit each Payment Request Package to Architect with AIA Form G810 - Transmittal Letter or other Architect approved transmittal form or letter containing the same information as AIA Document G810.
   1. Deliver official submittal of original documents in person or by courier, overnight delivery service or U.S. Mail postpaid.
   2. Do not fax official submittal. Contractor may fax a notification to Architect, on Contractor's letterhead, that a Payment Request Package is being sent and when it should arrive. Notification may include a copy of BWA Document 702 Application for Payment and 703 Application for Payment - Continuation Sheet for Architect information.

F. Contents of first Payment Request Package shall include the following:
   1. Transmittal - AIA Document G810.
   2. Application for Payment Form - BWA Document 702.
   3. Application for Payment - Continuation Sheet Form – BWA Document 703.
   4. Updated Construction Progress Schedule.
   5. Non-Kickback Statement.

H. Contents of subsequent Payment Request Package shall include the following:
   1. Transmittal - AIA Document G810.
   2. Application for Payment Form - BWA Document 702.
   3. Application for Payment - Continuation Sheet Form – BWA Document 703.

4. Stored Material Summary - CSI Form 2.5A as applicable.
5. Updated Construction Progress Schedule.
6. Contractor Affidavit of Payment of Debts and Claims and Release of Liens.
7. Affidavit of Payment of Debts and Claims and Release of Liens for each Subcontractor, Sub-subcontractor or material supplier as applicable.
8. Request for Contract Time Extension as defined within Document 00 7385 - Determination and Extension of Contract Time.
9. Non-Kickback Statement.

1.6 INCOMPLETE OR INCORRECT SUBMITTALS

A. Incomplete Submittals: Processing will stop for Payment Request Packages received by Architect that do not include all required items. Architect will contact Contractor and advise Contractor of missing items. Contractor is responsible for sending Architect items missing from Payment Request Package. Payment processing will not start until Payment Request Package is complete.

B. Incorrect Submittals: Payment Request Packages that are incorrectly submitted, incorrectly assembled or have incorrect data will be returned to Contractor for correction.
1. Packages submitted on photocopies of AIA forms rather than original AIA forms will be returned to Contractor to prepare on original AIA forms.
2. Handwritten forms will be returned to Contractor to prepare in typewritten form.
3. Payment Request Packages with Continuation Sheets containing major incorrect percentage complete numbers may be marked-up and returned to Contractor for correction.
4. Minor percentage complete numbers may be corrected by Architect and processed with corrected percentages and payment amount.
5. Determination of whether to return Payment Request Package or to process an Architect mark-up of Payment Request Package is at the discretion of the Architect.

C. Contractor is responsible for Payment Request Package processing being stopped due to submittal of incomplete or incorrect Payment Request Package.

1.7 SUBSTANTIATING DATA

A. If Contractor is making application for payment on account of materials and equipment delivered, suitably stored at site for subsequent incorporation in Work and properly invoiced, Contractor shall provide substantiating data showing flow of materials and equipment in and out of storage on CSI Form 2.5A - Stored Material Summary.

B. When Architect requires substantiating information, submit data justifying dollar amounts in question.

C. Provide one (1) copy of data with cover letter for each copy of submittal. Show application number and date, and line item by number and description.

D. Include the following with application:
1. Partial release of liens from major subcontractors and vendors.
2. Section 01 3216 - Construction Progress Schedules; Revised and current construction schedule as specified.

1.8 SUBSTANTIAL COMPLETION

A. It is the duty, responsibility and obligation of Contractor to achieve Substantial Completion within Contract Time stipulated in Document 00 5213 - Agreement-Stipulated Sum, and the Notice to Proceed.

B. If Contractor does not achieve Substantial Completion within Contract Time, Owner may suspend further Progress Payments until Work is Substantially Complete as determined by Architect.

C. If Contractor does not achieve Substantial Completion within 30 calendar days after expiration of Contract Time, Contract Sum will be adjusted as provided in Document 00 7213 – General Conditions in direct relation to true and accurate additional direct costs incurred by Owner, including Architect's additional fees.

D. Contractor expressly assumes risk of all delays to Work and waives all claims for damages or additional payment for any such delays to Work.

E. Nothing in Contract Documents limit Owner's full rights and remedies as allowed by law should delays in Work exceed 30 calendar days beyond Contract Time as established in the Agreement.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

AFFIDAVIT OF PAYMENT OF DEBTS AND CLAIMS

AND RELEASE OF LIENS

TO: _____
(Project Owner name & address)
_____

_____

_____
(Project name & address)
_____

_____

By this instrument the undersigned who performs the _____ work hereby certifies that on this date, or anytime prior thereto, except as listed below, he has paid in full or has otherwise satisfied all obligations for all materials and equipment furnished, for all work, labor, and services performed and for all known indebtedness and claims against the undersigned for damages arising in any manner on or against the PROJECT, its land, improvements and equipment of every kind.

The undersigned hereby certifies that he has received all payments currently due under his contract for work on the Project (except retainage). Therefore, the undersigned does hereby waive and/or release any and all liens against the PROPERTY PROJECT and as of the _____ day of _____, 20_____.

( ) Partial

( ) Final (including retainage)

_____
(Name of Contractor/Subcontractor)

By: _____

Title: _____

STATE OF _____( )

COUNTY OF_____( )

BEFORE ME, the undersigned authority, on this day personally appeared _____; _____ of _____ known to me to be the person whose name is subscribed to the foregoing instrument, and, being first duly sworn, acknowledged to me that he executed the same for the purposes and consideration therein expressed and declared to me that the statements contained therein are true.

SWORN AND SUBSCRIBED to before me this _____ day of _____, 20___

My commission expires:

_____ _____

NOTARY PUBLIC in and for said County and State.

This affidavit and Release shall be executed by the CONTRACTOR, all of his sub-contractors, material suppliers and lessors of equipment; or an independent contractor, who expects payment of funds from the current Progress Payment from the OWNER to the CONTRACTOR, or a Payment directly from the OWNER. Execution hereof is conditioned upon the bank's clearance of any check given in payment of the current Progress Payment.

END OF AFFIDAVIT

NON-KICKBACK STATEMENT
(Affidavit for Payment of Claim)

STATE OF _____)
) ss.
COUNTY OF_____)

The undersigned _____, of lawful age, being first duly sworn, on oath states: that this invoice or claim is true and correct; the work, services, or materials as shown by this invoice or claim have been completed or supplied in accordance with the plans, specifications, orders or requests furnished the claimant: that claimant has made no payment directly or indirectly to any elected official, officer, or employee of Independent School District Number 63**C**010 of Shawnee, Pottawatomie County, Oklahoma (North Rock Creek Public Schools), of money or other thing of value to obtain payment of the invoice or procure the contract or purchase order pursuant to which an invoice is required.

_____
Affiant

_____
NOTARY PUBLIC

Subscribed and sworn to before me this ___ day of _____, 20___.

_____
Notary

My Commission Expires:

_____

ACCORDING TO OKLAHOMA STATE LAW, ALL INVOICES OF $2,000 OR MORE FROM AN ARCHITECT, CONTRACTOR, ENGINEER OR SUPPLIER OF MATERIAL MUST HAVE THE ABOVE AFFIDAVIT SIGNED, NOTARIZED AND RETURNED BEFORE PAYMENT CAN BE PROCESSED

END OF STATEMENT

APPLICATION FOR PAYMENT

BWA Form - 702

PAGE ONE OF PAGES

TO OWNER:

PROJECT:

APPLICATION NO:

Distribution to:

- [ ] OWNER
- [ ] ARCHITECT
- [ ] CONTRACTOR
- [ ]
- [ ]

PERIOD TO:

FROM CONTRACTOR:

VIA ARCHITECT:

PROJECT NOS:

CONTRACT FOR:

CONTRACT DATE:

CONTRACTOR'S APPLICATION FOR PAYMENT

Application is made for payment, as shown below, in connection with the Contract.
Continuation Sheet, is attached.

1. ORIGINAL CONTRACT SUM	$	
2. Net change by Change Orders	$	
3. CONTRACT SUM TO DATE (Line 1 ± 2)	$	
4. TOTAL COMPLETED & STORED TO DATE (Column G on G703)	$	
5. RETAINAGE:		
a. _____ % of Completed Work (Column D + E on G703)	$	
b. _____ % of Stored Material (Column F on G703)	$	
Total Retainage (Lines 5a + 5b or Total in Column I of G703)	$	0.00
6. TOTAL EARNED LESS RETAINAGE (Line 4 Less Line 5 Total)	$	0.00
7. LESS PREVIOUS APPLICATIONS FOR PAYMENT (Line 6 from prior Certificate)	$	
8. CURRENT PAYMENT DUE	$	0.00
9. BALANCE TO FINISH, INCLUDING RETAINAGE (Line 3 less Line 6)	$	0.00

CHANGE ORDER SUMMARY	ADDITIONS	DEDUCTIONS
Total changes approved in previous months by Owner		
Total approved this Month		
TOTALS	$0.00	$0.00
NET CHANGES by Change Order	$0.00	

The undersigned Contractor certifies that to the best of the Contractor's knowledge, information and belief the Work covered by this Application for Payment has been completed in accordance with the Contract Documents, that all amounts have been paid by the Contractor for Work for which previous Application for Payment were issued and payments received from the Owner, and that current payment shown herein is now due.

CONTRACTOR:

By: _____ Date: _____

State of: County of:
Subscribed and sworn to before me this day of
Notary Public:
My Commission expires:

ARCHITECT'S REVIEW FOR PAYMENT

The Architect hereby confirms that based on site observations and to the best of the Architect's knowledge, this payment application accurately reflects the progress of the work and that the quality of the Work, subject to subsequent evaluation, is sufficient to justify payment in the amount certified by the Contractor and recommended below:

AMOUNT . . . . . $ _____

(Attach explanation if amount differs from the amount applied. Initial all figures on this Application and on the Continuation Sheet that are changed to conform with the adjusted amount.)
ARCHITECT:

By: _____ Date: _____

This Certificate is not negotiable. The AMOUNT is payable only to the Contractor named herein. Issuance, payment and acceptance of payment are without prejudice to any rights of the Owner or Contractor under this Contract.

APPLICATION FOR PAYMENT - CONTINUATION SHEET

BWA Form - 703

APPLICATION FOR PAYMENT, containing
Contractor's signed certification is attached.
In tabulations below, amounts are stated to the nearest dollar.

APPLICATION NO:
APPLICATION DATE:
PERIOD TO:
ARCHITECT'S PROJECT NO:

A	B	C	D	E	F	G	H	I	J	K	L	M
ITEM NO.	DESCRIPTION OF WORK	SCHEDULED VALUE	WORK COMPLETED			STORED MATERIALS			TOTAL COMPLETED AND STORED TO DATE	% COMPLETED AND STORED TO DATE (J / C)	BALANCE TO FINISH (C - G)	RETAINAGE (J x 0.05)
			(F) FROM PREVIOUS APPLICATIONS	WORK IN PLACE THIS APPLICATION	TOTAL WORK IN PLACE TO DATE (D + E)	(I) FROM PREV. APPLICATIONS LESS GOODS USED THIS PERIOD	NEW THIS APPLICATION	TOTAL STORED MATERIAL (G + H)				
	GRAND TOTALS	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	0.00%	$0.00	$0.00
		Line 1 on Pay Application							Line 4 on Pay Application		Line 9 on Pay Application	Line 5 on Pay Application

Advancement of Construction Technology

STORED MATERIAL SUMMARY

Project: _____ Application Period: _____

Owner: _____ Application Number: _____

A/E Project Number: _____ Application Date: _____

INVOICE NO.	SUBMITTAL TRANSMITTAL NO.	MATERIAL DESCRIPTION	STORED PREVIOUS		STORED THIS MONTH		INCORPORATED IN WORK		MATERIALS REMAINING IN STORAGE ($)
			DATE (MO/YR)	AMOUNT ($)	AMOUNT ($)	SUBTOTAL ($)	DATE (MO/YR)	AMOUNT ($)	
						$ -			$ -
						$ -			$ -
						$ -			$ -
						$ -			$ -
						$ -			$ -
						$ -			$ -
						$ -			$ -
						$ -			$ -
						$ -			$ -
						$ -			$ -
						$ -			$ -
						$ -			$ -
						$ -			$ -
						$ -			$ -
						$ -			$ -
				$ -	$ -	$ -		$ -	$ -

SECTION 01 2973

SCHEDULE OF VALUES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Submittals.
2. Schedule of values.
3. General Conditions breakdown.
4. Individual Section breakdown.
5. Individual Section breakdown - material and labor.
6. Schedule of values breakdown example form, located at end of Section.

B. Related Documents:
1. The Contract Documents, as defined in Document 00 7213 - General Conditions and modifications thereto, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.
2. Document 00 2113 - Instructions to Bidders: Requirements and procedures for bidding.
3. Document 00 2213 - Supplementary Instructions to Bidders

C. Related Sections:
1. Section 01 2900 - Payment Procedures: Applications for payment.
2. Section 01 4200 - References: Definitions.
3. Section 01 6200 - Product Options: Substitution requirements.

1.2 SUBMITTALS

A. Section 01 3300 - Submittal Procedures: Requirements for submittals.

B Submit a printed schedule on AIA Form G703 - Application and Certificate for Payment Continuation Sheet itemizing all contract costs with breakdown as specified herein.

C. Submit three copies of Schedule of Values within 10 days of Notice to Proceed.

D. Failure of Contractor to submit complete and accurate Schedule of Values within specified time and as specified in this Section will cause processing of Contractor Payment Request Packages to stop. Payment processing will not start until Schedule of Values has been submitted, reviewed and accepted by Architect.

1.3 SCHEDULE OF VALUES

A. Contractor is responsible for and shall provide a complete and detailed accounting to Owner of all Contractor costs for this Project. Owner requires that Contractor indicate where each dollar of Contract Sum is allocated.

B. The Schedule of Values will be used by Architect as a basis for reviewing Contractor's Applications for Payment.

C. Schedule of Values shall be broken down by Document and Specification utilizing Table of Contents of this Project Manual. Identify each line item with number and title of Document or Specification Section.

D. Include in each line item, the amount of Allowances specified in this section. For unit cost Allowances, identify quantities taken from Contract Documents multiplied by the unit cost to achieve the total for the item.

E. Revise schedule as necessary to reflect approved Change Orders with each Application for Payment.

F. Refer to attached Sample Form for Schedule of Values.
   1. Sample Form is not an exact breakdown for this Project, but an example of how the Schedule of Values for this Project should appear. Section numbers and titles in the Sample Form are not specifically prepared for this Project.
   2. Sample Form is not an eact copy of AIA Document G703, only a representation of AIA Document G703.

1.4 GENERAL CONDITIONS BREAKDOWN

A. Contracting Requirements: Provide breakdown for the following:
   1. Document 00 3143 - Permit Application: Cost of all permits and fees for Project.
   2. Document 00 6100 - Bonds: Cost of bonding Project.
   3. Document 00 7213 - General Conditions: Cost of miscellaneous Contractor expenses applicable to Project.
   4. Document 00 7316 - Insurance Requirements: Cost of Insurance for Project.

B. General Requirements: Provide breakdown for the following:
   1. Section 01 1100 - Summary: Cost of Contractor mobilization.
   2. Section 01 3100 - Project Management and Coordination: Cost for Contractor Project Field Superintendent.
   3. Section 01 7700 - Closeout Procedures: Cost for Final Cleaning.

C. Contractor Overhead and Profit: Cost for Contractor overhead and Contractor Profit.

1.5 INDIVIDUAL SECTION BREAKDOWN - MATERIAL AND LABOR

A. Provide cost for Work for material as a separate line item and labor as a separate line item for Specification Sections indicated.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SAMPLE FORM

BWA Document 703. APPLICATION AND CERTIFICATE OF PAYMENT.
Containing Contractor's signed Certificate is Attached in tabulations below, amounts are stated to the nearest dollar.
Use Column I on Contracts where variable retainage for line items may apply.

APPLICATION NUMBER:
APPLICATION DATE:
PERIOD FROM: **TO:**
ARCHITECT'S PROJECT No:

A	B	C	D	E	F	G	H	I	J	K	L	M
ITEM NO.	DESCRIPTION OF WORK	SCHEDULE VALUE	WORK COMPLETED			STORED MATERIALS			TOTAL COMPLETED AND STORED TO DATE	% AND STORED TO DATE	BALANC TO (C - G)	RETAINAG (J x 0.05)
			(F) FROM PREVIOUS APPLICATIONS	WORK IN PLACE THIS APPLICATION	TOTAL IN PLACE TO DATE (D + E)	(I) FROM PREV. APPLCATIONS LESS GOODS THIS PERIOD	NEW THIS APPLICATION	TOTAL STORED MATERIAL (G + H)				
	Contracting Requirements											
	00 6100 Bonds											
	00 7213 General Conditions											
	Superintendence/Contractor											
	Quality Control											
	Mobilization											
	Permits & Fees											
	Misc. GC Expenses											
	00 7316 Insurance Requirements											
	Division 1											
	General Requirements											
	01 4523 Testing and Inspection Services											
	Division 3											
	Concrete											
	03 0586 Vapor Barrier											
	03 1100 Concrete Forming											
	03 2000 Concrete Reinforcement											
	03 3000 Cast-In-Place Concrete											
	Building Concrete											
	03 3500 Concrete Finishing											
	03 3900 Concrete Curing											
	Division 4											
	Masonry											
	04 2111 Brick Veneer											
	04 2200 Concrete Masonry Units											
	04 2206 Masonry Screen Walls - Concrete											
	Division 5											
	Metals											
	05 4000 Cold-Formed Metal Framing											
	05 5000 Metal Fabrications											
	Division 6											
	Wood and Plastic											
	06 2000 Finish Carpentry											
	06 4102 Custom Architectural Wood Casework											
	Division 12 Furnishings											
	12 3624 Plastic Laminate Countertop											

SAMPLE FORM

BWA Document 703. APPLICATION AND CERTIFICATE OF PAYMENT.
Containing Contractor's signed Certificate is Attached in tabulations below, amounts are stated to the nearest dollar.
Use Column I on Contracts where variable retainage for line items may apply.

APPLICATION NUMBER:
APPLICATION DATE:
PERIOD FROM: **TO:**
ARCHITECT'S PROJECT No:

A	B	C	D	E	F	G	H	I	J	K	L	M
ITEM NO.	DESCRIPTION OF WORK	SCHEDULE VALUE	WORK COMPLETED			STORED MATERIALS			TOTAL COMPLETED AND STORED TO DATE	% AND STORED TO DATE	BALANC TO (C - G)	RETAINAG (J x 0.05)
			(F) FROM PREVIOUS APPLICATIONS	WORK IN PLACE THIS APPLICATION	TOTAL IN PLACE TO DATE (D + E)	(I) FROM PREV. APPLCATIONS LESS GOODS THIS PERIOD	NEW THIS APPLICATION	TOTAL STORED MATERIAL (G + H)				
	Division 13											
	Special Construction											
	13 3421 Pre-Engineered Metal Buildings											
	Material											
	Erection											
	Division 21											
	Fire Suppression											
	21 1300 Fire-Suppression Sprinklers System											
	Division 22											
	Plumbing											
	22 0000 General Plumbing											
	22 1000 Piping and Pumps											
	Division 23											
	HVAC											
	23 0500 Mechanical Systems, Testing, Adjusting and Balancing											
	23 0700 HVAC Insulation											
	23 3200 Air Outlets and Inlets											
	23 3300 Air Duct Accessories											
	23 3313 Fire and Smoke Dampers											
	23 3400 HVAC Fans											
	23 6200 Single Packaged HVAC Units											
	Division 25											
	Integrated Automation											
	25 3700 Integrated Intercommunication System											
	Division 26											
	Electrical											
	26 0500 Electrical Identification											
	26 0513 Conduit											
	26 0515 Building Wire and Cable											
	26 0518 Boxes											
	26 0521 Wiring Devices											
	26 0526 Electrical Grounding											

SAMPLE FORM

BWA Document 703. APPLICATION AND CERTIFICATE OF PAYMENT.
Containing Contractor's signed Certificate is Attached in tabulations below, amounts are stated to the nearest dollar.
Use Column I on Contracts where variable retainage for line items may apply.

APPLICATION NUMBER:
APPLICATION DATE:
PERIOD FROM: **TO:**
ARCHITECT'S PROJECT No:

A	B	C	D	E	F	G	H	I	J	K	L	M
ITEM NO.	DESCRIPTION OF WORK	SCHEDULE VALUE	WORK COMPLETED			STORED MATERIALS			TOTAL COMPLETED AND STORED TO DATE	% AND STORED TO DATE	BALANC TO (C - G)	RETAINAG (J x 0.05)
			(F) FROM PREVIOUS APPLICATIONS	WORK IN PLACE THIS APPLICATION	TOTAL IN PLACE TO DATE (D + E)	(I) FROM PREV. APPLCATIONS LESS GOODS THIS PERIOD	NEW THIS APPLICATION	TOTAL STORED MATERIAL (G + H)				
	26 0529 Hangers and Supports											
	26 1800 Motor and Circuit Disconnects											
	26 1805 Fuses											
	26 2400 Panelboards											
	26 5000 Lamps											
	26 5100 Ballasts and Accessories											
	26 5105 Interior Building Lighting											
	Division 27											
	Communications											
	27 3200 Telephone Service, Pathway and Wiring											
	Division 28											
	Electronic Safety & Security											
	28 0513 Fire Alarm and Detection System											
	Division 31 Earthwork											
	31 1000 Site Clearing											
	31 2200 Grading											
	31 2316 Spread and Continuous Footings											
	31 2324 Fill and Backfill											
	31 2333 Trenching for Site Utilities											
	31 2500 Erosion and Sedimentation Control											
	31 3116 Soil Treatment for Termite Control											
	31 3216 Excavation											
	31 3200 Soil Stabilization											
	Division 32											
	Exterior Improvements											
	32 1314 Concrete Walks and Pads											
	32 1541 Gravel Surfacing											
	32 9223 Sodding											
	Division 33											
	Utilities											
	33 4915 Storm Drainage											

Categories and subcategories to be added or deleted for each project as required. G.C. profit and overhead shall be prorated to each item/ category as applicable. Subcontractors cost, profit and overhead shall be included in their respective item/category. After each line item, under Description of Work, G.C. shall indicate in parenthesis, as a percentage, each item/categories material/subcontractors cost.

End of Document

SECTION 01 3300

SUBMITTAL PROCEDURES

PART 1 GENERAL

1.1 SUMMARY

A Section Includes:
1. Procedures.
2. Re-submittals.
3. Schedule of Submittals.
4. Schedule of Values.
5. Shop Drawings.
6. Product Data.
7. Samples.
8. Field Samples/Mock-Ups.
9. Manufacturer's Instructions.
10. Certificates.
11. Closeout Submittals.
12. Contractor Action.
13. Architect Action.
14. Architect's Consultant Action.
15. AIA Document G810 - Transmittal Letter.
16. CSI Form 12.2A - Submittal Checklist.
17. CSI Form 12.1B - Submittal Log.

B. Related Documents:
1. The Contract Documents, as defined in Document 00 7213 - General Conditions and modifications thereto, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.

C. Related Sections:
1. Section 01 2973 - Schedule of Values: Submittal requirements.
2. Section 01 4500 - Quality Control: Field samples.
4. Section 01 7800 - Closeout Submittals: Requirements for closeout and Project Record Submittals.

1.2 DEFINITIONS

A. Refer to Document 00 7213 - General Conditions; Article 3.12 for definitions of the following:
1. Product Data
2. Samples
3. Shop Drawings
4. Submittal Package
5. Submittals

1.3 PROCEDURES

A. Submit complete Submittal Packages. Coordinate each Submittal with Submittal requirements defined within Technical Section. Submittals covering the same Broad Grouping of the Work shall be submitted at the same time.
   1. Broad Groupings of Work may be defined by Contractor provided that Submittals within Broad Groupings are identified separately by Section number with separate transmittal.
   2. Using the Table of Contents from Project Manual, prepare Submittals, and Submittal Packages to identify contents of each Submittal.
   3. Submit Mechanical and Electrical Submittal Packages concurrent with one another in quantities required.
      a. Data within Mechanical and Electrical Submittal Packages shall be coordinated prior to submitting to Architect for action.

B. Each Submittal Package shall contain a Cover Sheet followed by an Index reflecting contents of Package. Each item of Submittal Package shall be tabbed and labeled.
   1. Shop Drawings, Product Data, Samples, or Submittal Packages not prepared as defined herein will be subject to rejection and returned to the Contractor with no action taken.

C. Architect will not accept partial Submittals.
   1. Any partial submittal received will be returned to Contractor without action.

D. Architect will not accept Submittals which obviously have not been reviewed by the Contractor before submittal to Architect. Any such submittal received will be returned to Contractor without action.

E. Make Submittals promptly in accordance with Submittal Schedule. Failure of Contractor to transmit Submittals to Architect in sufficient time for review shall not constitute adequate cause for extension of Contract Time.

F. Submittals shall be fastened in binders or folders, or otherwise assembled and organized into an easily manageable format and accompanied by separate transmittal form for each Submittal.
   1. Submittals covering the same Broad Grouping of the Work shall be submitted at the same time.
   2. Loose or fragmented submittals will be returned to Contractor without action.

G. Each Submittal shall contain the following information:
   1. Date of Submittal and dates of previous Submittals.
   2. Project title and Architect's project number.
   3. Names of Contractor, Subcontractor, Supplier and Manufacturer, as applicable.
   4. Field dimensions, clearly identified as field dimensions.
   5. Location where material and/or equipment will be installed; relation of product to adjacent or critical features of the Work or materials.
   6. Contractor's stamp, initialed and signed, certifying Contractor review of Submittals, verification of products, field measurements and field construction criteria, as well as coordination of information within Submittal with requirements of the Work and Contract Documents as a whole.

H. Transmit each Submittal to Architect with AIA Form G810 “Transmittal Letter” or other Architect approved transmittal form or letter containing the same information as AIA Form G810.
   1. Submittal Packages and Submittals shall be delivered in person or by courier, overnight delivery service or U.S. Mail postpaid.
   2. Do not fax submittals.

I. Sequentially number the transmittal form for each Submittal. Revise Submittals with original number and a sequential alphabetic suffix.

J. Transmit each Submittal within Submittal Package identifying the Project, Contractor, subcontractor, and major supplier.
   1. Prominently identify Submittal by Specification Section and pertinent Drawing or Detail number, as appropriate.
   2. Identify deviations from Contract Documents.
      a. Identify deviations from specified products or procedures.
      b. Identify deviations from specified standards.
   3. Failure of Contractor to identify deviations will result in Submittal being returned to Contractor marked “Incomplete-Rejected.”
      a. Upon receipt of returned item, revise Submittal to identify deviations and resubmit to Architect for review.
   4. Provide space for Contractor and Architect or Architect’s Consultant review stamps.

K. Submittals that will be forwarded to Architect’s Consultants shall be prepared in conformance with this Section and in conformance with requirements contained in other Sections outlining Architect’s Consultants procedures.

L. Submit initial Construction Schedule and Schedule of Values, as specified after Award of Contract. After review by Architect revise and resubmit as required. Submit revised schedules as specified reflecting changes since previous submittal.

M. Comply with Construction Schedule for Submittals related to Work progress. Coordinate Submittals of related items.

N. Submittal to Architect for review is for the limited purpose of checking for conformance information given and the design concept expressed in the Contract Documents.
   1. Samples will be reviewed only for aesthetic, color or finish selection.

O. After Architect review of Submittal, revise and resubmit as required, identifying changes made since previous submittal.
   1. Failure of Contractor to identify changes will result in item being returned to Contractor marked “Incomplete-Rejected.”
      a. Upon receipt of returned item, revise item to identify changes and resubmit.

P. Distribute copies of reviewed Submittals to concerned persons. Instruct recipients to promptly report any inability to comply with provisions.

Q. Maintain copies of Submittals at site as specified in Document 00 7213 - General Conditions.

R. Maintain Project Record Submittals for Owner's Record submitted at Project Closeout as specified in Section 01 7800 - Closeout Submittals.

1.4 RESUBMITTALS

A. Resubmit Submittals received back from Architect marked “Revise and Resubmit,” “Incomplete-Rejected," or “Provide Contract Specified Item.”

B. Re-submittal shall include entire original submittal with corrected items clearly identified by circling, highlighting or other Architect approved method. Provide clear, concise and complete written description of what revisions to original submittal have been made and where.

C. Re-submittal of only revised data without entire original submittal not permitted. Any re-submittals without the entire original submittal, revised data, identification of revised data, and written description of revisions will result in re-submittal being returned to Contractor marked “Incomplete-Rejected.”

D. If Architect or Architect’s Consultants are required to perform a second, or more, re-submittal review because the re-submittal is incomplete or incorrect and must be returned to Contractor marked "Incomplete-Rejected:"
   1. Architect will invoice Owner for additional services by the Architect or Architect’s Consultants.
   2. Contractor shall pay for Architect’s or Architect’s Consultant additional services by deductive change order.
   3. Change order will be issued deducting the additional service amount from the Contract Sum.

1.5 SCHEDULE OF SUBMITTALS

A. Submit three (3) copies of proposed Schedule of Submittals to Architect, within (10) days after Date of Notice to Proceed. List all items that require submittal for review by Architect in accordance with Document 00 7213 - General Conditions.

B. Submit three (3) copies of final Schedule of Submittals to Architect within five (5) days after receipt of proposed Schedule of Submittals review from Architect.

C. Schedule of Submittals: Include the following.
   1. Indicate type of Submittal; Product Data, Shop Drawing, Sample, Certificate, or other Submittal.
   2. Identify by Specification Section number, Specification paragraph number where item is specified, and description of item being submitted.
   3. Indicate scheduled date for initial submittal, date for approval, and date for possible re-submittal for each submittal.
   4. Indicate number of submittal copies required for each submittal.

D. Coordinate Schedule of Submittals with Construction Schedule. Revise and update Schedule of Submittals when required by changes in the Construction Schedule. Provide Architect with updated schedules within five (5) days of date schedule is revised.

E. Prepare Schedule of Submittals on CSI Form 12.2A - Submittal Checklist, CSI Form 12.1B - Submittal Log or other Architect approved form or document Contractor prefers to use.

1.6 SCHEDULE OF VALUES

A. Refer to Section 01 2973 - Schedule of Values.

1.7 SHOP DRAWINGS

A. Refer to Document 00 7213 - General Conditions.

B. It is the sole responsibility of Contractor, Subcontractors or Material Suppliers to prepare their own drawings or offer materials as required by their submittals.

C. Shop Drawings shall be presented in clear and thorough manner. Plan drawings shall be identified by reference to sheet numbers and room numbers indicated on Contract Documents. Detail drawings shall be identified by reference mark to sheet and plan drawing indicated on Contract Documents.
   1. Indicate special utility and electrical characteristics, utility connection requirements and location of utility outlets for service for functional equipment and appliances.

D. Submit five (5) copies for Submittals reviewed only by Architect:
   1. Three (3) copies will be returned to Contractor.
   2. One (1) copy will be returned to Contractor for Contractor to keep, assemble and furnish to Owner as a Record Submittal as specified in Section 01 7800 - Closeout Submittals.
   3. One (1) copy will be kept by Architect.

E. Contractor is allowed to submit one (1) electronic set of required Submittals to Architect for action instead of required number(s) of Submittals outlined above.
   1. Electronic Submittals shall be submitted on single writable compact disk in latest PDF format.

F. Reproductions of Contract Documents not permitted.
   1. Submittals received containing reproductions of Contract Documents will be returned, without review, for revision and re-submittal.

1.8 PRODUCT DATA

A. Refer to Document 00 7213 - General Conditions.

B. Mark each copy to identify applicable products, models, options, and other data; supplement manufacturers' standard data to provide information unique to Work. Indicate performance characteristics and capacities. Indicate dimensions and clearance required. Indicate connections to building systems and adjacent materials. Include manufacturers' installation instructions when required by individual Specification Section.

C. Manufacturer’s standard schematic drawings and diagrams shall be modified to delete information which is not applicable to Work.

D. Submit five (5) copies for Submittals reviewed only by Architect:
   1. Three (3) copies will be returned to Contractor.
   2. One (1) copy will be returned to Contractor for Contractor to keep, assemble and furnish to Owner as a Record Submittal as specified in Section 01 7800 - Closeout Submittals.
   3. One (1) copy will be kept by Architect.

E. Contractor is allowed to submit one (1) electronic set of required Product Data to Architect for action instead of required number(s) of Product Data outlined above.

1. Electronic Product Data shall be submitted on single writable compact disk in latest PDF format.

1.9 SAMPLES

A. Refer to Document 00 7213 - General Conditions.

B. Submit samples for selection of finishes maximum 60 days after date of Notice to Proceed. Color samples shall be submitted before date for Payment Request No. 2 submittal. Payment Request No. 2 will not be processed until all color samples are submitted.

C. Submit all samples together as one (1) Color Sample Submittal Package.

D. Submit full range of manufacturer's standard colors, textures, and patterns for Architect selection.

E. Submit samples to illustrate functional characteristics of the product, with integral parts and attachment devices. Coordinate submittal of different categories for interfacing work.

F. Include identification on each sample, giving full information.

G. Submit number of samples specified in respective Specification section; two (2) will be retained by Architect. Reviewed samples which may be used in the Work are indicated in the Specification Section.

H. Approved samples may be returned in the form of a Color Board. Maintain Color Board and other returned samples at Project Site for comparison of functional and aesthetic characteristics of the Work.
   1. One (1) copy of each approved sample shall be used for Project Record Submittals.

1.10 FIELD SAMPLES/MOCK-UPS

A. Specified in Section 01 4500 - Quality Control.

1.11 MANUFACTURER'S INSTRUCTIONS

A. Submittal of manufacturer's installation instructions is for information only and will not be reviewed by Architect.

B. When required in individual Specification Section, submit manufacturer's printed instructions for delivery, storage, assembly, installation (start-up) adjusting, and finishing, in quantities specified for Product Data.

C. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

D. Clearly identify conflicts between requirements of Contract Documents and Manufacturer’s Instructions.

1.12 CERTIFICATES

A. When specified in individual Specification Sections, submit certification by manufacturer to Architect, in quantities specified for Product Data.

B. Indicate material or Product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
   1. Certification shall contain the following statement:

      "(NAME OF MANUFACTURER) hereby certifies that the requirements of the Contract Documents for (NAME, NUMBER AND ADDRESS OF PROJECT) have been carefully studied and that (NAME OF PRODUCT OR MATERIAL) conforms to, or exceeds these requirements."

C. Certificates may be recent or previous test results on material or Product, but must be acceptable to Architect.

D. Contractor Installation Certification: When specified in individual Specification Section, submit notarized Contractor Installation Certification form as a Record Document Closeout Submittal.

1.13 CLOSEOUT SUBMITTALS

A. Specified in Section 01 7800 - Closeout Submittals.

B. Project Record Submittals: Maintain one (1) set of Shop Drawings, Product Data, Samples and Manufacturer's Instructions as specified in Section 01 7800 - Closeout Submittals.

1.14 CONTRACTOR ACTION

A. Preparation of overall Submittal Package is the responsibility of Contractor.
   1. Preparation of trade specific Submittals is the responsibility of specific trade subcontractor.
   2. Preparation of product specific Submittals is the responsibility of the product manufacturer representative.

B. Prepare Submittals and submit to Architect, after Contractor review and approval in accordance with the approved Submittal Schedule.
   1. Refer to Document 00 7213 – General Conditions.

C. Receive Submittals from subcontractors, material suppliers and others.

D. Review Submittals and re-Submittals from subcontractors, material suppliers and others for conformance with the Contract Documents before submitting to Architect. Review shall be thorough, complete and detailed.
   1. Return incomplete or incorrect Submittals for correction and re-submittal to Contractor.
   2. Receive corrected re-Submittals form subcontractors, material suppliers and others; review for required corrections and conformance with Contract Documents.

E. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of Products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with the requirements of the Work and Contract Documents.

1.15 ARCHITECT ACTION

A. For Submittals where action and return is required or requested, Architect will review each Submittal, mark to indicate action taken, and return to Contractor.
   1. Compliance with specified characteristics is the Contractor's responsibility.
   2. Submittals for Information, Closeout Documents, Record Documents and other Submittals for similar purposes, no action will be taken.

B. Action Stamp: Architect will stamp each Submittal with a uniform, self-explanatory action stamp. The stamp will be appropriately marked, as follows, to indicate the action taken.
   1. "Reviewed": Final Unrestricted Release. Where Submittals are marked "Reviewed", that part of the Work covered by the Submittal may precede provided it complies with requirements of the Contract Documents; final acceptance will depend upon that compliance.
   2. "Make Corrections Noted": Final-But-Restricted Release. When Submittals are marked "Make Corrections Noted", that part of the Work covered by the Submittals may precede provided it complies with notations or corrections on the Submittal and requirements of the Contract Documents; final acceptance will depend on that compliance.
   3. "Revise and Resubmit": Returned for Re-submittal. When Submittal is marked "Revise and Resubmit," do not proceed with that part of the Work covered by the Submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new Submittal in accordance with the notations; resubmit without delay. Repeat if necessary to obtain a different action mark.
      a. Do not permit Submittals marked "Revise and Resubmit," to be used at the Project site, or elsewhere where Work is in progress.
   4. "Incomplete-Rejected": When Submittal is marked "Incomplete-Rejected," do not proceed with that part of the Work covered by the Submittal, including purchasing, fabrication, delivery, or other activity. Product Shall Not Be Used.
      a. Do not permit Submittals marked "Incomplete-Rejected," to be used at the Project site, or elsewhere where Work is in progress.
   5. Provide Contract Specified Item: When Submittal is marked “Provide Contract Specified Item,” provide item as specified in the Contract Documents. No deviations permitted.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

AIA® Document G810™ – 2001

Transmittal Letter

PROJECT: *(Name and address)*
[Insert Project Name]
[Address]
[City, ST Zip]
[Phone Number]
[Fax Number]

TO: *(Name and address)*

FROM: *(Name and address)*

WE TRANSMIT:	☐ Attached	☐ Under separate cover	
VIA:	☐ Overnight delivery	☐ Mail	☐ E-mail
	☐ Courier	☐ Fax	☐ Other
FOR:	☐ Approval / Action	☐ Information	☐ Use as requested
	☐ Comment	☐ Distribution	☐ Other
THE FOLLOWING:	☐ Drawings	☐ Specifications	☐ Digital Files
	☐ Submittals	☐ Other	

NO. OF COPIES	DATE	FORMAT	DESCRIPTION

REMARKS:

BY:

COPIES TO:

Advancement of Construction Technology

SUBMITTAL LOG

Project: _____ A/E Project Number: _____

Owner: _____ Contractor: _____

SPEC. SECTION NO.	NEW SUB	RESUBMIT	ITEM DESCRIPTION	SUBMITTAL NO.	DATE REC= D	CONSULTANT			DATE RET= D	ACTION						
						TO	DATE SENT	DATE RET= D		APP= D	APP= D AS NOTED	NOT SUBJ= T TO REVIEW	NO ACTION REQ.	REVISE/ RESUB.	REJECT/ RESUB.	APP= D AS NOTED/ RESUB.

Advancement of Construction Technology

SUBMITTAL CHECKLIST

Project: _____ A/E Project Number: _____

Owner: _____ Contractor: _____

	PRECONSTRUCTION											POST-CONSTRUCTION				
SPECIFICATION SECTION (Number and Title)	PROD. DATA	SHOP DWG.	SAMP.	CALC.	DGN. DATA	TEST RPT.	CERT.	QUALF.	MFG. INST.	CONF.		MFG. FLD. RPT.	REC. DOC.	O / M DATA	WRTY.	

O = Required X = Received R = Rejected / Resubmit A = Approved

September 1996
CSI Form 12.2A

SECTION 01 4200

REFERENCES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Quality assurance.
2. Reference standards.
3. Abbreviations.
4. Definitions.

B. Related Documents:
1. The Contract Documents, as defined in Document 00 7213 - General Conditions and modifications thereto, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.

C. Related Sections:
1. Section 01 1100 - Summary: Definitions.
2. Section 01 6200 - Product Options: Definitions.

1.2 QUALITY ASSURANCE

A. For Products or workmanship specified by association, trade, or other consensus standards, comply with requirements of standard, except when more rigid requirements are specified or are required by applicable codes. Such standards are made a part of Contract Documents by reference.

B. Conform to reference standard by date of issue current on original date of issue indicated on Contract Documents.

C. Obtain copies of standards when required by Contract Documents.

D. Maintain copy at Project Site during submittals, planning, and progress of specific Work, until Final Acceptance.

E. Should specified reference standards conflict with Contract Documents, request clarification from the Architect before proceeding.

F. The contractual relationship, duties, and responsibilities of the parties in Contract nor those of the Architect shall not be altered from Contract Documents by mention or inference otherwise in any reference document.

1.3 REFERENCE STANDARDS

A. Conflicting Requirements: Where compliance with two or more standards is specified, and the standards may establish different or conflicting requirements for minimum quantities or quality levels. Refer requirements that are different, but apparently equal, and uncertainties to Architect for decision before proceeding.

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

B. Copies of Standards: Each entity engaged in construction on Project is required to be familiar with industry standards applicable to that entity's construction activity. Copies of applicable standards are not bound with Contract Documents.
   1. Where copies of standards are needed for performance of a required construction activity, Contractor shall obtain copies directly from publication source.

C. Standard Specification, Manufacturer's Specifications, Manufacturer's Published Instructions: These terms and other similar terms shall be defined as the latest edition, complete with all revisions, as published or printed on or before the Bid Date as indicated in the Invitation to Bid.

1.4 ABBREVIATIONS

A. Abbreviations and Names: Trade association names and titles of general standards are frequently abbreviated. Where such acronyms or abbreviations are used in Specifications or other Contract Documents, they mean the recognized name of trade association, standards generating organization, authority having jurisdiction, or other entity applicable to context of text provision.

1.5 DEFINITIONS (People and Entities)

A. Authority Having Jurisdiction: Local, State, or Federal government body having jurisdiction over the Work or the Project.

B. Contractor: Defined in Document 00 7213 – General Conditions. When used on the Drawings or in the Specifications the term "Contractor" may mean the Contractor, Sub-contractor, Sub-subcontractor, Material Supplier or similar entity as defined in Document 00 7213 – General Conditions, if the Contractor has divided the Work among such persons and entities.

C. Engineer/Engineer of Record: The engineer is the person lawfully licensed to practice engineering in a particular engineering area such as civil, structural, mechanical, electrical, and other areas as made be indicated.

D. Installer: The Contractor or another entity engaged by the Contractor, either as an employee, subcontractor, or contractor of lower tier, to perform a particular construction activity, including installation, erection, application, unpacking, assembly, placing, finishing, curing, adjusting, cleaning, protection, or similar operations. Installers are required to be experienced in the operations they are engaged to perform.
   1. Experienced: The term "experienced," when used with the term "installer," means having a minimum number of years experience on projects similar in size and scope to this Project, being familiar with the special requirements indicated, and having complied with requirements of the authority having jurisdiction.
   2. Trades: Using terms such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding

generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to tradespersons of the corresponding generic name.

E. Manufacturer: A person, firm, or corporation who makes Products.

F. Material Supplier: See Supplier.

G. Project Field Superintendent: The Contractor's representative at the site who is responsible for continuous field supervision, coordination, quality control, completion of the work, and, unless another person is designated in writing by the Contractor to the Architect, for the prevention of accidents.

H. Subcontractor: An individual, firm or corporation having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work at the Project Site.

I. Supplier: A manufacturer, fabricator, supplier, distributor, materialman or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or any Subcontractor, but does not perform labor at Project Site.

J. Testing Laboratory: An independent entity engaged to perform specific inspections or tests, either at the Project Site or elsewhere, and to report on and, if required, to interpret results of those inspections or tests.

K. Trade: See Installer.

L. Utility: Local Utility.

1.6 DEFINITIONS (Things, Services, and Dispositions)

A. Acceptable: Satisfactory to and approved by the Architect.

B. Approve: The term "approved," when used in conjunction with the Architect's action on the Contractor's submittals, applications, and requests, is limited to the Architect's duties and responsibilities as stated in the Contract.

C. Change Order: A modification to a contract.

D. Clarification Drawing: A graphic interpretation of the Drawings or other Contract Documents issued by the Architect.

E. Construction Occupancy Date: The date that the Contractor may assume occupancy and begin that portion of the Work within the existing facilities of the Owner. The Construction Occupancy Date may or may not coincide with the Date of the Notice to Proceed and more than one Construction Occupancy Date may be established for different portions of the existing facilities of the Owner.

F. Construction Operations: Activities of the Contractor at the Project Site.

G. Directed: Instructed by the Architect.

H. Experienced (Qualified): When used to describe the "installer", "fabricator", or similar terms; a person, firm or corporation skilled through observation or of participation in the

particular activities required to complete the Work or a portion of the Work to the degree of the quality specified.

I. Final Connections: Complete plumbing, mechanical, and electrical connections as required and recommended by manufacturer for optimum operation of equipment.

J. Indicated: The term "indicated" refers to graphic representations, notes or schedules on the Drawings, or other Paragraphs or Schedules in the Specifications, and similar requirements in the Contract Documents. Where terms such as "shown," "noted," "scheduled," and "specified" are used, it is to help the reader locate the reference. Location is not limited.

K. Install: Operations at the Project Site including the actual unloading, unpacking, assembly, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

L. Mobilization: To establish and commence work activity at the Project Site.

M. Notice to Proceed: A written instrument by the Owner which will authorize the Contractor to begin the Work and which will be issued after execution of the Agreement. The Date of the Notice to Proceed shall be the starting date of the Contract Time. The Contractor shall not begin the Work until the Notice to Proceed has been issued.

N. Partial Occupancy: Partial Occupancy occurs when the Owner begins to occupy parts of the project for its own purposes, such as early fixture set-up, merchandising, etc. Partial Occupancy shall not constitute acceptance of Work not in accordance with the Contract Documents.

O. Premises: Space or property made available to the Contractor for constructing the Work.

P. Project Site: The space available to the Contractor for performing construction operations, either exclusively or in conjunction, with others performing other work as part of the Project. The extent of the Project Site is shown on the Drawings and may or may not be identical with the description of the land on which the Project is to be built.

Q. Receive: Accepting a delivery. (Entity responsible for accepting a delivery.)

R. Regulations: The term "Regulations" includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.

S. Reviewed: Examined and found acceptable by the Architect.

T. Substantial Completion: 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 the Owner can occupy or utilize the Work for its intended use.

U. Substitution: A product that is exchanged for another of the same function.

V. Supply: To supply and deliver, unload, inspect for damage (same as furnish).

W. Temporary Facilities: Those portions of the Work which shall be removed from the Project Site by the Contractor before the completion of the Work and shall include, but shall not be limited to, such items as shoring, temporary bracing, concrete formwork, temporary

guardrail and other safety items, security fences, office and storage structures, and scaffolding and hoisting equipment.

X. Unacceptable: Determined not satisfactory by the Architect.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01 4500

QUALITY CONTROL

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Quality Control.
2. Workmanship.
3. References and Standards.
4. Manufacturer's Instructions.
5. Manufacturer's Certificates.
6. Manufacturer's Field Services.
7. Contractor's Quality Control.

B. Related Documents:
1. The Contract Documents, as defined in Document 00 7213 - General Conditions and modifications thereto, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.

C. Related Sections:
1. Section 01 3300 - Submittal Procedures: Requirements for submittals.
2. Section 01 6200 - Product Requirements: Requirements for material and product quality.
3. Section 01 7700 - Closeout Procedures: Requirements for project closeout.
4. Section 01 7800 - Closeout Submittals: Project record documents.

1.2 QUALITY CONTROL

A. Maintain quality control over suppliers, manufacturers, products, services, site conditions, and workmanship to produce work of specified quality.

B. Quality control monitored and documented by Contractor Quality Control Representative.

1.3 WORKMANSHIP

A. Comply with industry standards except when more restrictive tolerances or specified requirements indicate more rigid standards or more precise workmanship.

B. Perform work by persons qualified to produce workmanship of specified quality.

C. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, and racking.

1.4 REFERENCES AND STANDARDS

A. For products and workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with

requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. Conform to reference standard of date of issue current on date of Contract Documents, except where a specific date is established by applicable code.

C. Obtain copies of standards where required by product specification sections.

D. Maintain copy at project site during submittals, planning, and progress of the specific work, until Substantial Completion.

E. Should specified reference standards conflict with Contract Documents, request clarification from Architect before proceeding.

F. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of Architect shall be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.5 MANUFACTURER'S INSTRUCTIONS

A. Comply with instructions in full detail, including each step in sequence. Should instructions conflict with Contract Documents, request clarification from Architect before proceeding.

1.6 MANUFACTURER'S CERTIFICATES

A. When required by individual Specifications Sections, submit manufacturer's certificate, in duplicate, that products meet or exceed specified requirements.

1.7 MOCKUPS

A. When required by individual Specification Sections, erect complete, full-scale mockup of assembly at Project site. Remove mockup at completion, when approved by Architect.

1.8 MANUFACTURER'S FIELD SERVICES

A. When required by individual Specification Sections, require manufacturer to provide qualified personnel to observe field conditions, conditions of surfaces and installation, quality of workmanship, as applicable, and to make appropriate recommendations.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.1 CONTRACTOR QUALITY CONTROL

A. Contractor is responsible for overall quality of Work performed by Contractor or subcontractors working under this Contract.

B. Quality of any part of Work must not be less than that required by Contract Documents.

B. If Architect or Owner's Representative determines that quality of work does not conform to Contract Documents, Architect will notify Contractor, in writing, areas of non-conformance.

C. Contractor must correct identified deficiencies and advise Architect of corrective action taken within seven (7) days of date of notification.

3.2 CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.

B. Comply with manufacturers' instructions, including each step in sequence.

C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.

D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Have Work performed by persons qualified to produce required and specified quality.

F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

3.3 TOLERANCES

A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.

B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Architect before proceeding.

C. Adjust products to appropriate dimensions; position before securing products in place.

3.4 DEFECT ASSESSMENT

A. Replace Work or portions of the Work not conforming to specified requirements.

B. If, in the opinion of Architect, it is not practical to remove and replace the Work, Architect will direct an appropriate remedy or adjust payment.

3.5 CONTRACTOR FIELD INSPECTIONS

A. Contractor: Inspect Work provided under this Contract to ensure Work is in compliance with Contract requirements.

B. Preparatory Inspection: Performed prior to beginning Work and prior to beginning each segment of Work and includes:
   1. Review of Contract requirements.

2. Review of shop drawings and other submittal data after return and approval.
3. Examination to assure materials and equipment conform to Contract requirements.
4. Examination to assure required preliminary or preparatory Work is complete.

C. Initial Inspection: Performed when representative portion of each segment of Work is completed and includes:
1. Performance of required tests.
2. Quality of workmanship.
3. Review for omissions or dimensional errors.
4. Examination of products used, connections and supports.
5. Approval or rejection of inspected segment of Work.

D. Follow-Up Inspections: Performed daily, and more frequently as necessary, to assure non-complying Work has been corrected.

3.6 NON-COMPLIANCE CHECK-OFF LIST

A. Maintain check-off list of Work that does not comply with Contract Documents, stating specifically what is non-complying, date faulty Work was originally discovered, and date Work was corrected.

B. No requirement to report deficiencies corrected same day it was discovered.

C. Submit copy of Non-Compliance Check-Off List of non-complying work items to Architect and Owner's Contract Coordinator on a weekly basis.

D. Be prepared to discuss Contractor’s Non-Compliance Check-Off List contents with Architect at the weekly Jobsite Progress Meeting.

3.7 COMPLETION AND INSPECTION OF WORK

A. Substantial Completion: Refer to Section 01 7700 - Closeout Procedures.

B. Prior to final acceptance by Architect and Owner's Representative, submit a certification, on Contractor's Letterhead, signed by Contractor to Architect and Owner stating that all Work has been inspected and all Work, except as specifically noted, is complete and in compliance with Contract Documents.

END OF SECTION

SECTION 01 6200

PRODUCT OPTIONS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Definitions.
2. Preconstruction submittals.
3. Construction submittals.
4. Products.
5. Product options.
6. Manufacturer's instructions.
7. Product substitution procedures.
8. Product delivery requirements.
9. Product storage and handling requirements.
10. CSI Form 1.5A - Subcontractors and Major Material Suppliers List.

B. Related Documents:
1. The Contract Documents, as defined in Document 00 7213 - General Conditions and modifications thereto, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.
   a. Document 00 2113 - Instructions to Bidders: Substitutions before bid date, Preconstruction Submittals.

C. Related Sections:
1. Section 01 3300 - Submittal Procedures: Construction submittals, procedures, shop drawings, product data and samples.
2. Section 01 4200 - References: Reference standards, abbreviations and definitions.
3. Section 01 4500 - Quality Control: Product quality monitoring.
4. Section 01 6211 - Asbestos Prohibition for Public Works Projects: Oklahoma State requirements.
5. Section 01 6213 - Product Substitutions Procedures: Substitution procedures during bidding and after bidding.

1.2 DEFINITIONS

A. Provide: Furnish and install. Furnish labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, items, transportation, temporary facilities, services and related items required for a complete installation.

B. Products: Items purchased for incorporation in Work, whether purchased for Project or taken from previously purchased stock. Term includes the terms material, equipment, system, and terms of similar intent.

C. Named Products: Items identified by manufacturer's name, including make or model number or other designation, shown or listed in manufacturer's published product literature.

D. Materials: Products substantially shaped, cut, worked, mixed, finished, refined, or otherwise fabricated, process, or installed to form a part of Work.

E. Equipment: Product with operational parts, whether motorized or manually operated, that requires service connections, such as wiring or piping.

F. Furnish: Supply and deliver to Project site, ready for unloading, assembly, erection, placement of similar requirements.

G. Install: Unload, unpack, assemble, erect, place, finish, protect, adjust, and clean, or similar requirements.

1.3 PRECONSTRUCTION SUBMITTALS

A. Section 01 3300 - Submittal Procedures: Requirements for submittals.

B. Submit to Architect within 10 calendar days after date of notification of Award of Contract as specified in Document 00 2113 - Instructions to Bidders.

C. Identify work to be performed by Contractor's own forces.

D. List names of manufacturers, products and suppliers of principal items or systems of materials and equipment proposed for Work.
   1. Submit on CSI Subcontractors and Major Material Suppliers List Form 1.5A.

E. Architect and Owner will review submitted data and advice Contractor as specified in Document 00 2113 - Instructions to Bidders.

1.4 CONSTRUCTION SUBMITTALS

A. Section 01 3300 - Submittal Procedures: Requirements for submittals.

B. Proposed Products List: Update, modify and expand CSI Form 1.5A, submitted as part of Preconstruction Submittals, to provide list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.
   1. For products specified only by reference standards, list applicable reference standards.
   2. Submit within 10 calendar days after date of Notice to Proceed.

C. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.

D. Shop Drawing Submittals: Prepared specifically for this Project.

E. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
   1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

F. Indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

1.5 PRODUCTS

A. Provide Products that comply with Contract Documents, are undamaged, and new at time of installation.

B. Provide Products complete with accessories, trim, finish, safety guards, and other devices and details needed for complete installation and intended use and effect.

C. Provide Products of the same kind from a single source. When specified Products are available only from sources that do not, or cannot, produce a quantity adequate to complete Project requirements in compliance with project schedule, contact Architect, in writing, to determine most important product qualities before proceeding. Qualities may include attributes, such as visual appearance, strength, durability, or compatibility. When Architect makes determination, select Products from sources producing Products that possess those qualities to fullest extent possible.

D. Nameplates:
   1. Except for testing laboratory approval labels, and operating data, do not permanently attach or imprint manufacturer's or producer's nameplates or trademarks on exposed surfaces or products which will be exposed to view either in occupied spaces or on exterior of Work.
   2. Locate required labels and stamps on concealed surface or, where required for observation after installation, on accessible surface which, in occupied areas, is not conspicuous.

E. Product Nameplates:
   1. Provide permanent nameplate on each item of service-connected or power operated equipment.
   2. Indicate manufacturer, product name, model number, serial number, capacity, speed, ratings and similar essential operating data.
   3. Locate nameplates on an easily accessed surface which, in occupied spaces, is not conspicuous.

F. Monitor product quality as specified in Section 01 4500 - Quality Control.

1.6 PRODUCT OPTIONS

A. Throughout Contract Documents, types of Products may be specified by manufacturer's name and catalog number to establish standards of quality and performance, not for the purpose of limiting competition. Substitute methods and Products may be submitted to Architect for consideration. Substitutions may not be permitted where Owner requires a particular product for a specific purpose.

B. Products Specified by Reference Standards or by Description Only: Any Product meeting those standards or description.

C. Products Specified by Naming One or More Manufacturers: Products of manufacturers named and meeting specifications. Substitutions permitted if no Substitutions Not Permitted provision specified.

D. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a “Contractor’s Substitution Request” for any manufacturer not named.

E. Products Specified by Naming One Manufacturer and Product with Provision for Other Acceptable Manufacturers: Use product specified or equivalent product from listed Acceptable Manufacturers. This option is used for common equivalent products manufactured by many Acceptable Manufacturers. Product specified establishes standard. Submit data indicating product selected from Other Acceptable Manufacturer meets established standard of specified product.

F. Products Specified by Naming Only One Manufacturer with Substitutions Not Permitted Provision: Use product specified. No options, no substitutions permitted.

1.7 MANUFACTURER'S INSTRUCTIONS

A. When Contract Documents require that installation of Work shall comply with Manufacturer's Published Instructions, obtain and distribute copies of instructions to parties involved in installation, including copies to Architect, prior to starting Work.

B. Maintain one set of complete instructions at Project site during installation and until completion.

C. Maintain copies for Project Record Documents.

D. Handle, install, connect, clean, condition, and adjust products in strict accordance with manufacturer's instructions and in conformance with specified requirements.

E. Inspect substrate to receive Work and conditions Work will be performed for conditions detrimental to construction. Correct unacceptable conditions to comply with manufacturer's recommendations.

F. Should job conditions or specified requirements conflict with manufacturer's instructions, notify Architect in writing for further instructions. Do not proceed with work without clear instructions.

G. Perform work in accordance with manufacturer's instructions. Do not omit preparatory steps or installation procedures unless specifically modified or exempted by Contract Documents.

H. Install Work during conditions of temperature, humidity, exposure, forecasted weather, and status of project completion which will ensure best possible results for each item of material or equipment.

I. Isolate non-compatible materials to prevent deterioration.

J. Mount individual units of Work at industry recognized standard mounting heights for applications indicated. Refer questionable mounting height choices to Architect for final decision.

1.8 PRODUCT SUBSTITUTION PROCEDURES

A. Refer to the following Documents for substitution requirements and procedures.
   1. Document 00 2113 - Instructions to Bidders
   2. Document 00 2218 - Additional Instructions to Bidders
   3. Section 01 6213 - Product Substitution Procedures

B. Decision of Architect is final.

1.9 PRODUCT DELIVERY REQUIREMENTS

A. Transport and handle Products in accordance with manufacturer's instructions, using means and methods that will prevent damage, deterioration, and loss, including theft.

B. Schedule Product delivery to minimize long-term storage at Project site and prevent overcrowding of construction spaces.

C. Coordinate Product delivery with installation schedule to assure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.

D. Deliver Products to Project site in undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.

E. Promptly inspect shipments to ensure that Products comply with project requirements, quantities are correct, Products are undamaged, and properly protected.

F. Provide equipment and personnel to handle Products by methods to prevent soiling, disfigurement, or damage.

1.10 PRODUCT STORAGE AND HANDLING REQUIREMENTS

A. Store and protect Products in accordance with manufacturers' published instructions, with seals and labels intact and legible.

B. Store Products subject to damage by elements above ground, under cover in weathertight enclosure, with ventilation adequate to prevent condensation. Maintain temperature and humidity within range required by manufacturer's published instructions.

C. For exterior storage of fabricated Products, place on sloped supports, above ground.

D. Off-site storage not permitted.

E. Cover Products subject to deterioration with impervious sheet covering. Provide ventilation to avoid condensation or potential degradation of Product.

F. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.

G. Provide equipment and personnel to store Products by methods to prevent soiling, disfigurement, or damage.

H. Arrange storage of Products to permit access for inspection. Periodically inspect to verify Products are undamaged and are maintained in acceptable condition.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

Advancement of Construction Technology

SUBCONTRACTORS AND MAJOR MATERIAL SUPPLIERS LIST

Project: _____ From (Contractor): _____

_____ Date: _____

To (A/E): _____ A/E Project Number: _____

_____ Contract For: _____

List Subcontractors and Major Material Suppliers proposed for use on this Project as required by the Construction Documents. Attach supplemental sheets if necessary.

Section Number	Section Title	Firm	Address	Phone Number (Fax Number)	Contact

☐ Attachments

Signed by: Date:

Copies: ☐ Owner ☐ Consultants ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ File

SECTION 01 6211

ASBESTOS PROHIBITION FOR PUBLIC WORKS PROJECTS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Compliance with applicable law.
2. Intent.
3. Statement.
4. Certification forms, located at end of Section.

B. Related Documents:
1. The Contract Documents, as defined in Document 00 7213 - General Conditions and modifications thereto, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.

C. Related Sections:
1. Section 01 6200 - Product Requirements: Product options and procedures.

1.2 COMPLIANCE WITH APPLICABLE LAW

A. Contractor shall fully comply with the requirements of Public Law 99-519 the Asbestos Hazard Emergency Response Act of 1986 and the United States Environmental Protection Agency Regulations promulgated October 30, 1987, Federal Register Volume 52, No. 210.

B. Contractor shall enforce compliance with this law and these regulations to all Subcontractors, Sub-subcontractors and material suppliers on this Project. Each Subcontract, Sub-subcontract and purchase order applicable to this Project shall contain Paragraph A. directly above.

1.3 INTENT

A. It is the specific intent of this Section of the Specification to prohibit the use or installation of any product, material, component of any product or material assembled from two or more separate products or materials, or any other item into the Work which contains more than one (1) percent asbestos by weight, and, thus, would be classified by Law as an Asbestos Containing Building Material.

1.4 STATEMENT

A. The Contractor shall execute, and shall cause each and every Subcontractor, Sub-subcontractor and material supplier on this Project to execute the Federal General Contractors Certification of Compliance with Asbestos Restrictions or the Federal Subcontractors or Material Suppliers Certification of Compliance with Asbestos Restrictions.

B. Contractor shall deliver certification as defined above to Owner as part of Closeout Documents Package.

C. Copies of applicable certifications are attached to this Section.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

FEDERAL ASBESTOS "STATEMENT" ALTERNATIVE TO INSPECTION

TO:

RE:

Sirs,

As the Architect of Record for the above referenced project and having prepared the Contract Documents, Construction Drawings and Specifications, Boynton Williams and Associates issued a Certificate of Substantial Completion _____.

In the performance of our professional services for the preparation of Contract Documents, Construction Drawings and Specifications for the above referenced Project, no materials or products were knowingly specified, or called for, in any Construction Document that contained more than one percent (1%) asbestos by weight, within the meaning of Public Law 99-519 together with the United States Environmental Protection Agency Regulations, Section 763.83 promulgated October 30, 1987, Federal Register, Volume 52, No. 210 defining Asbestos Containing Building Material (ACBM).

We are enclosing a Federal General Contractors Certificate of Compliance with Asbestos Restrictions which completes the requirements for the Exclusion as allowed in Section 763.99 (a)(7) of the United States Environmental Protection Agency Regulations, promulgated October 30, 1987, Federal Register, Volume 52, No. 210.

Boynton Williams & Associates

BY: _____
President

DATE:

Subscribed and Sworn to Before Me This _____ day of _____, 20____.

Notary Public

My Commission Expires _____.

FEDERAL SUBCONTRACTORS OR MATERIAL SUPPLIERS CERTIFICATION OF COMPLIANCE WITH ASBESTOS RESTRICTIONS

TO: _____
(Name of General Contractor)

RE:

Sirs:

As a Subcontractor or Material Supplier for the above referenced project we do certify and attest that no building materials or products were knowingly incorporated or installed in this project that contained more than one percent (1%) asbestos by weight, within the meaning of Public Law 99-519 together with the United States Environmental Protection Agency Regulations, Section 763.83 promulgated October 30, 1987, Federal Register, Volume 52, No. 210 defining Asbestos Containing Building Material (ACBM).

We also certify and attest that this Certification of Compliance with Asbestos Restrictions was included in each and every Sub-Subcontract and purchase order connected with the performance of Work for this Project, with a copy signed by the Sub-Subcontractor or Material Supplier remaining in our Project File for inspection.

Respectfully,

_____
(Name of Subcontractor)

_____
(Address of Subcontractor)

BY: _____
(Title)

DATE:

Attest and Seal:

Subscribed and Sworn to Before Me This _____ day of _____, 20_____.

_____
Notary Public

My Commission Expires _____.

FEDERAL GENERAL CONTRACTORS CERTIFICATION OF COMPLIANCE WITH ASBESTOS RESTRICTIONS

TO:

RE:

Sirs:

As a General Contractor for the above referenced project we do certify and attest that no building materials or products were knowingly incorporated or installed in this Project that contained more than one percent (1%) asbestos by weight, within the meaning of Public Law 99-519 together with the United States Environmental Protection Agency Regulations, Section 763.83 promulgated October 30, 1987, Federal Register, Volume 52, No. 210 defining Asbestos Containing Building Material (ACBM).

We also certify and attest that this Certification of Compliance with Asbestos Restrictions was included in each and every Sub-contract and purchase order connected with the performance of Work for this Project, with a copy signed by the Subcontractor or Material Supplier remaining in our Project File for inspection.

Respectfully,

_____
(Name of Contractor)

_____
(Address of Contractor)

BY: _____
(Title)

DATE:

Attest and Seal:

Subscribed and Sworn to Before Me This _____ day of _____, 20____.

Notary Public

My Commission Expires _____.

SECTION 01 6213

PRODUCT SUBSTITUTION PROCEDURES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Product substitutions.
2. Substitution request package.
3. Product substitution procedures during bidding.
4. Product substitution procedures after Award of Contract.
5. Architect's review.
6. CSI Form 1.5C - Substitution Request (During the Bidding Phase).
7. CSI Form 13.1A - Substitution Request (After the Bidding Phase).

B. Related Documents:
1. The Contract Documents, as defined in Document 00 7213 - General Conditions and modifications thereto, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.
a. Document 00 2113 - Instructions to Bidders.
b. Document 00 2218 - Additional Instructions to Bidders.

C. Related Sections:
1. Section 01 2600 - Contract Modification Procedures: Change order procedures.
2. Section 01 6200 - Product Options: Product options.

1.2 DEFINITIONS

A. Substitution: Changes in products, materials, equipment and methods of construction from those required by the Contract Documents and proposed by Contractor.

1.3 PRODUCT SUBSTITUTIONS

A. During the Bidding Phase: Submit proposed substitutions to Architect minimum five (5) days before Bid Date. Requests received after that time may be considered or rejected at the discretion of the Architect.
1. Refer to Document 00 2113 - Instructions to Bidders and Document 00 2218 - Additional Instructions to Bidders.
2. Requests may be received by a contractor, subcontractor, manufacturer or material supplier.

B. After the Bidding Phase: Submit proposed substitutions to Architect maximum 60 days after date of Notice to Proceed. Requests received after that time may be considered or rejected at the discretion of the Architect.
1. Refer to Document 00 7213 - General Conditions.
2. Submit requests only through Contractor.

C. Architect will consider Contractor request for substitutions when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action.
   1. Proposed substitution offers Owner a substantial advantage or savings in cost, time, energy conservation or other consideration.
   2. Specified Product becomes unavailable through no fault of Contractor.
   3. Proposed substitution does not require extensive revisions to the Contract Documents.
   4. Proposed substitution is consistent with the Contract Documents and will produce indicated results.
   5. Proposed substitution is fully documented and properly submitted.
   6. Proposed substitution will not adversely affect Contractor Construction Schedule.
   7. Proposed substitution has received necessary approvals of authorities having jurisdiction.
   8. Proposed substitution is compatible with other portions of the Work.
   9. Proposed substitution has been coordinated with other portions of the Work.
   10. Proposed substitution provides specified warranty.
   11. If proposed substitution involves more than one contractor, proposed substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

D. Architect will not consider Contractor request for substitutions if the following conditions occur. Architect will return requests without action.
   1. Proposed substitution is not submitted in accordance with the requirements of this Section.
   2. Acceptance of proposed substitution will require substantial revision of Contract Documents or building spaces.
   3. Proposed substitution does not indicate specific item request is for.
   4. Proposed substitution does not offer Owner a substantial advantage or savings in cost, time, energy conservation or other consideration.
   5. Proposed substitution requires extensive revisions to the Contract Documents.
   6. Proposed substitution is not consistent with the Contract Documents and will not produce indicated results.
   7. Proposed substitution is not fully documented and properly submitted.
   8. Proposed substitution will adversely affect Contractor Construction Schedule.
   9. Proposed substitution has not received necessary approvals of authorities having jurisdiction.
   10. Proposed substitution is not compatible with other portions of the Work.
   11. Proposed substitution has not been coordinated with other portions of the Work.
   12. Proposed substitution does not provide specified warranty.
   13. If proposed substitution involves more than one contractor, proposed substitution has not been coordinated with other portions of the Work, is not uniform and consistent, is not compatible with other products, and is not acceptable to all contractors involved.

E. Architect may not consider Contractor request for substitutions if proposed substitution does not provide a cost savings to Owner and is solely for the convenience of Contractor, subcontractor or material supplier.
   1. Requests received not accompanied by a cost savings to Owner may be considered or rejected at the discretion of the Architect.

F. Materials, products and equipment described in the Bidding Documents establish a standard of required function, dimension, appearance and quality to be met by any product substitution.

G. Architect's decision of approval or disapproval of a proposed substitution is final.

1.4 SUBSTITUTION REQUEST PACKAGE

A. Prepare a separate Substitution Request Package for each proposed substitution. Package shall be fastened in binders or folders or otherwise assembled and organized into an easily manageable format and accompanied by transmittal form.

B. Transmit each Substitution Request Package to Architect with AIA Form G810 “Transmittal Letter” or other Architect approved transmittal form or letter containing the same information as AIA Document G810.
   1. Deliver submittal in person or by courier, overnight delivery service or U.S. Mail postpaid.
   2. Do not Fax submittal. Proposer may fax a notification to Architect on proposer’s letterhead, that a Substitution Request Package is being sent and when it should arrive.

C. Clearly and legibly type all items included on Substitution Request Form.

D. Provide a Point-by-Point Comparison sheet listing manufacturer, model number, specific features, accessories, function, fabrication method, power and utility requirements, warranty, referenced standards such as ASTM, ANSI, materials, physical properties when tested in conformance with a nationally recognized testing agency and cost.
   1. Prepare comparison data side by side in descending columns with specified product data on left side of page and proposed substitute product data on right side.
   2. Where products do not compare, indicate that information in the appropriate column.

E. Provide complete documentation indicating compliance with requirements for substitutions, and the following information as appropriate:
   1. Coordination information, including a list of changes or modifications needed to other parts of Work and to construction performed by Owner and Separate Contractors, that will become necessary to accommodate proposed substitution.
   2. Product data, including drawings and descriptions of products, fabrication and installation procedures.
   3. Samples, where applicable or requested.
   4. A statement indicting the effect of substitution on Contractor Construction Schedule compared to schedule without approval of substitution. Indicate effect of proposed substitution on overall Contract Time.
   5. Cost information, including a proposal of the net change in the Contract Sum.
   6. Contractor certification that proposed substitution conforms to requirements of Contract Documents in every respect and is appropriate for the applications indicated.
   7. Contractor waiver of right to additional payment or time that may subsequently become necessary because of the failure of substitution to perform adequately.

1.5 PRODUCT SUBSTITUTION PROCEDURES DURING BIDDING

A. Substitutions proposed with bid not permitted.

B. Refer to Document 00 2113 - Instructions to Bidders, and 00 7213 – General Conditions for additional substitution requirements.

C. Provide data on a Substitution Request (During the Bidding Phase) Form, CSI Form 1.5C, in compliance with the requirements specified in this Section.

D. Contents of Substitution Request Package shall include three (3) copies of the following:
1. Transmittal - AIA Document G810.
2. Substitution Request Form - CSI Form 1.5C.
3. Point-by-Point Comparison.
4. Product Substantiating Data.

1.06 PRODUCT SUBSTITUTION PROCEDURES AFTER AWARD OF CONTRACT

A. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to Contract Documents.

B. Refer to Document 00 2113 - Instructions to Bidders, Document 00 2218 - Additional Instructions to Bidders, and 00 7213 – General Conditions for additional substitution requirements.

C. Provide data on a Substitution Request (After the Bidding Phase) Form, CSI Form 13.1A, in compliance with the requirements specified in this Section.

D. Contents of Substitution Request Package shall include three (3) copies of the following:
1. Transmittal - AIA Document G810.
2. Substitution Request Form - CSI Form 13.1A.
3. Point-by-Point Comparison.
4. Product Substantiating Data.

1.07 ARCHITECT'S REVIEW

A. During the Bidding Phase: Architect will review Substitution Request Package upon receipt to determine if Package is complete and conforms to specified requirements.
1. If Package Does Not conform to specified substitution requirements, submittal will be returned to proposer as indicated below.
2. If Package conforms to specified substitution requirements, Architect will continue review and notify proposer as indicated below.
3. During the bidding phase, approved substitutions will be indicated in Addenda for information of all Bidders.

B. After the Bidding Phase:
1. Architect will review Substitution Request Package within five (5) working days of receipt of Package.
   a. If Package Does Not conform to specified substitution requirements, submittal will be returned to proposer as indicated below.
2. Architect will request additional information or documentation for evaluation of the request.
3. Within 10 working days of receipt of Package or five (5) working days of receipt of the additional information or documentation, whichever is later, Architect will notify Contractor of approval or rejection of proposed substitution.

C. If substitution is Not Approved, submittal form will be returned to proposer marked with one of the following actions:
1. Substitution Rejected - Use specified materials.

2. Substitution Request received too late - Use specified materials.

D. If substitution is Approved, submittal for will be returned to proposer marked with one of the following actions:
   1. Substitution approved - Make submittals in accordance with Specification Section 01 3300 - Submittal Procedures.
   2. Substitution approved as noted - Make submittals in accordance with Specification Section 01 3300 - Submittal Procedures.

F. After the bidding phase, approved substitution will be issued as a Change Order as specified in Section 01 2600 - Contract Modification Procedures.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

Advancement of Construction Technology

SUBSTITUTION REQUEST

(During the Bidding Phase)

Project: _____ Substitution Request Number: _____

_____ From: _____

To: _____ Date: _____

_____ A/E Project Number: _____

Re: _____ Contract For: _____

Specification Title: _____ Description: _____

Section: _____ Page: _____ Article/Paragraph: _____

Proposed Substitution: _____

Manufacturer: _____ Address: _____ Phone: _____

Trade Name: _____ Model No.: _____

Attached data includes product description, specifications, drawings, photographs, and performance and test data adequate for evaluation of the request; applicable portions of the data are clearly identified.

Attached data also includes a description of changes to the Contract Documents that the proposed substitution will require for its proper installation.

The Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.

Submitted by: _____

Signed by: _____

Firm: _____

Address: _____

_____

Telephone: _____

A/E= s REVIEW AND ACTION

☐ Substitution approved - Make submittals in accordance with Specification Section 01330.
☐ Substitution approved as noted - Make submittals in accordance with Specification Section 01330.
☐ Substitution rejected - Use specified materials.
☐ Substitution Request received too late - Use specified materials.

Signed by: Date:

Supporting Data Attached: ☐ Drawings ☐ Product Data ☐ Samples ☐ Tests ☐ Reports ☐ _____

Advancement of Construction Technology

SUBSTITUTION REQUEST

(After the Bidding Phase)

Project: _____ Substitution Request Number: _____

_____ From: _____

To: _____ Date: _____

_____ A/E Project Number: _____

Re: _____ Contract For: _____

Specification Title: _____ Description: _____

Section: _____ Page: _____ Article/Paragraph: _____

Proposed Substitution: _____

Manufacturer: _____ Address: _____ Phone: _____

Trade Name: _____ Model No.: _____

Installer: _____ Address: _____ Phone: _____

History: ☐ New product ☐ 2-5 years old ☐ 5-10 yrs old ☐ More than 10 years old

Differences between proposed substitution and specified product: _____

_____

_____

☐ Point-by-point comparative data attached - REQUIRED BY A/E

Reason for not providing specified item: _____

_____

Similar Installation:

Project: _____ Architect: _____

Address: _____ Owner: _____

_____ Date Installed: _____

Proposed substitution affects other parts of Work: ☐ No ☐ Yes; explain _____

_____

Savings to Owner for accepting substitution: _____ ($ _____).

Proposed substitution changes Contract Time: ☐ No ☐ Yes [Add] [Deduct] _____ days.

Supporting Data Attached: ☐ Drawings ☐ Product Data ☐ Samples ☐ Tests ☐ Reports ☐ _____

September 1996
CSI Form 13.1A

SUBSTITUTION REQUEST
(Continued)

The Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Cost data as stated above is complete. Claims for additional costs related to accepted substitution which may subsequently become apparent are to be waived.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.
- Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.

Submitted by: _____

Signed by: _____

Firm: _____

Address: _____

_____

Telephone: _____

Attachments: _____

_____

_____

_____

A/E= s REVIEW AND ACTION

☐ Substitution approved - Make submittals in accordance with Specification Section 01330.
☐ Substitution approved as noted - Make submittals in accordance with Specification Section 01330.
☐ Substitution rejected - Use specified materials.
☐ Substitution Request received too late - Use specified materials.

Signed by: Date:

Additional Comments: ☐ Contractor ☐ Subcontractor ☐ Supplier ☐ Manufacturer ☐ A/E ☐ _____

_____

_____

_____

_____

_____

_____

_____

SECTION 01 7329

CUTTING AND PATCHING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Requirements and limitations for cutting and patching of Work.

B. Related Documents:
1. The Contract Documents, as defined in Document 00 7213 - General Conditions and modifications thereto, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.

C. Related Sections:
1. Section 01 3300 - Submittal Procedures: Procedures for submittals.
2. Section 01 3516 - Alteration Project Procedures: Cutting and patching for alterations work.
3. Section 01 6200 - Product Requirements: Product options and substitutions.
4. Individual Product Specification Sections:
   a. Cutting and patching incidental to Work of the section.
   b. Advance notification to other sections of openings required in work of those sections.
   c. Limitations on cutting structural members.

1.2 SUBMITTALS

A. Section 01 3300 - Submittal Procedures: Procedures for submittals.

B. Submit written request in advance of cutting or alteration which affects:
1. Structural integrity of any element of Project.
2. Integrity of weather exposed or moisture resistant element.
3. Efficiency, maintenance, or safety of any operational element.
4. Visual qualities of sight exposed elements.
5. Work of Owner or separate contractor.

C. Include in request:
1. Identification of Project.
2. Location and description of affected Work.
3. Necessity for cutting or alteration.
4. Description of proposed Work and Products to be used.
5. Alternatives to cutting and patching.
6. Effect on work of Owner or separate contractor.
7. Written permission of affected separate contractor.
8. Date and time work will be executed.

PART 2 PRODUCTS

2.1 MATERIALS

A. Primary Products: Those required for original installation.

B. Product Substitution: For any proposed change in materials, submit request for substitution to Architect.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 7300 - Execution: Verification of existing conditions before starting work.

B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as indicated, and ready for cutting and patching.
   1. Examine elements subject to damage or movement during cutting and patching.
   2. After uncovering existing Work, assess conditions affecting performance of work.

C. Report in writing to Architect and Owner's Representative prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions are corrected.

D. By starting Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to Owner.

3.2 PREPARATION

A. Provide temporary supports to ensure structural integrity of the Work. Provide devices and methods to protect other portions of Project from damage.

B. Provide protection from elements for areas which may be exposed by uncovering work.

C. Maintain water tightness on all roof area.

3.3 CUTTING

A. Execute cutting and fitting to complete the Work.

B. Uncover work to install improperly sequenced work.

C. Remove and replace defective or non-conforming work.

D. Provide openings in the Work for penetration of mechanical and electrical work.

E. Employ skilled and experienced installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.

F. Cut rigid materials using masonry saw or core

C. Execute work by methods to avoid damage to other Work, and which will provide appropriate surfaces to receive patching and finishing.

D. Employ skilled and experienced installer to perform patching for weather exposed and moisture resistant elements, and sight-exposed surfaces. Pneumatic tools not permitted without prior approval.

3.4 PATCHING

A. Execute patching to complement adjacent Work.

B. Fit Products together to integrate with other Work.

C. Restore work with new Products in accordance with requirements of Contract Documents.

D. Fit work to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

E. Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.

END OF SECTION

SECTION 01 7700

CLOSEOUT PROCEDURES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Contract Closeout Meeting.
2. Contract Closeout Timeline.
3. Closseout Document Submittals.
4. Closeout Procedures – Substantial Completion.
5. Closeout Procedures – Final Completion
6. Partial Occupancy or Use.
7. Substantial Completion Cleaning and Final Cleaning.
8. Contents of Contract Closeout Package.
9. Preparation and Organization of Closeout Documents Manual
10. Final Payment
    a. AIA Document G706 - Contractor's Affidavit of Payment of Debts and Claims.
    b. AIA Document G706A - Contractor's Affidavit of Release of Liens.
    c. AIA Document G707 - Consent of Surety to Final Payment.

B. Related Documents:
1. The Contract Documents, as defined in Document 00 7213 - General Conditions and modifications thereto, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.

C. Related Sections:
1. Section 01 2900 - Payment Procedures: Applications for payment.
2. Section 01 4200 - References: Definitions.
3. Section 01 4500 - Quality Control: Contractor quality control inspections.
4. Section 01 7800 - Closeout Submittals: Requirements and procedures for closeout submittals.

1.2 DEFINITIONS

A. Substantial Completion: Refer to Document 00 7213 - General Conditions.

B. Final Completion: Refer to Document 00 7213 - General Conditions.

1.3 CONTRACT CLOSEOUT MEETING

A. Schedule a Contract Closeout Meeting (14) days minimum before Substantial Completion Inspection to cover Contract Closeout Procedures as specified in this Section and how the Contract Closeout Package shall be assembled and submitted for Architect review as specified in Section 01 3119 - Project Meetings.

B. Meeting may occur after a scheduled Contractor, Architect, Owner progress meeting or may be a separate meeting.

C. Contractor, Project Field Superintendent, Owner's Representative and Architect shall attend this meeting. Subcontractor representatives are welcome to attend this meeting.

D. Following completion of Contract Closeout Meeting, Contractor shall contact each subcontractor to instruct them in proper preparation of their portion of closing out Contract and Contract Closeout Package.

1. 4 CONTRACT CLOSEOUT TIMELINE

A. The following list identifies the order that this Contract shall be closed out. Contractor failure to follow the specified order or failure to properly complete each item will suspend any processing of Application for Payments until Contractor complies with specified contract closeout timeline, submittals and procedure.
   1. Contractor schedules Roofing Manufacturer Representative for final inspection prior to issuing Manufacturer Warranty.
   2. Contractor submits written certification to Archtect the Project is ready for Substantial Completion Inspection.
   3. Architect and Owner schedule a date and time for Substantial Completion Inspection.
   4. Contractor conducts Substantial Completion Cleaning.
   5. Contractor turns over Extra Products to Owner and obtains Owner signature of receipt within two (2) weeks of Substantial Completion Inspection.
   6. Contractor submits Preliminary Closeout Documents to Architect within two (2) weeks of Substantial Completion Inspection.
      a. Preliminary Closeout Documents at Substantial Completion Inspection require the following:
         1) Closeout Documents Manual Operation and Maintenance Manuals.
         2) Project Record Documents.
         3) Project Record Submittals.
      b. Preliminary submittal consists of one (1) copy of completed Manual at Substantial Completion Inspection. This copy will be reviewed and returned, with Architect and Consulting Engineer comments. Revise content of all document sets as required before final submittal.
   7. Architect and Owner conduct Substantial Completion Inspection.
   8. Architect issues Substantial Completion Punchlist.
   9. Contractor begins work on Substantial Completion Punchlist items.
   10. Architect issues Certificate of Substantial Completion.
   11. Architect returns reviewed Preliminary Closeout Documents to Contractor with list of items to be corrected.
   12. Contractor completes all Punchlist items no later than 30 days from Date of Substantial Completion.
   13. Contractor submits written certification to Architect that all Punchlist items are completed and Project is ready for Final Inspection.
   14. Architect and Owner schedule a date and time for Final Completion Inspection.
   15. Contractor conducts Final Completion Cleaning.
   16. Contractor submits completed and corrected Final Closeout Documents and Project Record Submittals to Architect within two (2) weeks of Final Completion Inspection.
      a. Mandatory Requirement: Submit Final Closeout Documents at one time to Architect at Final Inspection. Failure to submit all Final Closeout Documents will result in delay of Final Payment to Contractor until all documents are received.
      c. Final Submittal consists of three (3) sets of corrected Closeout Documents in final form at Final Inspection including (3) sets of Closeout Documents in PDF format on CD. Architect will distribute copies as follows:

1) Two (2) copies to Owner Maintenance Director for Maintenance Personnel use.
2) One (1) copy for Architect's records.

17. Architect and Owner conduct Final Completion Inspection.
18. Architect notifies Contractor that Closeout Items are complete and advises Contractor to submit Application for Final Payment.

B. If Contractor does not achieve Substantial Completion within Contract Time, Owner may suspend further Progress Payments until Work is Substantially Complete as determined by the Architect as specified in Section 01 2900 - Payment Procedures.

C. If Contractor is not Substantially Complete after two (2) Substantial Completion Inspections or Final Complete after two (2) at Final Completion Inspection, Contractor shall pay for all additional services and inspections by Architect or Architect's Consultants as specified in this Section

1.5 CLOSEOUT DOCUMENT SUBMITTALS

A. Project Record Documents: Documents as specified in Section 01 7800 - Closeout Submittals.
1. Record Drawings and Specifications.
2. Record Installation Certifications.

B. Project Record Submittals: Boxed and labeled complete set of reviewed and accepted Shop Drawings, Product Data and Samples as specified in Section 01 7800 - Closeout Submittals.

1.6 CLOSEOUT PROCEDURES - SUBSTANTIAL COMPLETION

A. At completion of Work of each subcontract or designated division of Work, conduct an initial inspection to verify completion of Work; prepare list of Work to be completed or corrected, and conduct follow-up inspection to verify that corrections have been made as specified in Section 01 4500 - Quality Control.

B. Comply with procedures stated in Document 00 7213 – General Conditions for Substantial Completion, which is used as a reference for the procedure for issuance of Certificate of Substantial Completion.
1. Substantial Completion definition.
2. Comprehensive Contractor list of items to be corrected.
3. Architect Substantial Completion inspection.
4. Establishment of Date of Substantial Completion.
5. Certificate of Substantial Completion.

C. When Contractor considers Work, or a portion of Work which Owner agrees to accept separately, is Substantially Complete, submit written certification, on Contractor letterhead, to Architect indicating Contract Documents have been reviewed, Work has been inspected by Project Field Superintendent and Contractor Project Manager, and Work is complete in accordance with Contract Documents and ready for Substantial Completion inspection.
1. Submit list of items to be completed or corrected.
2. Complete and correct items on list.
3. Failure to include an item on list does not change Contractor responsibility to complete Work in accordance with Contract Documents.

D. Architect and Owner Representative will review list and make inspection to determine if Work, or designated portion of Work, is substantially complete.
   1. Contractor will be notified by Architect of items identified during inspection as not in accordance with Contract Documents in a Substantial Completion Punchlist.
   2. Complete and correct items on Punchlist.
   3. Notify Architect that items have been corrected and request a Final Inspection.
   3. Architect will make inspection to determine if Work, or designated portion of Work, is substantially complete.

E. When Work, or designated portion of Work, is substantially complete, Architect will notify Contractor and document Date of Substantial Completion.

F. Contractor shall submit Preliminary Closeout Documents to Architect as defined herein within Article entitled “Contractor Closeout Timeline” with respect to Substantial Completion Inspection.

G. If Architect or Architect’s Consultants are required to perform a third, or more, re-inspections because of required follow-up inspection by regulatory authorities or because the Work was not Substantially Complete as certified by the Contractor:
   1. Architect will invoice Owner for additional services by the Architect or Architect’s Consultants.
   2. Contractor will pay for Architect’s or Architect’s Consultant additional services by deductive change order.
   3. Change order will be issued deducting the additional service amont form the Contract Sum.

1.7 CLOSEOUT PROCEDURES - FINAL COMPLETION

A. Contractor shall complete punch-list items no later than 30 days from date of Substantial Completion Inspection.

B. Submit written certification, on Contractor’s Letterhead, that items on the Substantial Completion Punch-list are completed, Work has been re-inspected, and Work is Final Complete in accordance with Contract Documents and ready for Architect final inspection.

C. Architect will make inspection to determine if Work of this Contract is complete.
   1. Contractor will be notified by Architect of items identified during inspection as not in accordance with contract documents and not ready for final acceptance.
   2. Contractor shall complete and correct items on list.
   3. Contractor shall notify Architect that items have been corrected and request re-inspection.

D. When Work is complete, as determined by Architect, Architect will notify Contractor and document Date of Final Acceptance.

E. Contractor shall submit Final Closeout Documents to Architect as defined herein within Article entitled “Contractor Closeout Timeline” with respect to Substantial Completion Inspection.
   1. Project Record Documents.

F. If Architect or Architect's Consultants are required to perform a third, or more, re-inspections because of required follow-up inspection by regulatory authorities or because the Work was not Final Complete as certified by the Contractor:
   1. Architect will invoice Owner for additional services by the Architect or Architect's Consultants.
   2. Contractor will pay for Architect's or Architect's Consultant additional services by deductive change order.
   3. Change order will be issued deducting the additional service amont from the Contract Sum.

1.8 PARTIAL OCCUPANCY OR USE

A. Refer to Document 00 7213 – General Conditions, Partial Occupancy or use.

1.9 SUBSTANTIAL COMPLETION CLEANING AND FINAL CLEANING

A. Execute project cleaning before Substantial Completion inspection and Final Completion inspection.

B. General:
   1. Clean interior surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces. Clean equipment and fixtures to a sanitary condition, clean or replace filters of mechanical equipment.
   2. Remove waste and surplus materials, rubbish, and construction facilities from the Project and from the site.
   3. Cleaning for areas occupied by Owner after date of Substantial Completion are the responsibility of the Owner as specified in Document 00 7213 – General Conditions.

C. Cleaning During Construction: Specified in Section 01 7300 - Execution.

D. Substantial Completion Cleaning:
   1. Use cleaning materials and agents recommended by manufacturer or fabricator of surface to be cleaned.
      a. Do not use cleaning agents that are potentially hazardous to health or property, or that might damage finished surfaces.
   2. Employ experienced workers or professional cleaners for cleaning. Clean each surface or unit of Work to condition expected from facility cleaning and maintenance program.
      a. Comply with manufacturer's published cleaning instructions.
   3. Complete following cleaning operations before requesting Architect inspection for Substantial Completion.
      a. Clean Project Site, yard and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste materials, litter and foreign substances.
         1) Sweep paved areas broom clean.
         2) Remove petro-chemical spills, stains and other foreign deposits.
         3) Rake grounds that are neither planted nor paved, to a smooth even-textured surface.
      b. Remove tools, construction equipment, machinery and surplus material from Project Site.
      c. Remove snow and ice to provide safe access to building.

d. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films and similar foreign substances.
    1) Avoid disturbing natural weathering of exterior surfaces.
    2) Restore reflective surfaces to their original condition.
e. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics and similar spaces.
f. Broom clean concrete floors in unoccupied spaces.
g. Clean transparent materials, including mirrors and glass in doors and windows.
    1) Remove glazing compounds and other substances that are noticeable vision-obscuring materials.
    2) Replace chipped or broken glass and other damaged transparent materials.
    3) Polish mirrors and glass, taking care not to scratch surfaces.
h. Remove labels that are not permanent labels.
i. Touch-up and otherwise repair and restore marred exposed finishes and surfaces.
    1) Replace finishes and surfaces that can not be satisfactorily repaired or restored, or that show evidence of repair or restoration.
    2) Do not paint over "UL" and similar labels, including mechanical and electrical name plates.
j. Wipe surfaces of mechanical and electrical equipment, and other similar equipment.
    1) Remove excess lubrication, paint and mortar droppings and other foreign substances.
k. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
l. Replace air disposable filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
    1) Clean ducts, blowers, and coils if units were operated without filters during construction.
m. Clean light fixtures, lamps, globes and reflectors to function with full efficiency.
    2) Replace burned out bulbs, and defective and noisy starters in fluorescent and mercury vapor fixtures.
n. Leave Project clean and ready for occupancy.

4. Remove temporary protection and facilities installed during construction to protect previously completed installations during remainder of construction.
5. Comply with governing regulations and safety standards for cleaning operations.
    a. Remove waste materials from Project Site and dispose of in accordance with requirements of local authorities having jurisdiction.

D. Substantial Completion Cleaning:
1. Use cleaning materials and agents recommended by manufacturer or fabricator of surface to be cleaned.
    a. Do not use cleaning agents that are potentially hazardous to health or property, or that might damage finished surfaces.
2. Employ experienced workers or professional cleaners for cleaning. Clean each surface or unit of Work to condition expected from facility cleaning and maintenance program.
    a. Comply with manufacturer's published cleaning instructions.
3. Complete following cleaning operations before requesting Architect inspection for Substantial Completion for Final Acceptance or a portion of Project.

a. Clean Project Site, yard and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste materials, litter and foreign substances.
1) Sweep paved areas broom clean.
2) Remove petro-chemical spills, stains and other foreign deposits.
3) Rake grounds that are neither planted nor paved, to a smooth even-textured surface.
b. Remove tools, construction equipment, machinery and surplus material from Project Site.

4. Remove temporary protection and facilities installed during construction to protect previously completed installations during remainder of construction.
5. Comply with governing regulations and safety standards for cleaning operations.
a. Remove waste materials from Project Site and dispose of in accordance with requirements of local authorities having jurisdiction.

E. Final Completion Cleaning:
1. Clean any items or areas affected by Contractor work on Substantial Completion Inspection Punchlist items to satisfaction of Owner.

1.10 CONTENTS OF CONTRACT CLOSEOUT PACKAGE

A. Contract Closeout Package shall consist of the following items.

B. Contact Names and Subcontractor List:
1. Contractor name, address, telephone number, fax number and telephone number to call after hours for emergency warranty work notification. Include a list of each Subcontractor with listing of Work installed. Include Subcontractor address, telephone number, fax number and person to contact who is familiar with Work.

C. Contractor Warranty:
1. Contractor Warranty Letter written on Contractor letterhead and signed by Contractor stating that Contractor warrants Work and that Contractor will correct Work for one (1) year after the Date of Substantial Completion as specified in Document 00 7213 - General Conditions.

D. Warranties:
1. Original executed copies of Warranties required in each technical Specification Section for each material and product requiring warranty as specified in Section 01 7800- Closeout Submittals.
2. Provide duplicate original signed and executed copies of each warranty in each Closeout Documents Manual.
a. Photocopies not permitted.

E. Project Record Documents:
1. Provide data as specified in Section 01 7800- Closeout Submittals:
a. Record Drawings.
b. Additional Record Submittals.

F. Project Record Submittals:
1. Boxed and labeled complete set of reviewed and accepted Shop Drawings, Product Data and Samples as specified in Section 01 7800- Closeout Submittals.

G. AIA Document G706:
   1. Copies of executed and notarized Contractor's Affidavit of Payment of Debts and Claims on original copy of AIA Document G706 (Example copy attached). Original copies attached to Final Payment Applications.

H. AIA Document G706A:
   1. Copies of executed and notarized Contractor's Affidavit of Release of Liens on original copy of AIA Document G706A (Example copy attached). Original copies attached to Final Payment Applications.

I. AIA Document G707:
   1. Executed and notarized Consent of Surety to Final Payment on original copy of AIA Document G707 (Example copy attached). Original copies attached to Final Payment Applications.

J. Lien Releases:
   1. Executed and notarized separate releases of waivers of liens for entities with lien rights against property Owner as required by Document 00 7213 – General Conditions; forms located at end of Section 01 2900 - Payment Procedures. Include list of each entity:
      a. General Contractor.
      b. Each Subcontractor.

K. Purchase Order Record:
   1. Copies of purchase orders and corresponding vendor invoices for the Project as required by Oklahoma Statute 68 OS 1356 and as specified in Document 00 7390 - Sales Tax/Designation of Purchasing Agent. Submit Purchase Order Record for each of the following. Include list of each entity:
      a. General Contractor.
      b. Subcontractor.
      c. Sub-subcontractor.

K. Products and Completed Operations Insurance:
   1. Certificate of Insurance from Contractor's insurance provider evidencing insurance required by Contract Documents to remain in force after Final Payment is in effect as required by Document 00 7213 – General Conditions.
      a. Provide certificate for Contractor's General Liablity for Products and Completed Operations maintained for one (1) year after date of Final Payment as specified in Document 00 7316 - Insurance Requirements.

L. Contractor Statement for Products and Completed Operations Insurance:
   1. Contractor's written statement that insurance will be renewable as required by Document 00 7213 – General Conditions.
      a. Submit statement on Contractor's Letterhead for Contractor's General Liablility insurance coverage for Products and Completed Operations for one (1) year after date of Final Payment attached to Certificate of Insurance specified in previous paragraph.

M. Asbestos Certification Forms:
   1. Executed and notarized Federal Certification of Compliance with Asbestos Restrictions form specified in Section 01 6211 - Asbestos Prohibition for Public Works Projects for each of the following:
      a. Each subcontractor and material supplier.

b. General Contractor.
c. Architect will insert Architect's certification form into Closeout Documents Manual.

N. Final Statement of Accounting:
1. Provide a final statement or accounting to Owner through Architect, including but not limited to the following, attached to Final Application for Payment:
a. Original Contract Sum and adjustments, including:
1) Change Orders or other modifications.
2) Allowances, if any.
3) Other adjustments, if any.
4) Deductions for Work not corrected, if any.
5) Deductions for additional services incurred by Owner due to Contractor, if any.
b. Statement of outstanding Claim amounts, if any.

1.11 PREPARATION AND ORGANIZATION OF CLOSEOUT DOCUMENTS MANUAL

A. Prepare and organize the Closeout Documents Manual as follows. All items shall be typewritten, computer word processed/printed or photocopies. No handwritten or hand printing permitted.

B. Contractor shall obtain and execute warranties for each Product that has a warranty specified. Obtain ORIGINAL Warranty Forms from manufacturer's and suppliers, not photocopies of fax.
a. Obtain ORIGINAL signatures, in blue ink, and fill-in all data on the blank spaces of each Warranty Form.
b. Each Warranty shall clearly indicate specific specification section number, product or material warranted.
c. Where a blank space is provided for Owner signature, obtain signatures on Warranty copies from Owner.
d. Substantial Completion Date: Contractor shall make sure correct Substantial Completion Date (as indicated on Certificate of Substantial Completion Form issued by Architect) is noted on each Warranty Form submitted.

C. Binders: Provide commercial heavy duty quality, locking D-side, 3-inch ring or larger size, white color, with durable plastic covers with clear plastic sleeves for insertion of identification cover sheet. Provide clear plastic sleeve on binder spine to hold insertion of identification spine sheet. Provide pockets in the covers to receive folded sheets.
1. Multiple Closeout Documents Manuals: Manuals comprising the complete Closeout Documents Package set shall be the same size and have the same appearance.

D. Identification Cover and Spine Sheet: Provide insertion sheet that fully covers the entire sleeve area. Identify binder on front and spine with printed title CLOSEOUT DOCUMENTS MANUAL at top and the following information.
1. School Information: Affix Color School Logo and identify title of Project by School Name and Location, School District, Independent School District Number, School District address, telephone number, fax number and School Superintendent Name under the logo.

E. Index Sheet: Provide a printed index identifying the items in each tabbed section and the Tab Number where each item is located. Tabbed sections shall be assembled in the following order with tabbed section titles as follows.
   1. Contractor Information: General Contractor, Subcontractor, material and equipment supplier information list.
   2. Building Permit, Inspections and Certificate of Occupancy: Copies of all permits and inspection reports from Authorities Having Jurisdiction.
   3. Warranties: General Contractor Warranty and Contractor and/or Manufacturer Warranties required in individual Specification Sections.
      a. Assemble warranties in this section with General Contractor Warranty 1st followed by other warranties organized by the Specification Section number where the Product is specified.
      b. Refer to Section 01 7800 - Closeout Submittals for additional information.
   4. Lien Releases. Copies of lien releases. Refer to Section 01 7800 - Closeout Submittals for additional information.
   5. Extra Materials Documentation: Copy of Extra Material Transmittal Letter signed by Owner acknowledging receipt.
      a. Indicate the type and quanitiy of each Extra Material provided to Owner on Transmittal Letter.
   6. Asbestos Certification Forms: Copies of asbestos certification forms. Certification forms are located in Section 01 6211 - Asbestos Prohibition for Public Works Projects.
   7. Purchase Order Record: Copies of Purchase Order Records from Contractor, Subcontractor and Sub-Subcontractor for Tax Exempt Purchases.
      a. Refer to Section 01 7800 - Closeout Submittals for additional information.
      b. Refer to Document 00 7390 - Sales Tax Exemption/Designation of Purchasing Agent for specific requirements.

1.12 FINAL PAYMENT

A. After Architect determines that Work is final complete and Project Closeout Package is accepted, Contractor may submit Final Application for Payment in conformance with requirements specified in Section 01 2900 - Payment Procedures.

B. Architect will certify Final Application for Payment and forward to Owner.

C. Waiver of Claims:
   1. Owner: Refer to Document 00 7213 - General Conditions.
   2. Contractor, Subcontractor's and Material Suppliers: Refer to Document 00 7213 - General Conditions.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

AIA® Document G706A™ – 1994

Contractor's Affidavit of Release of Liens

PROJECT: *(Name and address)*
[Insert Project Name]
[Location]
[City, ST Zip]
[Phone Number]
[Fax Number]

ARCHITECT'S PROJECT NUMBER:
[Insert]

OWNER: ☐
ARCHITECT: ☐
CONTRACTOR: ☐
SURETY: ☐
OTHER: ☐

CONTRACT FOR:
CONTRACT DATED:

TO OWNER: *(Name and address)*
[Insert Owner's Name]
[Address]
[City, ST Zip]
[Phone Number]
[Fax Number]

STATE OF:
COUNTY OF:

The undersigned hereby certifies that to the best of the undersigned's knowledge, information and belief, except as listed below, the Releases or Waivers of Lien attached hereto include the Contractor, all Subcontractors, all suppliers of materials and equipment, and all performers of Work, labor or services who have or may have liens or encumbrances or the right to assert liens or encumbrances against any property of the Owner arising in any manner out of the performance of the Contract referenced above.

EXCEPTIONS:

SUPPORTING DOCUMENTS ATTACHED HERETO:

1. Contractor's Release or Waiver of Liens, conditional upon receipt of final payment.

2. Separate Releases or Waivers of Liens from Subcontractors and material and equipment suppliers, to the extent required by the Owner, accompanied by a list thereof.

CONTRACTOR: *(Name and address)*

BY:

_____
(Signature of authorized representative)

_____
(Printed name and title)

Subscribed and sworn to before me on this date:

Notary Public:
My Commission Expires:

AIA® Document G706™ – 1994

Contractor's Affidavit of Payment of Debts and Claims

PROJECT: *(Name and address)*
[Insert Project Name]
[Location]
[City, ST Zip]
[Phone Number]
[Fax Number]

ARCHITECT'S PROJECT NUMBER:
[Insert]

OWNER: ☐
ARCHITECT: ☐
CONTRACTOR: ☐
SURETY: ☐
OTHER: ☐

CONTRACT FOR:
CONTRACT DATED:

TO OWNER: *(Name and address)*
[Insert Owner's Address]
[Address]
[City, ST Zip]
[Phone Number]
[Fax Number]

STATE OF:
COUNTY OF:

The undersigned hereby certifies that, except as listed below, payment has been made in full and all obligations have otherwise been satisfied for all materials and equipment furnished, for all work, labor, and services performed, and for all known indebtedness and claims against the Contractor for damages arising in any manner in connection with the performance of the Contract referenced above for which the Owner or Owner's property might in any way be held responsible or encumbered.

EXCEPTIONS:

SUPPORTING DOCUMENTS ATTACHED HERETO:

1. Consent of Surety to Final Payment. Whenever Surety is involved, Consent of Surety is required. AIA Document G707, Consent of Surety, may be used for this purpose

Indicate Attachment ☐ Yes ☒ No

The following supporting documents should be attached hereto if required by the Owner:

1. Contractor's Release or Waiver of Liens, conditional upon receipt of final payment.

2. Separate Releases or Waivers of Liens from Subcontractors and material and equipment suppliers, to the extent required by the Owner, accompanied by a list thereof.

3. Contractor's Affidavit of Release of Liens (AIA Document G706A).

CONTRACTOR: *(Name and address)*

BY: _____
(Signature of authorized representative)

_____
(Printed name and title)

Subscribed and sworn to before me on this date:

Notary Public:
My Commission Expires:

AIA® Document G707™ – 1994

Consent Of Surety to Final Payment

PROJECT: *(Name and address)*
[Insert Project Name]
[Location]
[City, ST Zip]
[Phone Number]
[Fax Number]

ARCHITECT'S PROJECT NUMBER: [Insert]

CONTRACT FOR:

CONTRACT DATED:

OWNER: ☐
ARCHITECT: ☐
CONTRACTOR: ☐
SURETY: ☐
OTHER: ☐

TO OWNER: *(Name and address)*
[Insert Owner's Name]
[Address]
[City, ST Zip]
[Phone Number]
[Fax Number]

In accordance with the provisions of the Contract between the Owner and the Contractor as indicated above, the
(Insert name and address of Surety)

, SURETY,

on bond of
(Insert name and address of Contractor)

, CONTRACTOR,

hereby approves of the final payment to the Contractor, and agrees that final payment to the Contractor shall not relieve the Surety of any of its obligations to
(Insert name and address of Owner)

, OWNER,

as set forth in said Surety's bond.

IN WITNESS WHEREOF, the Surety has hereunto set its hand on this date:
(Insert in writing the month followed by the numeric date and year.)

_____
(Surety)

_____
(Signature of authorized representative)

Attest:
(Seal):

_____
(Printed name and title)

CLOSEOUT SUBMITTALS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Closeout Submittal Responsibilities
2. Product Warranties.
3. Project Record Documents.
4. Closeout Documents Manual Operation and Maintenance data.
5. Project Record Submittals.
6. Extra products.

B. Related Documents:
1. The Contract Documents, as defined in Document 00 7213 - General Conditions and modifications thereto, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.

C. Related Documents:
1. Section 01 7700 - Closeout Procedures: Contract closeout procedures.

1.2 CLOSEOUT SUBMITTAL RESPONSIBILITIES

A. Contractor: Reference Section 01 7700 - Closeout Procedures for content of Contract Closeout Package.
1. Responsible for collection, preparation, and assembly of Closeout Submittals, with specified content, in the specified quantity, and format specified in Section 01 7700 - Closeout Procedures.
2. Shall collect Closeout Submittal data and items as available throughout construction of the Project so that as the Date of Substantial Completion approaches and the Contract Closeout Meeting is held, a majority of the Closeout Submittals have already been received and are ready for insertion into the Closeout Documents Manual specified in Section 01 7700 - Closeout Procedures.
3. Responsible for review of Closeout Submittals received from Subcontractors and Suppliers for conformance with specified content and format.
   a. Contractor shall return items that do not conform to specified content and format to the submitter for correction and re-submittal to Contractor.
   b. Including submittal items from Subcontractors and Suppliers without Contractor review is not permitted.
4. Responsible for submittal of completed Closeout Submittals to Architect at the start of Substantial Completion Inspection as specified in Section 01 7700 - Closeout Procedures.
5. Responsible for making corrections to items identified by Architect's review and resubmitting complete and correct Closeout Documents to Architect within 14 calendar days of receipt of Architect's list of correction items.

B. Architect:

1. Will review Closeout Submittals for compliance with specified content, format and presentation after receipt from Contractor within two (2) weeks of Substantial Completion Inspection.
2. Will return Closeout Submittals to Contractor after review with a written list of correction items.
3. Will review corrected Closeout Submittals submitted by Contractor for compliance with specified content, format and presentation.

C. Re-submittals of Closeout Submittals: If Architect or Architect's Consultants are required to perform a third, or more, re-submittal review because the re-submittal is incomplete or incorrect and must be returned to Contractor for additional corrections:
1. Architect will invoice Owner for additional services by the Architect or Architect's Consultants.
2. Contractor will pay for Architect's or Architect's Consultant additional services by deductive change order.
3. Change order will be issued deducting the additional service amount from the Contract Sum.

D. Owner: Will receive Closeout Submittals as a part of the Closeout Documents Package specified in Section 01 7700 - Closeout Procedures.

1.3 PRODUCT WARRANTIES

A. Submittal: Provide Warranties as a part of the Warranty part of the Closeout Documents Manual specified in Section 01 7700 - Closeout Procedures.
1. Warranty Start Date: As indicated in Document 00 7213 – General Conditions, the warranty start date is the Date of Substantial Completion indicated on the Certificate of Substantial Completion issued by the Architect.
   a. All warranty forms shall have the actual Month, Day and Year of the Date of Substantial Completion or "Date of Substantial Completion" listed for the Warranty Start Date.
   b. No other date permitted.
   c. Dates such as Date of Installation, Date of Delivery, Date of Sale, etc. not permitted.
2. Notarization: Provide notarized original copies for products requiring warranties as specified in individual Specification Sections.
3. Subcontractor, Supplier and Manufacturers: Execute and assemble transferable warranty documents from Subcontractors, suppliers and manufacturers. Identify specification section number, product or material on each warranty.
4. Warranty Table of Contents: Provide neatly word processed and printed Warranty Module table of contents with each item identified with number and title of Specification Section in which specified, and name of Product or Work item.
5. Index Tab Sheets: Separate each warranty with index tab sheets keyed to Table of Contents listing. Provide full information, using separate word processed and printed sheets as necessary. List Subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

B. Definitions:
1. Standard Product Warranties: Preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.

2. Special Warranties: Written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the Owner.

C. Warranty Requirements:
   1. Related Damages and Losses: When correcting failed or damaged warranted construction, remove and replace construction that has been damaged as a result of such failure or must be removed and replaced to provide access for correction of warranted construction.
   2. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate warranty by written endorsement. Reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.
   3. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild Work to an acceptable condition complying with requirements of Contract Documents. Contractor is responsible for cost of replacing or rebuilding defective Work regardless of whether Owner has benefited from use of Work through a portion of its anticipated useful services life.
   4. Owner's Recourse: Expressed warranties made to Owner are in addition to implied warranties and shall not limit duties, obligations, rights, and remedies otherwise available under law. Expressed warranty periods shall not be interpreted as limitations on time in which Owner can enforce such other duties, obligations, rights or remedies.
      a. Rejection of Warranties: Owner reserves the right to reject warranties and to limit selection to products with warranties not in conflict with requirements of Contract Documents.
   5. Special Warranties: Where Contract Documents require a special warranty, or similar commitment of Work or part of Work, Owner reserves the right to refuse to accept Work, until Contractor presents evidence that entities required to countersign such commitments are willing to do so.

D. Preparation of Submittals:
   1. Obtaining Warranties: Obtain warranties executed by responsible Subcontractors, suppliers and manufacturers upon establishment of the Date of Substantial Completion as indicated on the Certificate of Substantial Completion issued by the Architect.
   2. Contractor Verification of Warranty Forms: Upon receipt of warranty forms, Contractor shall verify that documents are in proper form, contain full information, contain correct warranty time duration as specified in Contract Documents, are signed and notarized.
   3. Obtaining Owner Signature: Where warranties require a signature of Owner, Contractor shall make arrangements with Owner to obtain Owner signature.
   4. Contractor Warranty Cover Letter: Where Product Manufacturer data offers a warranty but Product Manufacturer does not have a specific warranty form, Contractor shall prepare a cover letter indicating all warranty information, Warranty Start Date and warranty duration, on Contractor letterhead, signed by Contractor with Product Manufacturer Data indicating warranty specifics attached to Contractor letter.
   5. Special Warranty: When the Contract Documents require Contractor, or Contractor and a Subcontractor, supplier or manufacturer to execute a special warranty, prepare a written document that contains appropriate terms and identification, ready for execution by required parties. Submit a draft of special warranty to Architect for review before final execution.

E. Schedule of Warranties: Refer to Warranties Article in each individual Specification Section indicated below for specifics of warranty requirements.

1. Section 07 5400 - Thermoplastic Membrane Roofing (TPO)
2. Section 07 6200 - Sheet Metal Flashing and Trim

1.4 PROJECT RECORD DOCUMENTS

A. Project Record Documents shall include, but not be limited to, the following:
1. Record Drawings.
2. Record Specifications.
3. Record Installation Certifications.
4. Record Purchase Order Record.

B. Record Purchase Order Record:
1. Purchase Orders: General Contractor, Subcontractors and Sub-Subcontractors shall provide copies of purchase orders and corresponding vendor invoices for the Project as required by Oklahoma Statute 68 OS 1356 and as specified in Document 00 7390 - Sales Tax/Designation of Purchasing Agent.
2. Responsibility: General Contractor Project Manager is responsible to ensure that General Contractor, each Subcontractor and each Sub-Subcontractor maintains a record for all purchase orders issued under the tax exemption applicable to this Project and General Contractor Project Manager is responsible for obtaining a Purchase Order Record from General Contractor, each Subcontractor and each Sub-Subcontractor and submitting the combined purchase order record to Owner as a Closeout Document as specified Article 1.06 of Document 00 7390 - Sales Tax/Designation of Purchasing Agent.

1.5 PROJECT RECORD SUBMITTALS

A. Submittal: Submit Project Record Submittals as specified within Section 01 7700 – Closeout Procedures; Article entitled “Contractor Closeout Timeline” with respect to Substantial Completion Inspection.

B. Contractor shall submit a complete set of reviewed and accepted Shop Drawings, Product Data and Samples that were submitted to and received back from Architect that will be a Record Set of Submittals for Owner’s use.

C. Preparation: As shop drawings, product data and samples are submitted to and received back from architect during construction, keep one set of each separate in a specified box or container and clearly identify as “Project Record Submittals.” Keep a submittal log and maintain submittals in numerical sequence by Submittal Number as assigned in the Schedule of Submittals or as items are submitted.

D. Maintenance of Documents: Store record submittals in Contractor’s Office, not at project site. Do not permit Project Record Submittals to be used for construction purposes. Maintain and protect record submittals from damage in a clean, dry location.

E. Format for Submittal:
1. Box: Assemble Project Record Submittals in a new, unused, undamaged legal sized cardboard “Bankers Box” with cardboard lid. Use multiple boxes as required for quantity of submittals. Use of any other cardboard box not permitted.

2. Identification: Identify each box with printed title RECORD SUBMITTALS; identify title of Project. Identify box number when multiple boxes are required.
3. Contents: Neatly assemble product data, neatly fold shop drawings, and neatly package samples and place them in “Bankers Box” in numerical sequence. Provide a typewritten submittal log identifying each submittal item by submittal number, specification section and subject.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 02 4119

SELECTIVE DEMOLITION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Procedures for demolition and removal of designated existing building elements.
2. Salvaged items.
3. Salvaged material.
4. Salvaged items for re-use.
5. Disposal of materials.
6. Identification of utilities.

B. Related Documents:
1. The Contract Documents, as defined in Document 00 7213 - General Conditions and modifications thereto, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.

C. Related Sections:
1. Section 01 3216 - Construction Progress Schedule: Demolition scheduling.
2. Section 07 0150 – Preparation for Reroofing: Remove and replace existing roofing membrane.
3. Section 22 and 23 – Renovation of existing HVAC system.

1.2 SYSTEM DESCRIPTION

A. The extent of Selective Demolition Work is that Work necessary, and required to facilitate the new construction indicated.

B. Demolition shall be such that all construction, new and existing, can be performed, and completed in accordance with the construction documents.

C. The contractor shall visit the project site and familiarize himself with the existing conditions and project requirements.

D. Clarify scope of the Work under this Section including salvage material.

1.3 SUBMITTALS

A. Section 01 7800 - Closeout Submittals: Procedures for closeout submittals.

B. Project Record Documents: Accurately record actual locations of capped utilities.

1.4 SCHEDULING

A. Schedule work to coincide with other trades.

1.5 QUALITY ASSURANCE

A. Performance Criteria:
   1. Operational and Safety Limitations: Do not cut operational elements and safety-related components in a manner resulting in a reduction of capacities to perform in a manner intended or resulting in a decreased operational life, increased maintenance or decreased safety.
   2. Vibration: Do not use means, methods, techniques or procedures which would induce vibration into any element of the structure.
   3. Fire: Do not use means, methods, techniques or procedures which would produce any fire hazard.
   4. Water: Do not use means, methods, techniques or procedures which would produce excessive water run-off, and water pollution.
   5. Air Pollution: Do not use means, methods, techniques or procedures which would produce uncontrolled dust, fumes or other damaging air pollution.

B. Regulatory Requirements:
   1. Conform to applicable code for demolition work, dust control, products requiring electrical disconnection and re-connection.
   2. Obtain required permits from authorities.
   3. Do not close or obstruct egress from any building exit or site exit.
   4. Do not disable or disrupt building fire or life safety systems without seven (7) days prior written notice to Owner and receipt of Owner approval.
   5. Conform to applicable regulatory procedures when hazardous or contaminated materials are discovered.

1.6 PROJECT CONDITIONS

A. Contractor shall verify all existing conditions and notify the Architect of discrepancies before proceeding with the Work.

B. Perform the removal, cutting, drilling, etc., of existing work with extreme care, and using small tools in order not to jeopardize the structural integrity of the building.

C. Condition of Structure: Owner assumes no responsibility for actual condition of portions of the structure to be demolished.

D. Partial removal: Items of salvageable value to the Contractor may be removed from the structure as the work progresses if not claimed by the Owner. Salvaged items must be transported from the site as they are removed.

E. Protection: Ensure that the safe passage of persons around the area of demolition. Conduct operations to prevent injury to adjacent buildings, structures, other facilities and persons.

1.7 PROTECTION OF EXISTING CONSTRUCTION

A. Provide temporary protection of existing construction (roof, and walls).

B. Provide temporary construction, constructed of framing and plywood, to protect existing construction and surrounding surfaces from damage by movement of materials and personnel.

C. The contractor is responsible for all damage to existing structure and shall replace or repair all areas of damage.

D. Repair, replace, or rebuild existing construction as required or as directed which has been removed, altered or disrupted to allow for new construction. Existing construction shall be corrected to match adjacent construction, new or existing.

E. Perform cutting of existing concrete and masonry construction with saws and core drills. Do not use jack-hammers or explosives.

PART 2 PRODUCTS

2.1 SALVAGED ITEMS

A. The Contract Documents indicate the existing materials that are to be reused in the new construction. The Contractor shall remove, protect and reinstall these items as indicated.
   1. Items for reinstallation will be indicated as such within the Contract Documents.

B. Materials scheduled for reuse which are damaged by the Contractor to the extent that they cannot be reused shall be replaced by the Contractor with equal quality material at no additional cost to the Owner.

C. Coordinate with the Owner on disposition of salvage items not scheduled for reuse, demolished materials, and equipment. Salvaged materials, not reused, shall be delivered, as directed, to the Owner.

2.2 SALVAGED MATERIALS

A. Removed and salvaged materials of value not designated for re-use, unless claimed as salvage by the Owner, shall become the property of the Contractor and shall be removed from the premises by the Contractor, and be legally disposed of off-site.

B. The Owner will remove or, under separate contract, have all materials and equipment which the Owner requires removed prior to Work under this Section begins.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 7300 - Execution: Verification of existing conditions before starting work.

B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.

C. Report in writing to Architect prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.

D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 PREPARATION

A. Provide, erect, and maintain temporary barriers and partitions as required.

B. Erect and maintain weatherproof closures for exterior openings.

C. Protect existing materials that are not to be demolished. Provide adequate protection of other work during selective demolition to prevent damage and provide protection of the work from adverse weather exposure.

D. Provide adequate temporary support for work to be cut to prevent failure. Do not endanger other work. Prevent movement of structure; provide bracing and shoring.

E. Notify affected utility companies before starting work and comply with their requirements.

3.2 PROCEDURE

A. Employ only skilled workers to perform selective site demolition.

B. Cut work by methods least likely to damage work to the retained and work adjoining.

C. Where physical cutting action is required, cut work with sawing and grinding tools, not with hammering and chopping tools. Core drill openings through concrete and masonry work.

D. Patch with seams which are durable and as invisible as possible. Comply with specified tolerances for the work.

E. Where selective demolition is terminated at a surface, finish or to remain, completely remove all traces of material selectively demolished, including mortar beds. Provide smooth, even substrate transition.

3.4 DEMOLITION

A. Remove existing construction and equipment indicated on Drawings.

B. Disconnect, remove, and identify designated utilities within demolition areas where indicated on Drawings.

C. Demolish in an orderly and careful manner. Protect existing supporting structural members.

D. Remove demolished materials from site except where specifically noted otherwise. Do not burn or bury materials on site.

E. Remove materials as demolition progresses. Upon completion of demolition, leave areas in clean condition.

3.4 POLLUTION CONTROLS

A. Comply with governing authorities pertaining to environmental protection.

B. Clean adjacent portion of the structure and improvement of dust, dirt and debris caused by demolition operations, as directed by Owner and governing authorities. Return adjacent areas to conditions existing prior to the start of the work.

3.5 DISPOSAL OF DEMOLISHED MATERIALS

A. Remove debris, rubbish and other materials resulting from demolition operations and legally dispose of off the site.

B. Burning of removed materials from demolished structures will not be permitted on the site.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Nailers and blocking.
   4. Preservative and fire resistive treatment.

B. Related Documents:
   1. The Contract Documents, as defined in Document 00 7213 - General Conditions and modifications thereto, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.

C. Related Sections:
   1. Section 07 5400 – TPO-Thermoplastic Roofing: Roof edge blocking and utility line supports.
   2. Section 07 6200 – Sheet Metal Flashing and Trims: Wall flashing and parapet coping.

1.2 REFERENCES

A. American Wood Preservers Association (AWPA):
   1. AWPA - C1 - All Timber Products - Preservative Treatment by Pressure Process.
   2. AWPA - C15 - Wood for Commercial-Residential Construction Preservative Treatment by Pressure Processes.
   3. AWPA - C20 - Structural Lumber - Fire-Retardant Treatment by Pressure Processes.
   4. AWPA - P5 - Water Borne Preservatives.

B. National Institute of Standards and Technology (Department of Commerce) (PS):
   1. NIST PS 1 - Construction and Industrial Plywood.
   2. NIST PS 20 - American Softwood Lumber Standard.

C. Western Wood Products Association (WWPA):
   1. WWPA G-5 - Western Lumber Grading Rules.

1.3 SUBMITTALS

A. Section 01 3300 - Submittal Procedures: Procedures for submittals.
   1. Assurance/Control Submittals:
      a. Certificates:
         1) Preservative Treated Wood: Certification for water-borne preservative that moisture content was reduced to 19 percent maximum, after treatment.

1.4 QUALITY ASSURANCE

A. Lumber: Comply with PS 20 and approved grading rules and inspection agencies.

1. Acceptable Lumber Inspection Agencies: WWPA G-5.
2. Lumber of other species or grades, or graded by other agencies, is acceptable provided structural and appearance characteristics are equivalent to or better than products specified.

B. Plywood: Comply with PS 1.

1.5 DELIVERY, STORAGE AND HANDLING

A. Section 01 6200 - Product Options: Transport, handle, store, and protect products.
1. Inspect wood materials for conformance to specified grades, species, and treatment at time of delivery to Project Site.
2. Reject and return unsatisfactory wood materials.

B. Provide facilities for handling and storage of materials to prevent damage to edges, ends and surfaces.

C. Keep materials dry. Stack materials off ground minimum 12 inches or, if on concrete slab-on-grade, minimum 1-1/2 inches, fully protected from weather. Provide for air circulation within and around stacks and under temporary coverings.

D. For materials pressure treated with waterborne chemicals, place spacers between each bundle to provide air circulation.

PART 2 PRODUCTS

2.1 MATERIALS

A. Grading Agency: Western Wood Products Association (WWPA).

B. Sizes: Nominal sizes as indicated on Drawings, S4S.

C. Moisture Content: S-dry or MC19.

D. Blocking and Nailers: S4S, No. 2 or Standard Grade.

E. Electrical Component Mounting: APA rated sheathing.

F. Fasteners: Hot-dipped galvanized steel for treated wood locations.

2.2 WOOD TREATMENT

A. Preservative Pressure Treated Lumber:
1. Manufacturers:
   a. Wolmanized Pressure-Treated Wood, Wolman CCA Type C, by Hickson Corporation.
   b. CCA Pressure Treated Lumber Type C, by Hoover Treated Wood Products, Incorporated.
2. Impregnate lumber with preservative treatment conforming to AWPA Standard C1 and P5. Apply the preservative in a closed cylinder by pressure process in accordance with AWPA Standard C15.
3. Retention of dry salts:

a. Moderate service conditions (weather exposure): 0.25 pounds per cubic foot (oxide basis).
b. Severe conditions (constant contact with ground or water): 0.40 pounds per cubic foot (oxide basis).

4. Remove excess moisture where shrinkage is a serious fault or where treated lumber will be in contact with plaster, or stucco, and where water-borne treated lumber is to be painted or stained.
5. Lumber shall be dried to 15-19 percent moisture content after treatment, and material to be painted or stained shall have knots and pitch streaks sealed as with untreated wood.
6. Liberally brush freshly cut surfaces, bolt holes and machined areas with the same preservative in accordance with AWPA Standard M4.

B. Wood Requiring Treatment:
1. Lumber, Preservative Treated: Nailers, blocking, stripping, and similar items in conjunction with roofing, flashing, and other construction. Sills, blocking, furring, stripping, and similar items in contact with masonry or concrete.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 7300 - Execution: Verification of existing conditions before starting work.

B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.

C. Report in writing to Architect prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.

D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 INSTALLATION - NAILERS AND BLOCKING

A. Set members level and plumb, in correct position.

B. Provide miscellaneous members as indicated or as required to support finishes, fixtures, equipment, specialty items and trim.

3.3 INSTALLATION - PLYWOOD

A. Secure with long dimension perpendicular to framing members, with ends over firm bearing.

B. Install telephone and electrical panel back boards made of plywood at locations indicated on Drawings. Size back boards as required for equipment.

3.4 SITE TREATMENT OF WOOD MATERIALS

A. Apply preservative treatment in accordance with manufacturer's published instructions.

B. Brush apply two coats of preservative treatment on wood in contact with cementitious materials and roofing and related metal flashings. Treat site-sawn cuts.

C. Allow preservative to dry prior to erecting members.

3.5 FIELD QUALITY CONTROL

A. Section 01 4500 - Quality Control: Contractor Quality Control Representative shall perform contractor quality control inspections.
   1. Inspect rough carpentry installation, blocking, nailers, backboards, wood treatment and attachment to substrate.
   2. Document preparatory, initial and follow-up inspection in Contractor's Test and Inspection Reports.
   3. Test and Inspection Reports shall be available to Architect upon request.

B. Correct deficiencies in products and installation found not to be in compliance with Contract Documents.

END OF SECTION

SECTION 07 0150

PREPARATION FOR REROOFING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Inspection of existing roof conditions.
   2. Requirements and procedures for reroofing.

B. Related Documents:
   1. The Contract Documents, as defined in Document 00 7213 - General Conditions and modifications thereto, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.

C. Related Sections:
   1. Section 01 1100 - Summary: Work covered by Contract Documents, work Descriptions for each area of Work.
   2. Section 01 2900 - Payment Procedures: Determination of cost adjustment for replacing deteriorated roof decking and roof insulation.
   3. Section 02 4113 - Selective Demolition: Removal of roofing system and associated materials.
   4. Section 07 5400 – TPO-Thermoplastic Membrane: Overlayment membrane system.
   5. Section 07 6200 - Sheet Metal Flashing and Trim: Replacement flashings, counterflashings and fabricated sheet metal items.

1.2 INSPECTION OF EXISTING ROOF CONDITIONS

A. Investigate and document existing conditions. Take measurements of sheet metal flashings, trim gutters and downspouts required for preparation of shop drawings and submittals.

1.3 SYSTEM DESCRIPTION

A. Perform Work at roof areas indicated on Drawings and specified in Section 01 1100 - Summary, “Work Covered by Contract Documents.”

B. Perform Work in accordance with manufacturer’s published instructions for Re-roofing, including evaluation of existing roofing system, on-site inspection, interior inspection, exterior inspection, roof perimeter and field inspection, and requirements for specific deck, substrate and roofing material.

C. Keep existing rooftop mechanical units in operation. Should re-roofing work require a unit to be taken out-of-service, give prior notification to and coordinate with Owner Representative as specified in Section 01 1100 – Summary.

D. Protect existing roof mounted fuel gas piping from damage. Provide temporary supports to keep piping off roof substrate unitl completion of replacement roof installation and setting of new support blocks.

E. Remove existing roofing, flashing, gutters and downspouts as incicated in Section 01 1100 – Summary and Drawings.

F. Existing roof mounted mechanical equipment and curbs to remain. Remove existing flashing, counterflashing and roof membrane. Prepare roof curbs for installation of new flashing, counterflashing and new roofing system.
   1. Extend existing roof mounted mechanical equipment and skylight curbs to provide minimum clearance of 8" above finish roof surface indicated on Drawings.

G. Existing mechanical vents, plumbing vents and electrical conduits penetrating roof shall remain. Remove existing flashing and roof membrane. Prepare mechanical vents, plumbing vents and electrical conduits for installation of new flashing and roofing.

H. Broom clean existing roof decks and substrates at completion of existing roofing removal.

I. Prepare existing roof decks and substrates for installation of replacement roof system.

J. Prepare existing roof areas for installation of new or replacement wood blocking and nailers.

K. Replace existing wood blocking and nailers in areas.

L. Prepare existing roof deck for installation of replacement roof system.

M. Prepare existing roof areas for installation of new or replacement wood blocking, nailers, flashing, gutters and downspouts and collector heads and downspouts.

1.4 QUALITY ASSURANCE

A. Qualifications:
   1. Manufacturer: Company specializing in manufacturing Products specified with minimum five (5) years documented experience.
   2. Installer: Company specializing in performing the Work of this Section with minimum five (5) years documented experience.
      a. Work under this Section shall be performed by registered "Roofing Contractor" having current Certification on file with State of Oklahoma Construction Industries Board.
      b. Registration Certificate Number shall be readily available and on display at all times by Roofing Contractor.

B. Pre-Installation Meeting:
   1. Convene one (1) week before starting Work of this section.
   2. Owner's Representative will conduct Pre-Installation Meeting with Roofing Contractor and Project Field Superintendent.
   3. Agenda:
      a. Tour, inspect and discuss condition of substrate, curbs, penetrations, existing roofing at existing building and other preparatory work performed by other trades.
      b. Review structural loading limitations of deck and inspect deck for loss of flatness and for required mechanical fastening.

c. Review manufacturer roofing system requirements and published instructions for Re-roofing.
d. Review required submittals, both completed and yet to be completed.
e. Review and finalize construction schedule related to roofing work and verify availability of materials, installer's personnel, equipment and facilities needed to make progress and avoid delays.
f. Review requirements for Manufacturer's Roofing Quality Control Inspector inspections.
g. Review weather and forecasted weather conditions, and procedures for coping with unfavorable conditions, including possibility of temporary roofing.
h. Review safety precautions relating to roofing installation.

1.5 ENVIRONMENTAL REQUIREMENTS

A. Section 01 6200 - Product Options: Environmental conditions affecting products on site.

B. Section 01 5000 - Temporary Facilities and Controls: Temporary protection of existing building and adjacent areas.

C. Do not remove existing roofing membrane when weather conditions threaten the integrity of the building contents or intended continued occupancy.

D. Maintain continuous temporary protection prior to and during installation of new roofing system.

1.6 PROJECT CONDITIONS

A. Section 01 3100 - Project management and coordination.

B. Section 01 4500 - Quality Control: Contractor quality control inspections.

C. Schedule Work to coincide with commencement of installation of new roofing system.

D. Remove only existing roofing materials that can be replaced with new materials as weather will permit.

E. Coordinate the work with other affected mechanical and electrical work associated with roof curbs and roof penetrations.

PART 2 PRODUCTS

2.1 MATERIALS

A. Temporary Protection: Provide plastic sheeting and other necessary materials and methods of temporary protection for exposed areas of existing roof deck and existing building where existing roofing and roof insulation are removed to prevent water intrusion into building and onto exposed roof deck until permanent roof system is installed.
1. Any damage caused by contractor not providing adequate temporary protection from water intrusion shall be repaired by the contractor at no expense to the owner.

B. Wood Nailers and Blocking: Complying with PS 20 and approved grading rules and inspection agencies, preservative treated per AWPA Treatment C1, Exterior Type, chemically treated and pressure impregnated.

C. Deck replacement shall match existing materials and profile.

PART 3 EXECUTION

3.1 EXAMINATION

A. Sectiaon 01 7300 - Execution: Verification of existing conditions before starting work.

B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
   1. Verify existing roof slopes.
   2. Locate and record roof penetrations locations.
   3. Verify that existing roof surface is clear and ready for work of this section.

C. Report in writing to Architect prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.

D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 TEMPORARY PROTECTION

A. Provide temporary protective sheeting over uncovered deck surfaces.
   1. Protect existing roof and curbing. Retain temporary protection in position with temporary fasteners.

B. Turn sheeting up and over parapets and curbing. Retain sheeting in position with temporary fasteners.

C. Provide for surface drainage from temporary protection to existing drainage facilities.

D. Do not permit traffic over unprotected or repaired deck surface.

3.3 REPLACEMENT ROOFING

A. Provide replacement roofing and associated flashings, counter flashings, gutters and downspouts as specified in each individual specification section.

B. Seal all joints watertight with sealant as specified in Section 07 9000 - Joint Sealers.

END OF SECTION

SECTION 07 5410

THERMOPLASTIC MEMBRANE ROOFING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Manufacturers
2. Roofing - Adhered
3. Roofing Membrane and Associated Materials
4. Insulation – Re-roof
4. Cover Board – as Alternate #1
5. Metal Edge Flashing
6. Accessories
7. Temporary Protection

B. Related Documents:
1. The Contract Documents, as defined in Document 00 7213 - General Conditions and modifications thereto, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.

C. Related Sections:
1. Section 07 0150 - Preparation for Reroofing: Requirements and procedures for reroofing.
2. Section 07 6200 - Sheet Metal Flashing and Trim: Flashings and counterflashings.

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM):
1. ASTM C 1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
2. ASTM D 624 - Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers.
3. ASTM D 746 - Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact.
4. ASTM D 751 - Standard Test Methods for Coated Fabrics.
5. ASTM E 96 - Standard Test Methods for Water Vapor Transmission of Materials.

B. Factory Mutual Research Coproration (FM):
1. FM - Approval Guide, Building Materials.
2. FM - Loss Prevention Data 1-28, Wind Loads to Roof Systems and Roof Deck Securement.
3. FM - Loss Prevention Data 1-29, Above Deck Roof Components.
4. FM - Standard 4450, Class 1 Insulated Steel Deck Roofs.
5. FM - Standard 4470, Class 1 Roof Covers.

C. National Roofing Contractors Association (NRCA):
1. NRCA ML104 - The NRCA Roofing and Waterproofing Manual.

1.3 SUBMITTALS

A. Section 01 3300 - Submittal Procedures: Requirements for submittals.
   1. Product Data:
      a. Provide data indicating membrane materials, flashing materials, cover board and fasteners.
      b. Cover board fastener layouts complying with FM Loss Prevention Data Sheet 1-29 patterns for specified wind uplift resistance. Indicate number of cover board fasteners required and spacing of fasteners for field, perimeter, and corners for each pattern.
   2. Shop Drawings: Indicate setting plan for cover board including fastener pattern, layout of roofing seams, directions of laps and base flashing details.
   3. Assurance/Control Submittals:
      a. Qualification Documentation: Submit documentation of Applicator experience indicating compliance with specified qualification requirements.
         1) Qualification Documentation: Upon request, submit evidence of compliance with Oklahoma Bill #2180 “Roofing Contractor Registration Act.”
      b. Manufacturer's Field Reports: Submit the following reports directly to Architect from Manufacturer's Quality Control Inspector, with copy to Contractor. Indicate procedures followed, ambient temperatures, humidity, wind velocity during application, and supplementary instructions given.
         1) Preparatory inspection.
         2) Initial inspection.
         3) Follow-up inspection.
         4) Final inspection.

B. Section 01 7800 - Closeout Submittals: Procedures for closeout submittals.
   1. Manufacturer Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer. Provide manufacturer’s total system warranty. No material only warranties will be accepted.
   2. Roofing Installer Warranty: Submit Roofing Installer Warranty form located at end of Section.
   3. Installation Certification: Submit written certification of installation on form located at end of Section.

1.4 QUALITY ASSURANCE

A. Perform work in accordance with NRCA ML104 and manufacturer's instructions.

B. Applicator Qualifications: Company specializing in performing the Work of this section with minimum five (5) years documented experience certified by roofing system manufacturer as follows:
   1. Carlisle: Authorized Roofing Installer.
   2. Firestone Building Products: Red Shield Applicator.
   3 Johns-Manville: NDL Approved.
   4. Versico: Versico Authorized Contractor.

C. Installer: .
   1. Work under this Section shall be performed by registered “Roofing Contractor” having current Certification on file with State of Oklahoma Construction Industries Board.

2. Registration Certificate Number shall be readily available and on display at all times by Roofing Contractor.

D. Single Source Responsibility: Roofing system materials and components shall be supplied and warranted by membrane manufacturer for specified roofing system and specified membrane manufacturer's warranty and shall be in compliance with specified regulatory requirements.

E. Regulatory Requirements:
1. Roof Assembly: Comply with Factory Mutual System Approval Guide to provide FMRC-Approved roof assembly meeting IA-90 (FM Standard 4450/4470) requirements for fire resistance and wind uplift in accordance with FM Loss Prevention Data Sheets 1-28 and 1-29.
   a. Wind Load: 90 mph and three (3) second wind gust duration of 90 mph in accordance with IBC.

F. Manufacturer Installation Instructions: Contractor shall maintain current copy of thermoplastic membrane roofing manufacturer published instructions in Project Field Office and refer to instructions at all times during installation.

G. Pre-Installation Meeting:
1. Section 01 3100 - Project Management and Coordination: Procedures for pre-installation meetings.
2. Convene a pre-installation meeting one (1) week before starting Work of this Section.
3. Require attendance of parties directly affecting Work of this Section.
4. Review conditions of operations, procedures and coordination with related Work.
   a. **Roofing Manufacturer's Representative** will conduct Pre-Installation Meeting with Owner's Representative, Roofing Contractor and Project Field Superintendent.
5. Agenda:
   a. Tour, inspect and discuss condition of substrate, curbs, penetrations, existing roofing at existing building and other preparatory work performed by other trades.
   b. Review structural loading limitations of deck and inspect deck for loss of flatness and for required mechanical fastening.
   c. Review roofing system requirements (Drawings, Specifications and other Contract Documents).
   d. Review required submittals, both completed and yet to be completed.
   e. Review and finalize construction schedule related to roofing work and verify availability of materials, installer's personnel, equipment and facilities needed to make progress and avoid delays.
   f. Review requirements for Manufacturer's Roofing Quality Control Inspector inspections.
   g. Review weather and forecasted weather conditions, and procedures for coping with unfavorable conditions, including possibility of temporary roofing.
   h. Review safety precautions relating to roofing installation.

1.5 DELIVERY, STORAGE, AND PROTECTION

A. Section 01 6200 - Product Options: Transport, handle, store, and protect Products.

B. Deliver products in manufacturer's original containers, dry, undamaged, with seals and labels intact.

C. Deliver Material Safety Data Sheet (MSDS) for each material to Project Field Superintendent for Contractor Records.

D. Accept Products on site in manufacturer's packaging. Inspect for damage. Return damaged Products and replace with undamaged Products.

E. Project Field Superintendent shall inspect Products immediately upon delivery to Project Site, determine Product conformance with specified requirements and reject Products not complying with specifications. Project Field Superintendent shall direct that non-complying Products be removed from Project Site immediately.

F. Do not expose materials to moisture in any form before, during or after delivery to site. Reject delivery of materials that show evidence of contact with moisture.

G. Store products in weather protected environment, clear of ground and moisture. Use "breathable" type covers such as canvas tarpaulins to allow venting. Do not remove protective tarpaulins until immediately before the material will be installed.

H. Stand roll materials on end on pallets.

1.6 PROJECT CONDITIONS

A. Environmental Requirements:
1. Do not apply roofing membrane during unsuitable weather.
2. Do not apply roofing membrane when ambient temperature is below 40 degrees F or above 90 degrees F.
3. Do not apply roofing membrane to damp or frozen surface or when precipitation is expected or occurring.
4. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed the same day.

1.7 WARRANTY

A. Section 01 7800 - Closeout Submittals: Procedures for closeout submittals.

B. Roofing Installer Warranty: Roofing contractor agrees to correct defective Work within a two (2) year period from Date of Substantial Completion.
1. Submit Roofing Installer Warranty located at end of Section.

C. Manufacturer Warranty: Provide twenty (20) year No Dollar Limit manufacturer's material and labor warranty to cover failure to prevent penetration of water.
1. Warranty shall state that roofing system is in compliance with Factory Mutual Classification Class I and windstorm resistance of I-90, in accordance with FM DS 1-28.
2. Include tewnty (20) years NDL - 2" diameter hail damages protection coverage as **Alternate #1**

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: The design for Thermoplastic Membrane Roofing is based on the product named.
   1. Membrane Materials: Carlisle SynTec Incorporated: www.carlisle-syntec.com.

B. Section 01 6200 - Product Options: Product options and substitutions. Subject to compliance with requirements, provide either the named product or a comparable product by one of the following manufacturers:
   1. Firestone Building Products: www.firestonebpco.com
   2. Johns Manville: www.jm.com.
   3. Versico Incorporated: www.versico.com.

2.2 ROOFING - ADHERED

A. Thermoplastic Membrane Roofing: Carlisle SynTec, Inc.: TPO Sure-Weld TPO one (1) ply membrane, adhered over cover board.
   1. Other Acceptable Manufacturer Memebranes:
      a. Firestone Building Products: UltraPly TPO
      b. Johns Manville: UltraGuard TPO
      c. Versico Incorporated: Versiweld TPO.

B. Roofing Assembly Requirements:
   1. Roof Covering External Fire-Resistance Classification: UL Class A.
   2. Factory Mutual Classification: Class I and windstorm resistance of I-90, in accordance with FM DS 1-28.

2.3 ROOFING MEMBRANE AND ASSOCIATED MATERIALS

A. Membrane: Thermoplastic Polyolefin (TPO); reinforced; complying with the following minimum properties:
   1. Thickness: 60 mils.
   2. Sheet Width: 10 feet or largest sheets available.
   3. Color: White.

B. Seaming Materials: As recommended by membrane manufacturer, suitable for mechanically attached TPO system.

C. Flexible Flashing Material: Same material as membrane.

2.5 INSULATION - RE-ROOF

A. Manufacturer: Roofing manufacturer approved, listed on roofing manufacturer approved insulation list.

B. Polyisocyanurate Board Insulation: ASTM 1289, rigid cellular foam, both faces finished with organic/glass facers, minimum 1.5 pounds per cubic foot. Approved by Roof Membrane Manufacturer, with the following characteristics:
   1. Board Size: 48 x 96 inch.
   2. Board Thickness: 1.5” and 2” minimum staggered joint.
   3. Board Edges: Square.

C. Tapered Insulation: Slope as indicated.

1. Crickets and Saddles: Per manufacturer requirement
2. Insulation Installed to Counterslope Roof Structure: 1/2 inch per foot.
3. Slope as indicated on Drawings; fabricate of fewest layers possible.

2.5 COVER BOARD - RE-ROOF (As Alternate #1)

A. Manufacturer: Roofing manufacturer approved, listed on roofing manufacturer approved insulation list.

B. As per manufacturer 2" diameter hail protection warranty requirement.

2.6 METAL EDGE FLASHING

A. Metal flashing specifi ed in Section 07 6200 - Sheet Metal Flashing and Trim.
1. Metal edge flashing shall meet ES-1 approvals.

2.7 ACCESSORIES

A. Pipe Boots: Prefabricated flexible boot and collar for pipe stacks through membrane; same material as membrane.

B. Wood Equipment Curbs, Blocking and Nailers: whare required.
1. Sizes: Nominal sizes as indicated on Drawings.
2. Type: S4S, No. 2 or Standard Grade, preservative treated.

C. Insulation Fasteners: Coated fasteners, screw type with plates as specified, appropriate for purpose intended and approved by Factory Mutual and system manufacturer; length as required for thickness of insulation material plus minimum 3/4 inch penetration of deck substrate.

D. Membrane Adhesive: VOC compliant TPO type as recommended by membrane manufacturer.

E. Surface Conditioner for Adhesives: Compatible with membrane and adhesives.

F. Thinners and Cleaners: As recommended by adhesive manufacturer, compatible with membrane.

G. Insulation Adhesive: As recommended by insulation manufacturer.

H. Sealants: As recommended by membrane manufacturer.

J. Vents, Pipe and Conduit Flashing: Roofing manufacturer standard molded or fabricated flashing.

I. Walkway Pads: Manufacturer standard walkway pads compatible with roofing material.
1. Size: Minimum 30 inch x 30 inch.

K. Isolation Pads: Walkway pad material of size suitable to provide protection of roof membrane from pipe supports.

L.. Utilities pipes support: Provide Roller type support by Miro Industry Inc. or approved equal

For utilities pipe larger than 3" OD. Smaller pipes shall be supported by 4x4x8 treated wood Wood blocking with fasenters.

2.8 TEMPORARY PROTECTION

A. Provide plastic sheeting, roll roofing or other suitable temporary protective material and other necessary materials and methods for temporary protection for exposed areas of existing roof deck and existing building where existing roofing and roof insulation are removed to prevent water intrusion into building and onto exposed roof deck until permanent roof system is installed.
   1. Damage caused by Contractor not providing adequate temporary protection from water intrusion shall be repaired by Contractor at no additional cost to Owner.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 7300 - Execution: Verification of existing conditions before starting work.

B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
   1. Verify that surfaces and site conditions are ready to receive work.
   2. Verify deck is supported and secure.
   3. Verify deck is clean and smooth, flat, free of depressions, waves, or projections and suitable for installation of roof system.
   4. Verify deck surfaces are dry and free of snow or ice.
   5. Verify that roof openings, curbs, and penetrations through roof are solidly set and extended to height above roofing membrane as indicated on Drawings.

C. Report in writing to Architect prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.

D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 PREPARATION

A. Clean substrate of dust, debris, and other substances detrimental to roofing installation according to roofing system manufacturer published instructions. Remove sharp projections.

B. All roof surfaces shall be free for water, ice and snow.

C. Prevent materials from entering and clogging roof drains and conductors (where occurs) and from spilling or migrating onto surfaces of other construction. Remove roof drain plugs when no work is taking place or when rain is forcast.

D. Preparation for reroofing specified in Section 07 0150 - Preparation for Re-Roofing .

3.3 WOOD NAILER INSTALLATION

A. Provide wood nailers continuous at perimeter of roof, roof penetrations and other locations indicated on Drawings.

B. Anchor nailers to resist minimum force of 175 pounds per lineal foot in any direction. Space fasteners maximum 36 inches on center, maximum 6 inches from ends.
   1. Fastener spacing and embedment shall conform to Factory Mutual Loss Prevention Data Sheet 1-49.
   2. Nailer thickness shall match insulation height.

3.4 COVER BOARD INSTALLATION

1. As per manufacturer requirement.

3.5 METAL EDGE FLASHING INSTALLATION

A. Install metal edge flashing at locations indicated on Drawings.

B. Install in accordance with Factory Mutual Loss Prevention Data Sheet 1-49 and ES-1 standards.

C. Install fasteners back 1 inch for outside edge of metal.

D. Install flashing to provide resistance to bending and allow for thermal expansion and contraction.

E. Space metal 1/4 inch to 1/2 inch apart. Install 4 inch wide strip of flashing membrane over center of joint.

F. Fasten metal cleat at 12 inches on center.

3.6 MEMBRANE APPLICATION

A. Roll out roof membrane, free from wrinkles, buckles or tears. Place sheet into place without stretching.

B. Roof membrane shall be mechanically attached immediately after it is rolled out, followed by welding to adjacent sheets.

C. Install membrane so side laps run across roof slope lapped toward drainage points.

D. Round exposed corners minimum 1 inch.

E. Full-width rolls shall be installed in field regions of roof.
   1. Perimeter half sheets shall be installed parallel with entire perimeter edge. Half sheets shall be laid out in an approved pattern.

F. Overlap edges and ends and seal by heat welding, minimum 3 inches with 1-1/2 inch heat weld at side and end laps. Seal permanently waterproof.
   1.. Seal cut edges of reinforced membrane with manufacturer Cut Edge Sealant.

G. Adhere to insulation with applicable bonding adhesive required by roof system and Factory Mutual classification requirements.

H. Install supplemental membrane attachment at base of walls, curbs, and where angle of substrate changes by more than 10 degrees. Secure roof membrane to roof deck with fasteners and plates of same type and spacing used for lap-in attachment. Install fasteners and plates minimum 1/2 inch from membrane edge. As an alternate, roofing membrane may be turned up vertical plane minimum 3 inches and fastened with screws and termination bar. Fastener spacing same as for lap-in attachment. Install termination bar within 1-1/2 inch to 2 inches of the plane of roof membrane with minimum 1 inch of membrane extending above termination bar.

I. Install supplementary fasteners and plates around all perimeters at base of walls, drains, curbs, vent pipes or any other roof penetration.

J. Install fasteners to achieve proper embedment depth without lean or tilt.

K. Install fasteners so that plate to termination bar is drawn tightly to membrane surface. Properly installed fasteners will not allow plate or termination bar to move (underdriving), but will not cause wrinkling of membrane (overdriving).

3.7 MEMBRANE FLASHING INSTALLATION

A. Install flashings concurrently with roof membrane as Work progresses. No temporary flashings permitted. If any water is permitted to enter under roofing due to incomplete flashing, affected area shall be removed and replace at Contractor expense.

B. Extend flashing minimum 8 inches above roof level.

C. Fully adhere flashing membrane to solvent-resistant substrates. All interior and exterior corners and miters shall be cut and welded in place.

D. Weld flashings at joints and connections with roof membrane.

E. Mechanically attach flashing flashing membrane along top edge using metal plates and fasteners or predrilled termination bar.

F. Terminate flashings in accordance with manufacturer recommended details.

3.8 HOT AIR WELDING

A. Weld adjacent sheets in accordance with manufacturer's published instructions. Weld side and end laps.

B. Surfaces to be welded shall be clean with no adhesives or other contaminants within lap area.

C. Hand Welding: Hand welding permitted only for detail work and small seams.

D. Machine Welding: Weld seams with manufacturer's automatic welding equipment. Provide a portable generator to power welding equipment. Use of building power not permitted.

E. Quality Control: Check welded seams after cooling for continuity by using a seam probe. Perform on-site evaluation of welded seams daily. At completion of roof work, check each seam with a seam probe.

1. When automatic welding equipment is first started or any time equipment is cooled and restarted, minimum 2 seam test cuts required.
2. Test cuts shall be 2 inches wide, cross cutting seam. Test cuts shall be dated, marked for location, and kept by Contractor for future evaluation if required.

3.9 WATER CUTOFFS AND WEATHER PROTECTION

A. Install water cut-offs of type recommended by roof membrane manufacturer, at end of day's operation to seal insulation and edge of roof membrane from moisture entry.

B. If rain or foul weather appears imminent during roofing application, cease operations and protect deck, insulation, flashings, penetrations and membrane from moisture intrusion and damage with water cutoffs. Insulation and roofing materials not so protected before rain are considered damaged materials and will be rejected.

C. Plug steel deck flutes under cutoff membrane to prevent moisture from getting under insulation.

D. Remove water cut-offs and other temporary weather protections prior to continuing roofing work. Remove materials that have been subject to moisture damage and return deck to clean, dry condition before proceeding with roofing operations. Remove damaged materials from Project site.

E. Water cut-offs and weather protection not considered part of final roof system specified.

3.10 FLASHING MEMBRANE AND ACCESSORIES

A. Flash irregularly shaped penetrations with flanged sealant pans formed of coated metal, secured to the deck through the roof membrane, with screws 6 inches on center, aminimum of two per side.

B. Strip in metal flanges with 8” wide membrane flashing strips heat welded to both the roof membrane and the metal flanges.

C. Fill sealant pans with two-part pourable sealant. Alternatively, fill sealant pans with non-shrink quick-set grout, and top off sealant pans with a 2 inch minimum thickness of two-part pourable sealant.

D. Roof Penetrations:
1. Vents, Pipe and Conduit Flashing: Install where configuration of penetration will permit, including but not limited to electrical conduit, plumbing and mechanical vents.

E. At intersections with vertical surfaces:
1. Extend membrane up a minimum of 8 inches onto vertical surfaces and 4 inches onto field of roof membrane.
2. Fully adhere flexible flashing over membrane and up to nailing strips.
3. Secure flashing to termination bars at 6 inches on center.

F. Roof Drains: Set membrane flashing in bed of sealant on completed roofing membrane in accordance with manufacturer's published instructions.
1. Cover flashing with stripping extending minimum 4 inches beyond edge of flashing onto field of roof membrane.
2. Clamp roof membrane, flexible flashing, and stripping into roof-drain clamping ring.

G. Walkway Pads: Provide walkway pads from the point of roof access to and completely around all rooftop mechanical units requiring periodic access.
   1. Provide walkway pads to access other roof levels.
   2. Provide minimum 1 inch gap between perpendicular pads to allow for positive drainage.

H. Isolation Pads: Set pads in roofing cement. Install isolation pads at pipe supports where piping is run across roof area.

3.11 CONSTRUCTION

A. Interface with Other Work:
   1. Coordinate work with installation of associated metal counterflashings specified under other Sections as Work of this Section proceeds.

3.12 FIELD QUALITY CONTROL

A. Section 01 4500 - Quality Control: Contractor Quality Control Representative shall perform contractor quality control inspections.
   1. Inspect roof insulation, membrane system installation, type, thickness, seams, roof slope, roof penetrations and flashing.
   2. Document preparatory, initial and follow-up inspection in Contractor's Test and Inspection Reports.
   3. Test and Inspection Reports shall be available to Architect upon request.

B. Manufacturer's Field Services: Manufacturer's Roofing Quality Control Inspector.
   1. Conduct Pre-Installation Meeting.
   2. Perform preparatory, initial, follow-up and final inspections for roof insulation and roofing system and transition from new roofing membrane to existing.
   3. Prepare and submit inspection reports for each inspection made.

C. Correct deficiencies in products and installation found not to be in compliance with Contract Documents.

3.13 CLEANING

A. Remove manufacturer markings from finished surfaces.

B. In areas where finished surfaces are soiled by work of this section, consult manufacturer of surfaces for cleaning advice and conform to their documented instructions.

C. Repair or replace defaced or damaged finishes caused by work of this section.

3.14 PROTECTION

A. Protect installed roofing and flashings from construction operations.

B. Where traffic must continue over finished roof membrane, protect surfaces using durable materials.

END OF SECTION

ROOFING INSTALLER WARRANTY

WHEREAS _____ of _____,
Contractor Name Contractor Address

herein called the "Roofing Installer," has performed roofing and associated work ("work") on the following project:

Owner: CANADIAN COUNTY

Address: 200 N. Choctaw Avenue

Building Name/Type: Administration Building

Address: 200 N. Choctaw Avenue, El Reno, Ok 73036

Area of Work: _____ .

Substantial Completion Date: _____ .

Warranty Period: Two (2) years from Date of Substantial Completion.

Expiration Date: _____ .

AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period,

NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period installer will, at installer's own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain said work in a watertight condition.

This Warranty is made subject to the following terms and conditions:

1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:
   a. lightning;
   b. peak gust wind speed exceeding UL I-90 requirements;
   c. fire;
   d. failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
   e. faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;
   f. vapor condensation on bottom of roofing; and
   g. activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.
2. When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof has been paid by Owner or by another responsible party so designated.
3. The Roofing Installer is responsible for damage to work covered by this Warranty but is not liable for consequential damages to building or building contents, resulting from leaks or faults or defects of work.

4. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of said alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Roofing Installer to perform said alterations, Warranty shall not become null and void, unless Roofing Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.
5. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a promenade, work deck, spray-cooled surface, flooded basin, or other use or service more severe than originally specified, this Warranty shall become null and void on date of said change, but only to the extent said change affects work covered by this Warranty.
6. The Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect work and to examine evidence of such leaks, defects, or deterioration.
7. This Warranty is recognized to be the only warranty of Roofing Installer on said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of original work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

IN WITNESS THEREOF, this instrument has been duly executed this _____ day of _____, 20____ .

Authorized Signature: _____

Name: _____

Title: _____

END OF ROOFING INSTALLER WARRANTY

ROOFING INSTALLATION CERTIFICATION

PROJECT: Administration Building – Rereef

LOCATION: 200 N. Choctaw Ave, El Reno, OK 73036

ARCHITECT'S PROJECT NUMBER: N16001A

OWNER: Candian County

CONTRACTOR: _____

ROOFING INSTALLER:

Name: _____

Address: _____

Telephone Number: _____

UPON COMPLETION OF INSTALLATION INSTALLER CERTIFIES THAT:

1. Installer obtained a current copy of the manufacturer's published installation instructions and NRCA ML 104 for the specific product being installed.
2. Installer reviewed and discussed manufacturer's published installation instructions, requirements of NRCA ML 104 requirements of FM Loss Prevention Data Sheets with Project Field Superintendent before start of installation.
3. Installer furninshed and installed specified roofing and roof insulation in accordance with the Contract Documents.
4. Installer furnished and installed specified metal edge flashing system in accordance with the Contract Documents.
5. Installer has sealed around all penetrations and has inspected, repaired and sealed any and all tears or punctures as per manufacturer's published instructions.
6. Manufacturer's Roofing Quality Control Inspector performed inspections as specified.

EXECUTED AND DELIVERED this _____ day of _____, 20___ .

_____
(company name)

BY: _____
(authorized signature)

Subscribed and sworn to before me this _____day of _____, 20___.

_____
Notary Public

_____ Affix Seal
My Commission expires:

END OF CERTIFICATION

SECTION 07 6200

SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Pre-finished flashings, counterflashings and fabricated sheet metal items.
2. Reglets and accessories.

B. Related Documents:
1. The Contract Documents, as defined in Document 00 7213 - General Conditions and modifications thereto, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.

C. Related Sections:
1. Section 07 0150 - Preparation for ReRoofing: Requirements and procedures for repair of existing roof.
2. Section 07 5400 - Thermoplastic Membrane Roofing: Flashings associated with TPO roofing.

1.2 REFERENCES

A. American Architectural Manufacturer's Association (AAMA):
1. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.

B. American Society for Testing and Materials (ASTM):
1. ASTM A 653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
2. ASTM D 4586 - Standard Specification for Asphalt Roof Cement, Asbestos-Free.

C. Sheet Metal and Air Conditioning Contractor's National Association (SMACNA):
1. SMACNA (ASMM) - Architectural Sheet Metal Manual.

D. Single Ply Roofing Institute (SPRI):
1. SPRI ES-1 - Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems.

1.3 SUBMITTALS

A. Section 01 3300 - Submittal Procedures: Requirements for submittals.
1. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.
2. Samples for Selection: Submit manufacturer's complete set of finish color samples for Architect initial color selection.

3. Assurance/Control Submittals:a. Roof Edge System and/or Parapet Caps/Coping Certification: Provide certification that system has been tested and meets performance criteria according to SPRI ES-1.

B. Section 01 7800 - Closeout Submittals: Procedures for closeout submittals.
   1. Warranty: Submit written warranty with forms completed in Owner's name and regisered with manufacturer as specified in this Section.

1.4 QUALITY ASSURANCE

A. Perform work in accordance with SMACNA Architectural Sheet Metal Manual requirements and standard details, except as otherwise indicated.

B. Fabricator and Installer Qualifications: Company specializing in sheet metal work with minimum five (5) years of documented experience.

C. Roof Edge System and/or Parapet Coping System: System shall be certified by system manufacturer or sheet metal fabricator as meeting or exceeding performance design criteria according to SPRI ES-1 for the following test standards:
   1. Systems shall be tested simultaneously on horizontal and vertical surfaces and shall exceed horizontal and vertical design with pressure as calculated in accordance with specified test.
   2. Roof Edge System:
      a. SPRI Test RE-1 - Test for Roof Edge Termination of Ballasted or Mechanically Attached Roofing Membrane Systems.
      b. SPRI Test RE-2 - Pull-Off Test for Edge Flashings.
   3. Parapet Cap/Coping System: SPRI Test RE-3 – Pull-Off Test for Copings.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Section 01 6200 - Product Options: Transport, handle, store and protect Products.

B. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.

C. Prevent contact with materials which may cause discoloration or staining.

1.6 WARRANTY

A. Section 01 7800 - Closeout Submittals: Procedures for closeout submittals.

B. Flashing and Coping Systems: Material and labor warranty covering all defects in materials and workmanship, combined as part of roofing membrane warranty.
   1. Warranty Period: Two (2) years.

C. Pre-Finished Coating: Warranty covering pre-finished color coat against chipping, cracking or crazing, blisering, peeling, chalking, or fading.
   1. Warranty Period: 20 years.

PART 2 PRODUCTS

2.1 SHEET MATERIALS

A. Pre-Finished Galvanized Sheet: ASTM A 653, with G90/Z275 zinc coating, minimum 24 gage, shop pre-coated with fluoropolymer system utilizing 70 percent Kynar 500 or Hylar 5000 resin.
   1. Color: Selected by Architect.

B. Expansion Joint Flashing: J-M “Expand-O-Flash” sheet butyl over close cell foam backing seamed to galvanized steel flanges with factory prefabricated corners, tees, and transions.

2.2 ACCESSORIES

A. Fasteners: Same material and finish as flashing with soft neoprene washers.

B. Primer: Zinc molybdate type.

C. Protective Backing Paint: Zinc molybdate alkyd.

D. Sealant: One part, non-skinning butyl as manufactured by one of the following:
   1. Bostik: www.bostik-us.com.
   2. Pecora Corporation: www.pecora.com.
   3. Tremco, Inc.: www.tremcosealants.com.

E. Plastic Cement: ASTM D 4586, Type I.

2.3 FABRICATION

A. Form sections to profiles and size as indicated on Drawings, square, and free from distortion or defects.

B. Form pieces in longest possible lengths.

C. Hem exposed edges on underside 1/2 inch; miter and seam corners.

D. Form material with flat lock seams, except where otherwise indicated. At moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.

E. Fabricate corners from one piece with minimum 18 inch long legs; seam for rigidity, seal with sealant.

F. Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed to form drip.

G. Seal metal joints watertight.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 7300 - Execution: Verification of existing conditions before starting work.

B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.

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

C. Report in writing to Architect prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.

D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 PREPARATION

A. Install starter and edge strips, and cleats before starting installation.

B. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil.

3.3 INSTALLATION

A. Secure flashings in place using concealed fasteners. Use exposed fasteners only where permitted.

B. Apply plastic cement compound between metal flashings and felt flashings.

C. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.

D. Seal metal joints watertight.

E. Install expansion joint flashing in accordance with manufacturer's published instructions.

3.4 FIELD QUALITY CONTROL

A. Section 01 4500 - Quality Control: Contractor Quality Control Representataive shall perform contractor quality control inspections.
1. Inspect sheet metal flashing installation, material, shapes, finish, joints and attachment to substrate, finish and color.
2. Document preparatory, initial and follow-up inspection in Contractor's Test and Inspection Reports.
3. Test and Inspection Reports shall be available to Architect upon request.

B. Correct deficiencies in products and installation found not to be in compliance with Contract Documents.

END OF SECTION

END OF TABLE OF CONTENTS

SECTION 22 0500

COMMON WORK RESULTS FOR PLUMBING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
1. Plumbing Demolition
2. Polyphase Motors
3. Polyphase Motors With Additional Requirements
4. Single-Phase Motors
5. Sleeves.
6. Sleeve-seal systems.
7. Grout.
8. Escutcheons.
9. Floor plates.
10. Liquid-in-glass thermometers.
11. Dial-type pressure gages.
12. Gage attachments.
13. Test plugs.
14. Equipment labels.
15. Pipe labels.
16. Valve tags.

1.3 COORDINATION

A. Coordinate features of motors, installed units, and accessory devices to be compatible with the following:
1. Motor controllers.
2. Torque, speed, and horsepower requirements of the load.
3. Ratings and characteristics of supply circuit and required control sequence.
4. Ambient and environmental conditions of installation location.

B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

C. Coordinate installation of identifying devices with locations of access panels and doors.

D. Install identifying devices before installing acoustical ceilings and similar concealment.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.

C. Valve Schedules: For each piping system to include in maintenance manuals.

PART 2 - PRODUCTS

2.1 PLUMBING DEMOLITION

A. The extent of demolition work is indicated on the drawings and by the requirements of this section.

B. Provide all demolition work required for the removal and/or relocation of mechanical equipment, gas, condensate, domestic cold water, domestic hot water and sanitary waste piping, plumbing fixtures, floor drains, etc. to provide a complete and operable system upon completion of the project.

C. Work shall at all times be in compliance with local and national safety codes. Great care shall be taken to avoid leaving hazardous conditions unattended.

D. Where devices or equipment are indicated or required to be removed by the architectural layout, the associated plumbing serving such shall be removed back to their source.

E. Where devices or equipment are indicated or required to be relocated by the architectural layout, the associated plumbing shall be removed back to a main line or source and new products shall be used to extend the service to the new location.

F. Where devices or equipment are served from under a concrete floor, the piping shall be cut off below finish floor level and capped. Grout concrete shall be provided to level the finished floor.

G. Where piping is run above inaccessible ceilings or in walls, which are to remain undisturbed, the piping shall be capped and abandoned in place.

H. Where the removal of devices or equipment renders equipment downstream inoperable, services shall be extended to the downstream device or equipment so that the device or equipment is left in operating condition.

I. This Contractor shall remove all abandoned piping in the areas where construction is taking place.

J. Some of the piping which is to remain may have to be rerouted to accommodate the new construction. This shall be done at no additional cost to the Owner.

K. Where devices or equipment are served with piping penetrating the basement wall, the piping shall be cut off outside the basement wall, capped and the basement wall penetration shall be sealed and made watertight.

2.2 MOTOR CHARACTERISTICS

A. Comply with NEMA MG 1 unless otherwise indicated.

B. Duty: Continuous duty at ambient temperature of 40 deg C and at altitude of 3300 feet above sea level.

C. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.

2.3 POLYPHASE MOTORS

A. Description: NEMA MG 1, Design B, medium induction motor.

B. Efficiency: Energy efficient, as defined in NEMA MG 1.

C. Service Factor: 1.15.

D. Multispeed Motors: Variable torque.
1. For motors with 2:1 speed ratio, consequent pole, single winding.
2. For motors with other than 2:1 speed ratio, separate winding for each speed.

E. Rotor: Random-wound, squirrel cage.

F. Bearings: Regreasable, shielded, antifriction ball bearings suitable for radial and thrust loading.

G. Temperature Rise: Match insulation rating.

H. Insulation: Class F.

I. Code Letter Designation:
1. Motors 15 HP and Larger: NEMA starting Code F or Code G.
2. Motors Smaller than 15 HP: Manufacturer's standard starting characteristic.

J. Enclosure Material: Cast iron for motor frame sizes 324T and larger; rolled steel for motor frame sizes smaller than 324T.

2.4 POLYPHASE MOTORS WITH ADDITIONAL REQUIREMENTS

A. Motors Used with Variable Frequency Controllers: Ratings, characteristics, and features coordinated with and approved by controller manufacturer.
1. Windings: Copper magnet wire with moisture-resistant insulation varnish, designed and tested to resist transient spikes, high frequencies, and short time rise pulses produced by pulse-width modulated inverters.
2. Energy- and Premium-Efficient Motors: Class B temperature rise; Class F insulation.
3. Inverter-Duty Motors: Class F temperature rise; Class H insulation.
4. Thermal Protection: Comply with NEMA MG 1 requirements for thermally protected motors.

2.5 SINGLE-PHASE MOTORS

A. Motors larger than 1/20 hp shall be one of the following, to suit starting torque and requirements of specific motor application:
1. Capacitor start, capacitor run.

B. Multispeed Motors: Variable-torque, permanent-split-capacitor type.

C. Bearings: Prelubricated, antifriction ball bearings or sleeve bearings suitable for radial and thrust loading.

D. Motors 1/20 HP and Smaller: Shaded-pole type.

E. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device shall automatically reset when motor temperature returns to normal range.

2.6 SLEEVES

A. Galvanized-Steel-Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, with plain ends.

B. Molded-PE or -PP Sleeves: Removable, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.

2.7 SLEEVE-SEAL SYSTEMS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Metraflex Company (The).
2. Pipeline Seal and Insulator, Inc.

B. Description: Modular sealing-element unit, designed for field assembly, for filling annular space between piping and sleeve.
1. Sealing Elements: EPDM-rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
2. Pressure Plates: Stainless steel.
3. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements.

2.8 GROUT

A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

B. Characteristics: Nonshrink; recommended for interior and exterior applications.

C. Design Mix: 5000-psi, 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

2.9 ESCUTCHEONS

A. One-Piece, Cast-Brass Type: With polished, chrome-plated finish and setscrew fastener.

B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with chrome-plated finish and spring-clip fasteners.

C. One-Piece, Stamped-Steel Type: With chrome-plated finish and spring-clip fasteners.

D. Split-Casting Brass Type: With polished, chrome-plated finish and with concealed hinge and setscrew.

E. Split-Plate, Stamped-Steel Type: With chrome-plated finish, concealed hinge, and spring-clip fasteners.

2.10 FLOOR PLATES

A. One-Piece Floor Plates: Cast-iron flange with holes for fasteners.

2.11 LIQUID-IN-GLASS THERMOMETERS

A. Metal-Case, Industrial-Style, Liquid-in-Glass Thermometers:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Weiss Instruments, Inc.
   b. Winters Instruments - U.S.
2. Standard: ASME B40.200.
3. Case: Cast aluminum; 9-inch nominal size unless otherwise indicated.
4. Case Form: Adjustable angle unless otherwise indicated.
5. Tube: Glass with magnifying lens and blue or red organic liquid.
6. Tube Background: Nonreflective aluminum with permanently etched scale markings graduated in deg F.
7. Window: Glass.
8. Stem: Aluminum and of length to suit installation.
   a. Design for Thermowell Installation: Bare stem.
9. Connector: 1-1/4 inches, with ASME B1.1 screw threads.
10. Accuracy: Plus or minus 1 percent of scale range or one scale division, to a maximum of 1.5 percent of scale range.

2.12 PRESSURE GAGES

A. Direct-Mounted, Metal-Case, Dial-Type Pressure Gages:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Ashcroft Inc.
   b. Weiss Instruments, Inc.
   c. Winters Instruments - U.S.
2. Standard: ASME B40.100.
3. Case: Liquid-filled type(s); cast aluminum or drawn steel; 4-1/2-inch nominal diameter.
4. Pressure-Element Assembly: Bourdon tube unless otherwise indicated.
5. Pressure Connection: Brass, with NPS 1/4, ASME B1.20.1 pipe threads and bottom-outlet type unless back-outlet type is indicated.
6. Movement: Mechanical, with link to pressure element and connection to pointer.
7. Dial: Nonreflective aluminum with permanently etched scale markings graduated in psi.
8. Pointer: Dark-colored metal.
9. Window: Glass.
10. Ring: Stainless steel.
11. Accuracy: Grade A, plus or minus 1 percent of middle half of scale range.

2.13 GAGE ATTACHMENTS

A. Snubbers: ASME B40.100, brass; with NPS 1/4, ASME B1.20.1 pipe threads and piston-type surge-dampening device. Include extension for use on insulated piping.

B. Valves: Brass ball, with NPS 1/4, ASME B1.20.1 pipe threads.

2.14 TEST PLUGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Flow Design, Inc.
2. Weiss Instruments, Inc.

B. Description: Test-station fitting made for insertion into piping tee fitting.

C. Body: Brass or stainless steel with core inserts and gasketed and threaded cap. Include extended stem on units to be installed in insulated piping.

D. Thread Size: NPS 1/4 or NPS 1/2, ASME B1.20.1 pipe thread.

E. Minimum Pressure and Temperature Rating: 500 psig at 200 deg F.

Core Inserts: EPDM self-sealing rubber.

2.15 EQUIPMENT LABELS

A. Plastic Labels for Equipment:
1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/16 inch thick, and having predrilled holes for attachment hardware.
2. Letter Color: White.
3. Background Color: Black.
4. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
6. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
7. Fasteners: Stainless-steel rivets or self-tapping screws.
8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

B. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified.

C. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch bond paper. Tabulate equipment identification number and identify Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

2.16 PIPE LABELS

A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.

B. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to cover full circumference of pipe. Attach to pipe without nylon straps.

C. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.
   1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions, or as separate unit on each pipe label to indicate flow direction.
   2. Lettering Size: At least 1-1/2 inches.

2.17 VALVE TAGS

A. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers.
   1. Tag Material: Brass, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
   2. Fasteners: Brass wire-link or beaded chain; or S-hook.

B. Valve Schedules: For each piping system, on 8-1/2-by-11-inch bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.
   1. Valve-tag schedule shall be included in operation and maintenance data.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION

A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.

B. For sleeves that will have sleeve-seal system installed, select sleeves of size large enough to provide 1-inch annular clear space between piping and concrete slabs and walls.
   1. Sleeves are not required for core-drilled holes.

C. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.
   1. Cut sleeves to length for mounting flush with both surfaces.
      a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level.
   2. Using grout, seal the space outside of sleeves in slabs and walls without sleeve-seal system.

D. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified in Section 07 8413 "Penetration Firestopping."

3.2 SLEEVE-SEAL-SYSTEM INSTALLATION

A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at service piping entries into building.

B. Select type, size, and number of sealing elements required for piping material and size and for sleeve ID or hole size. Position piping in center of sleeve. Center piping in penetration, assemble sleeve-seal system components, and install in annular space between piping and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make a watertight seal.

3.3 SLEEVE AND SLEEVE-SEAL SCHEDULE

A. Use sleeves and sleeve seals for the following piping-penetration applications:
   1. Concrete Slabs-on-Grade:
      a. Piping NPS 6 and Smaller: Galvanized-steel-pipe sleeves with sleeve-seal system.
         1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.
   2. Concrete Slabs above Grade:
      a. Piping NPS 6 and Smaller: Galvanized-steel-pipe sleeves.

3.4 ESCUTCHEON AND FLOOR PLATE INSTALLATION

A. Install escutcheons for piping penetrations of walls, ceilings, and finished floors.

B. Install escutcheons with ID to closely fit around pipe, tube, and insulation of insulated piping and with OD that completely covers opening.

   1. Escutcheons for New Piping:

      a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
      b. Insulated Piping: One-piece, stamped-steel type or split-plate, stamped-steel type with concealed hinge.
      c. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, cast-brass or split-casting brass type with polished, chrome-plated finish.
      d. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece, cast-brass or split-casting brass type with polished, chrome-plated finish.

C. Install floor plates for piping penetrations of equipment-room floors.

D. Install floor plates with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.

   1. New Piping: One-piece, floor-plate type.

3.5 METER AND GAGE INSTALLATION

A. Install direct-mounted pressure gages in piping tees with pressure gage located on pipe at the most readable position.

B. Install valve and snubber in piping for each pressure gage for fluids.

C. Install test plugs in piping tees.

D. Install thermometers in the following locations:
   1. Inlets and outlets of each domestic water heat exchanger.

E. Install pressure gages in the following locations:
   1. Building water service entrance into building.
   2. Suction and discharge of each domestic water pump.

3.6 CONNECTIONS FOR METERS AND GAGES

A. Install meters and gages adjacent to machines and equipment to allow service and maintenance of meters, gages, machines, and equipment.

3.7 ADJUSTING METERS AND GAGES

A. Adjust faces of meters and gages to proper angle for best visibility.

3.8 THERMOMETER SCHEDULE

A. Thermometers at inlets and outlets of each domestic water heat exchanger shall be the following:
   1. Industrial-style, liquid-in-glass type.

B. Thermometer stems shall be of length to match thermowell insertion length.

3.9 THERMOMETER SCALE-RANGE SCHEDULE

A. Scale Range for Domestic Cold-Water Piping: 0 to 100 deg F.

B. Scale Range for Domestic Hot-Water Piping: 0 to 250 deg F.

3.10 PRESSURE-GAGE SCHEDULE

A. Pressure gages at discharge of each water service into building shall be the following:
   1. Liquid-filled, direct-mounted, metal case.

B. Pressure gages at suction and discharge of each domestic water pump shall be the following:
   1. Liquid-filled, direct-mounted, metal case.

3.11 PRESSURE-GAGE SCALE-RANGE SCHEDULE

A. Scale Range for Water Service Piping: 0 to 100 psi.

B. Scale Range for Domestic Water Piping: 0 to 100 psi.

3.12 EQUIPMENT LABEL PREPARATION

A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.13 EQUIPMENT LABEL INSTALLATION

A. Install or permanently fasten labels on each major item of mechanical equipment.

B. Locate equipment labels where accessible and visible.

3.14 PIPE LABEL INSTALLATION

A. Piping Color-Coding: Painting of piping is specified in Section 09 9123 "Interior Painting."

B. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:
   1. Near each valve and control device.
   2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
   3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
   4. At access doors, manholes, and similar access points that permit view of concealed piping.
   5. Near major equipment items and other points of origination and termination.
   6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
   7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.

C. Pipe Label Color Schedule:
   1. Domestic Water Piping:
      a. Background Color: White.
      b. Letter Color: Black.
   2. Sanitary Waste and Storm Drainage Piping:
      a. Background Color: White.
      b. Letter Color: Black.

3.15 VALVE-TAG INSTALLATION

A. Install tags on valves and control devices in piping systems, except check valves; valves within factory-fabricated equipment units; shutoff valves; faucets; convenience and lawn-watering hose connections; and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.

B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following subparagraphs:
   1. Valve-Tag Size and Shape:
      a. Cold Water: 1-1/2 inches, round.
      b. Hot Water: 1-1/2 inches, round.
   2. Valve-Tag Color:
      a. Cold Water: Natural.
      b. Hot Water: Natural.
   3. Letter Color:
      a. Cold Water: Black.
      b. Hot Water: Black.

END OF SECTION 22 0500

SECTION 22 0523

GENERAL-DUTY VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
1. Bronze angle valves.
2. Bronze ball valves.
3. Iron, single-flange butterfly valves.
4. Bronze swing check valves.
5. Iron, center-guided check valves.
6. Bronze globe valves.
7. Iron globe valves.
8. Chainwheels.

B. Related Sections:
1. Section 22 0553 "Identification for Plumbing Piping and Equipment" for valve tags and schedules.
2. Section 22 1113 "Facility Water Distribution Piping" for valves applicable only to this piping.
3. Section 22 1116 "Domestic Water Piping" for valves applicable only to this piping.

1.3 DEFINITIONS

A. CWP: Cold working pressure.

B. EPDM: Ethylene propylene copolymer rubber.

C. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.

D. NRS: Nonrising stem.

E. OS&Y: Outside screw and yoke.

F. RS: Rising stem.

G. SWP: Steam working pressure.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of valve indicated.

1.5 QUALITY ASSURANCE

A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.

B. ASME Compliance:
1. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
2. ASME B31.1 for power piping valves.
3. ASME B31.9 for building services piping valves.

C. NSF Compliance: NSF 61 for valve materials for potable-water service.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:
1. Protect internal parts against rust and corrosion.
2. Protect threads, flange faces, grooves, and weld ends.
3. Set angle, gate, and globe valves closed to prevent rattling.
4. Set ball and plug valves open to minimize exposure of functional surfaces.
5. Set butterfly valves closed or slightly open.
6. Block check valves in either closed or open position.

B. Use the following precautions during storage:
1. Maintain valve end protection.
2. Store valves indoors and maintain at higher than ambient dew point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

C. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES

A. Refer to valve schedule articles for applications of valves.

B. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

C. Valve Sizes: Same as upstream piping unless otherwise indicated.

D. Valve Actuator Types:
1. Gear Actuator: For quarter-turn valves NPS 8 and larger.
2. Handwheel: For valves other than quarter-turn types.
3. Handlever: For quarter-turn valves NPS 6 and smaller except plug valves.
4. Wrench: For plug valves with square heads. Furnish Owner with 1 wrench for every 10 plug valves, for each size square plug-valve head.
5. Chainwheel: Device for attachment to valve handwheel, stem, or other actuator; of size and with chain for mounting height, as indicated in the "Valve Installation" Article.

E. Valves in Insulated Piping: With 2-inch stem extensions and the following features:
1. Gate Valves: With rising stem.

2. Ball Valves: With extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.
3. Butterfly Valves: With extended neck.

F. Valve-End Connections:
1. Flanged: With flanges according to ASME B16.1 for iron valves.
2. Grooved: With grooves according to AWWA C606.
3. Solder Joint: With sockets according to ASME B16.18.
4. Threaded: With threads according to ASME B1.20.1.

G. Valve Bypass and Drain Connections: MSS SP-45.

2.2 BRONZE ANGLE VALVES

A. Class 125, Bronze Angle Valves with Bronze Disc:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. Hammond Valve.
b. Milwaukee Valve Company.
2. Description:
a. Standard: MSS SP-80, Type 1.
b. CWP Rating: 200 psig.
c. Body Material: ASTM B 62, bronze with integral seat and screw-in bonnet.
d. Ends: Threaded.
e. Stem and Disc: Bronze.
f. Packing: Asbestos free.
g. Handwheel: Malleable iron, bronze, or aluminum.

2.3 BRONZE BALL VALVES

A. Three-Piece, Full-Port, Bronze Ball Valves with Bronze Trim:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. Conbraco Industries, Inc.; Apollo Valves.
b. Hammond Valve.
c. Milwaukee Valve Company.
d. NIBCO INC.
2. Description:
a. Standard: MSS SP-110.
b. SWP Rating: 150 psig.
c. CWP Rating: 600 psig.
d. Body Design: Three piece.
e. Body Material: Bronze.
f. Ends: Threaded.
g. Seats: PTFE or TFE.
h. Stem: Bronze.
i. Ball: Chrome-plated brass.
j. Port: Full.

2.4 IRON, SINGLE-FLANGE BUTTERFLY VALVES

A. 200 CWP, Iron, Single-Flange Butterfly Valves with EPDM Seat and Aluminum-Bronze Disc:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Conbraco Industries, Inc.; Apollo Valves.
   b. Crane Co.; Crane Valve Group; Jenkins Valves.
   c. Hammond Valve.
   d. Milwaukee Valve Company.
   e. NIBCO INC.
2. Description:
   a. Standard: MSS SP-67, Type I.
   b. CWP Rating: 200 psig.
   c. Body Design: Lug type; suitable for bidirectional dead-end service at rated pressure without use of downstream flange.
   d. Body Material: ASTM A 126, cast iron or ASTM A 536, ductile iron.
   e. Seat: EPDM.
   f. Stem: One- or two-piece stainless steel.
   g. Disc: Aluminum bronze.

2.5 BRONZE SWING CHECK VALVES

A. Class 125, Bronze Swing Check Valves with Bronze Disc:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Crane Co.; Crane Valve Group; Crane Valves.
   b. Hammond Valve.
   c. Milwaukee Valve Company.
   d. NIBCO INC.
2. Description:
   a. Standard: MSS SP-80, Type 3.
   b. CWP Rating: 200 psig.
   c. Body Design: Horizontal flow.
   d. Body Material: ASTM B 62, bronze.
   e. Ends: Threaded.
   f. Disc: Bronze.

2.6 IRON, CENTER-GUIDED CHECK VALVES

A. Class 125, Iron, Compact-Wafer, Center-Guided Check Valves with Metal Seat:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Hammond Valve.
   b. Milwaukee Valve Company.
   c. Mueller Steam Specialty; a division of SPX Corporation.
   d. NIBCO INC.
2. Description:
   a. Standard: MSS SP-125.
   b. CWP Rating: 200 psig.
   c. Body Material: ASTM A 126, gray iron.
   d. Style: Compact wafer.
   e. Seat: Bronze.

2.7 BRONZE GLOBE VALVES

A. Class 125, Bronze Globe Valves with Bronze Disc:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Crane Co.; Crane Valve Group; Crane Valves.
   b. Hammond Valve.
   c. Milwaukee Valve Company.
   d. NIBCO INC.
2. Description:
   a. Standard: MSS SP-80, Type 1.
   b. CWP Rating: 200 psig.
   c. Body Material: ASTM B 62, bronze with integral seat and screw-in bonnet.
   d. Ends: Threaded or solder joint.
   e. Stem and Disc: Bronze.
   f. Packing: Asbestos free.
   g. Handwheel: Malleable iron, bronze, or aluminum.

2.8 IRON GLOBE VALVES

A. Class 125, Iron Globe Valves:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Crane Co.; Crane Valve Group; Crane Valves.
   b. Hammond Valve.
   c. Milwaukee Valve Company.
   d. NIBCO INC.
2. Description:
   a. Standard: MSS SP-85, Type I.
   b. CWP Rating: 200 psig.
   c. Body Material: ASTM A 126, gray iron with bolted bonnet.
   d. Ends: Flanged.
   e. Trim: Bronze.
   f. Packing and Gasket: Asbestos free.

2.9 CHAINWHEELS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Babbitt Steam Specialty Co.
2. Roto Hammer Industries.
3. Trumbull Industries.

B. Description: Valve actuation assembly with sprocket rim, brackets, and chain.
1. Brackets: Type, number, size, and fasteners required to mount actuator on valve.
2. Attachment: For connection to ball, butterfly and plug valve stems.
3. Sprocket Rim with Chain Guides: Aluminum, of type and size required for valve.
4. Chain: Hot-dip, galvanized steel, of size required to fit sprocket rim.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.

B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.

C. Examine threads on valve and mating pipe for form and cleanliness.

D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.

E. Do not attempt to repair defective valves; replace with new valves.

3.2 VALVE INSTALLATION

A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

B. Locate valves for easy access and provide separate support where necessary.

C. Install valves in horizontal piping with stem at or above center of pipe.

D. Install valves in position to allow full stem movement.

E. Install chainwheels on operators for butterfly and globe valves NPS 4 and larger and more than 96 inches above floor. Extend chains to 60 inches above finished floor.

F. Install check valves for proper direction of flow and as follows:
1. Swing Check Valves: In horizontal position with hinge pin level.
2. Center-Guided Check Valves: In horizontal or vertical position, between flanges.
3. Lift Check Valves: With stem upright and plumb.

3.3 ADJUSTING

A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

3.4 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

A. If valve applications are not indicated, use the following:
1. Shutoff Service: Ball or butterfly valves.
2. Butterfly Valve Dead-End Service: Single-flange (lug) type.
3. Throttling Service: Globe , ball, or butterfly valves.
4. Pump-Discharge Check Valves:
   a. NPS 2 and Smaller: Bronze swing check valves with bronze disc.

B. If valves with specified SWP classes or CWP ratings are not available, the same types of valves with higher SWP classes or CWP ratings may be substituted.

C. Select valves, except wafer types, with the following end connections:
1. For Copper Tubing, NPS 2 and Smaller: Threaded ends except where solder-joint valve-end option is indicated in valve schedules below.
2. For Copper Tubing, NPS 2-1/2 to NPS 4: Flanged ends except where threaded valve-end option is indicated in valve schedules below.

3. For Copper Tubing, NPS 5 and Larger: Flanged ends.
4. For Steel Piping, NPS 2 and Smaller: Threaded ends.
5. For Steel Piping, NPS 2-1/2 to NPS 4: Flanged ends except where threaded valve-end option is indicated in valve schedules below.
6. For Steel Piping, NPS 5 and Larger: Flanged ends.

3.5 DOMESTIC, HOT- AND COLD-WATER VALVE SCHEDULE

A. Pipe NPS 2 and Smaller:
1. Bronze Valves: May be provided with solder-joint ends instead of threaded ends.
2. Bronze Angle Valves: Class 125, bronze disc.
3. Ball Valves: Three piece, full port, bronze with bronze trim.
4. Bronze Swing Check Valves: Class 125, bronze disc.
5. Bronze Globe Valves: Class 125, bronze disc.

B. Pipe NPS 2-1/2 and Larger:
1. Iron, Single-Flange Butterfly Valves: 200 CWP, EPDM seat, aluminum-bronze disc.
2. Iron, Center-Guided Check Valves: Class 125, compact-wafer, resilient seat.
3. Iron Globe Valves: Class 125.

END OF SECTION 22 0523

SECTION 22 0529

HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
1. Metal pipe hangers and supports.
2. Trapeze pipe hangers.
3. Thermal-hanger shield inserts.
4. Fastener systems.

B. Related Sections:
1. Section 05 5000 "Metal Fabrications" for structural-steel shapes and plates for trapeze hangers for pipe and equipment supports.
2. Section 22 0516 "Expansion Fittings and Loops for Plumbing Piping" for pipe guides and anchors.
3. Section 22 0548 "Vibration and Seismic Controls for Plumbing Piping and Equipment" for vibration isolation devices.

1.3 DEFINITIONS

A. MSS: Manufacturers Standardization Society of The Valve and Fittings Industry Inc.

1.4 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design trapeze pipe hangers and equipment supports, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Structural Performance: Hangers and supports for plumbing piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.
1. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.
2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
3. Design seismic-restraint hangers and supports for piping and equipment and obtain approval from authorities having jurisdiction.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.6 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.7 QUALITY ASSURANCE

A. Structural Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

PART 2 - PRODUCTS

2.1 METAL PIPE HANGERS AND SUPPORTS

A. Carbon-Steel Pipe Hangers and Supports:
1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Galvanized Metallic Coatings: Pregalvanized or hot dipped.
3. Nonmetallic Coatings: Plastic coating, jacket, or liner.
4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
5. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.

B. Copper Pipe Hangers:
1. Description: MSS SP-58, Types 1 through 58, copper-coated-steel, factory-fabricated components.
2. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel.

2.2 TRAPEZE PIPE HANGERS

A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural carbon-steel shapes with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts.

2.3 THERMAL-HANGER SHIELD INSERTS

A. Insulation-Insert Material for Cold Piping: ASTM C 591, Type VI, Grade 1 polyisocyanurate with 125-psig minimum compressive strength and vapor barrier.

B. Insulation-Insert Material for Hot Piping: ASTM C 591, Type VI, Grade 1 polyisocyanurate with 125-psig minimum compressive strength.

C. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.

D. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.

E. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.4 FASTENER SYSTEMS

A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

B. Mechanical-Expansion Anchors: Insert-wedge-type, stainless- steel anchors, for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

2.5 MISCELLANEOUS MATERIALS

A. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.

B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.
   1. Properties: Nonstaining, noncorrosive, and nongaseous.
   2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT INSTALLATION

A. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.

B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.
   1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.
   2. Field fabricate from ASTM A 36/A 36M, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.

C. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.

D. Fastener System Installation:
   1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches thick in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
   2. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

E. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.

F. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

G. Install lateral bracing with pipe hangers and supports to prevent swaying.

H. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

I. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

J. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.

K. Insulated Piping:
1. Attach clamps and spacers to piping.
   a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
   b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
   c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.
2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
   a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.
3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.
   a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.
4. Shield Dimensions for Pipe: Not less than the following:
   a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
   b. NPS 4: 12 inches long and 0.06 inch thick.
   c. NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.
   d. NPS 8 to NPS 14: 24 inches long and 0.075 inch thick.
   e. NPS 16 to NPS 24: 24 inches long and 0.105 inch thick.
5. Pipes NPS 8 and Larger: Include wood or reinforced calcium-silicate-insulation inserts of length at least as long as protective shield.
6. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.2 METAL FABRICATIONS

A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers.

B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and 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. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.3 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.4 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils.

B. Touchup: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Section 09 9123 "Interior Painting."

C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

3.5 HANGER AND SUPPORT SCHEDULE

A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.

B. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in piping system Sections.

C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.

D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

E. Use carbon-steel pipe hangers and supports and attachments for general service applications.

F. Use copper-plated pipe hangers and copper or stainless-steel attachments for copper piping and tubing.

G. Use padded hangers for piping that is subject to scratching.

H. Use thermal-hanger shield inserts for insulated piping and tubing.

I. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes NPS 1/2 to NPS 30.
2. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes NPS 3/4 to NPS 36, requiring clamp flexibility and up to 4 inches of insulation.

3. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes NPS 1/2 to NPS 24 if little or no insulation is required.
4. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
5. Adjustable Band Hangers (MSS Type 9): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
6. Pipe Saddle Supports (MSS Type 36): For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate.
7. Adjustable Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes NPS 2-1/2 to NPS 36 if vertical adjustment is required, with steel-pipe base stanchion support and cast-iron floor flange.
8. Single-Pipe Rolls (MSS Type 41): For suspension of pipes NPS 1 to NPS 30, from two rods if longitudinal movement caused by expansion and contraction might occur.
9. Adjustable Roller Hangers (MSS Type 43): For suspension of pipes NPS 2-1/2 to NPS 24, from single rod if horizontal movement caused by expansion and contraction might occur.
10. Complete Pipe Rolls (MSS Type 44): For support of pipes NPS 2 to NPS 42 if longitudinal movement caused by expansion and contraction might occur but vertical adjustment is not necessary.

J. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to NPS 24.
2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers NPS 3/4 to NPS 24 if longer ends are required for riser clamps.

K. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.

L. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction, to attach to top flange of structural shape.
3. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
4. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
5. C-Clamps (MSS Type 23): For structural shapes.
6. Welded-Steel Brackets: For support of pipes from below or for suspending from above by using clip and rod. Use one of the following for indicated loads:
   a. Light (MSS Type 31): 750 lb.
   b. Medium (MSS Type 32): 1500 lb.
   c. Heavy (MSS Type 33): 3000 lb.
7. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
8. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
9. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.

M. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
   1. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
   2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
   3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.

N. Comply with MSS SP-69 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.

O. Use powder-actuated fasteners or mechanical-expansion anchors instead of building attachments where required in concrete construction.

END OF SECTION 22 0529

SECTION 22 0719

PLUMBING PIPING INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes insulating the following plumbing piping services:
   1. Domestic cold-water piping.
   2. Domestic hot-water piping.
   3. Domestic recirculating hot-water piping.
   4. Roof drains and rainwater leaders.
   5. Supplies and drains for handicap-accessible lavatories and sinks.

B. Related Sections:
   1. Section 22 0716 "Plumbing Equipment Insulation."

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory- and field-applied, if any).

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.

B. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84 by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.
   1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
   2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

C. Comply with the following applicable standards and other requirements specified for miscellaneous components:
   1. Supply and Drain Protective Shielding Guards: ICC A117.1.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.7 COORDINATION

A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Section 22 0529 "Hangers and Supports for Plumbing Piping and Equipment."

B. Coordinate clearance requirements with piping Installer for piping insulation application. Before preparing piping Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

C. Coordinate installation and testing of heat tracing.

1.8 SCHEDULING

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

A. Comply with requirements in "Piping Insulation Schedule, General," "Indoor Piping Insulation Schedule," "Outdoor, Aboveground Piping Insulation Schedule," and "Outdoor, Underground Piping Insulation Schedule" articles for where insulating materials shall be applied.

B. Products shall not contain asbestos, lead, mercury, or mercury compounds.

C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.

D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.

E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

F. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II and ASTM C 1290, Type I. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

G. Mineral-Fiber, Preformed Pipe Insulation:
   1. Type I, 850 Deg F Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, with factory-applied ASJ-SSL. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

2.2 INSULATING CEMENTS

A. Mineral-Fiber Insulating Cement: Comply with ASTM C 195.

B. Expanded or Exfoliated Vermiculite Insulating Cement: Comply with ASTM C 196.

C. Mineral-Fiber, Hydraulic-Setting Insulating and Finishing Cement: Comply with ASTM C 449.

2.3 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated, unless otherwise indicated.

B. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.
   1. For indoor applications, adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

C. ASJ Adhesive, and FSK Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.
   1. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.4 MASTICS

A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.
   1. For indoor applications, use mastics that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Vapor-Barrier Mastic: Water based; suitable for indoor use on below-ambient services.
   1. Water-Vapor Permeance: ASTM E 96/E 96M, Procedure B, 0.013 perm at 43-mil dry film thickness.
   2. Service Temperature Range: Minus 20 to plus 180 deg F.
   3. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.
   4. Color: White.

C. Breather Mastic: Water based; suitable for indoor and outdoor use on above-ambient services.
   1. Water-Vapor Permeance: ASTM F 1249, 1.8 perms at 0.0625-inch dry film thickness.
   2. Service Temperature Range: Minus 20 to plus 180 deg F.
   3. Solids Content: 60 percent by volume and 66 percent by weight.
   4. Color: White.

2.5 LAGGING ADHESIVES

A. Description: Comply with MIL-A-3316C, Class I, Grade A, and shall be compatible with insulation materials, jackets, and substrates.
   1. For indoor applications, use lagging adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
   2. Fire-resistant, water-based lagging adhesive and coating for use indoors to adhere fire-resistant lagging cloths over pipe insulation.
   3. Service Temperature Range: 0 to plus 180 deg F.
   4. Color: White.

2.6 SEALANTS

A. FSK and Metal Jacket Flashing Sealants:
1. Materials shall be compatible with insulation materials, jackets, and substrates.
2. Fire- and water-resistant, flexible, elastomeric sealant.
3. Service Temperature Range: Minus 40 to plus 250 deg F.
4. Color: Aluminum.
5. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.7 FACTORY-APPLIED JACKETS

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:
1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.
2. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.
3. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.

2.8 FIELD-APPLIED CLOTHS

A. Canvas Fabric: Fire resistant, plain weave, cotton and presized a minimum of 8 oz./sq. yd.

2.9 FIELD-APPLIED JACKETS

A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.

2.10 TAPES

A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.
1. Width: 3 inches.
2. Thickness: 11.5 mils.
3. Adhesion: 90 ounces force/inch in width.
4. Elongation: 2 percent.
5. Tensile Strength: 40 lbf/inch in width.
6. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

B. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136.
1. Width: 3 inches.
2. Thickness: 6.5 mils.
3. Adhesion: 90 ounces force/inch in width.
4. Elongation: 2 percent.
5. Tensile Strength: 40 lbf/inch in width.
6. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.

2.11 SECUREMENTS

A. Bands:

1. Aluminum: ASTM B 209, Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch thick, 1/2 inch wide with wing seal.

B. Staples: Outward-clinching insulation staples, nominal 3/4-inch- wide, stainless steel or Monel.

C. Wire: 0.062-inch soft-annealed, stainless steel.

2.12 PROTECTIVE SHIELDING GUARDS

A. Protective Shielding Pipe Covers:
1. Description: Manufactured plastic wraps for covering plumbing fixture hot-water supply hot- and cold-water supplies and trap and drain piping. Comply with Americans with Disabilities Act (ADA) requirements.

B. Protective Shielding Piping Enclosures,:
1. Description: Manufactured plastic enclosure for covering plumbing fixture hot- and cold-water supplies and trap and drain piping. Comply with ADA requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.
1. Verify that systems to be insulated have been tested and are free of defects.
2. Verify that surfaces to be insulated are clean and dry.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Surface Preparation: Clean and prepare surfaces to be insulated. Before insulating, apply a corrosion coating to insulated surfaces as follows:
1. Stainless Steel: Coat 300 series stainless steel with an epoxy primer 5 mils thick and an epoxy finish 5 mils thick if operating in a temperature range between 140 and 300 deg F. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.
2. Carbon Steel: Coat carbon steel operating at a service temperature between 32 and 300 deg F with an epoxy coating. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.

C. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.

D. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.3 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping including fittings, valves, and specialties.

B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of pipe system as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

G. Keep insulation materials dry during application and finishing.

H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

I. Install insulation with least number of joints practical.

J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
   1. Install insulation continuously through hangers and around anchor attachments.
   2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
   3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
   4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

L. Install insulation with factory-applied jackets as follows:
   1. Draw jacket tight and smooth.
   2. Cover circumferential joints with 3-inch- wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
   3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 2 inches o.c.
      a. For below-ambient services, apply vapor-barrier mastic over staples.
   4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
   5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.

M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

P. For above-ambient services, do not install insulation to the following:
1. Vibration-control devices.
2. Testing agency labels and stamps.
3. Nameplates and data plates.
4. Cleanouts.

3.4 PENETRATIONS

A. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

B. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.
1. Comply with requirements in Section 07 8413 "Penetration Firestopping" for firestopping and fire-resistive joint sealers.

C. Insulation Installation at Floor Penetrations:
1. Pipe: Install insulation continuously through floor penetrations.
2. Seal penetrations through fire-rated assemblies. Comply with requirements in Section 07 8413 "Penetration Firestopping."

3.5 GENERAL PIPE INSULATION INSTALLATION

A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.

B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:
1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.
2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets,

valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.

5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below-ambient services, provide a design that maintains vapor barrier.
6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below-ambient services and a breather mastic for above-ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
8. For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.
9. Stencil or label the outside insulation jacket of each union with the word "union." Match size and color of pipe labels.

C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

D. Install removable insulation covers at locations indicated. Installation shall conform to the following:

1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.
2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.
3. Construct removable valve insulation covers in same manner as for flanges, except divide the two-part section on the vertical center line of valve body.
4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless-steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.
5. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.

3.6 INSTALLATION OF MINERAL-FIBER INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above-ambient surfaces, secure laps with outward clinched staples at 6 inches o.c.
4. For insulation with factory-applied jackets on below-ambient surfaces, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:
1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with mineral-fiber blanket insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:
1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:
1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
4. Install insulation to flanges as specified for flange insulation application.

3.7 FIELD-APPLIED JACKET INSTALLATION

A. Where canvas-cloth jackets are indicated, install directly over bare insulation or insulation with factory-applied jackets.
1. Draw jacket smooth and tight to surface with 2-inch overlap at seams and joints.
2. Embed canvas cloth between two 0.062-inch- thick coats of lagging adhesive.
3. Completely encapsulate insulation with coating, leaving no exposed insulation.

B. Where metal jackets are indicated, install with 2-inch overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless-steel bands 12 inches o.c. and at end joints.

3.8 FINISHES

A. Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Section 09 9113 "Exterior Painting" and Section 09 9123 "Interior Painting."

1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.
   a. Finish Coat Material: Interior, flat, latex-emulsion size.

B. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.

C. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.

D. Do not field paint aluminum or stainless-steel jackets.

3.9 PIPING INSULATION SCHEDULE, GENERAL

A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.

B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:
1. Drainage piping located in crawl spaces.
2. Underground piping.
3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

3.10 INDOOR PIPING INSULATION SCHEDULE

A. Domestic Cold Water:
1. NPS 1 and Smaller: Insulation shall be the following:
   a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1/2 inch thick.
2. NPS 1-1/4 and Larger: Insulation shall be the following:
   a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.

B. Domestic Hot and Recirculated Hot Water:
1. NPS 1-1/4 and Smaller: Insulation shall be the following:
   a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.
2. NPS 1-1/2 and Larger: Insulation shall be the following:
   a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.

C. Stormwater and Overflow:
1. All Pipe Sizes: Insulation shall be the following:
   a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.

D. Roof Drain and Overflow Drain Bodies:
1. All Pipe Sizes: Insulation shall be the following:
   a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.

E. Exposed Sanitary Drains, Domestic Water, Domestic Hot Water, and Stops for Plumbing Fixtures for People with Disabilities:
1. All Pipe Sizes: Provide manufactured Protective Shielding Pipe Covers.

F. Floor Drains, Traps, and Sanitary Drain Piping within 10 Feet of Drain Receiving Condensate and Equipment Drain Water below 60 Deg F:
1. All Pipe Sizes: Insulation shall be the following:

a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1/2 inch thick.

3.11 INDOOR, FIELD-APPLIED JACKET SCHEDULE

A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.

B. If more than one material is listed, selection from materials listed is Contractor's option.

C. Piping, Concealed:
1. None.

D. Piping, Exposed:
1. Canvas..

END OF SECTION 22 0719

SECTION 22 1116

DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
1. Under-building-slab and aboveground domestic water pipes, tubes, and fittings inside buildings.

B. Related Requirements:
1. Section 22 1113 "Facility Water Distribution Piping" for water-service piping outside the building from source to the point where water-service piping enters the building.

1.3 ACTION SUBMITTALS

A. Product Data: For transition fittings and dielectric fittings.

B. Shop Drawings: For domestic water piping system. Include plans, elevations, sections, and riser details. Show all required valves, water hammer arrestors, plumbing fixtures, and other accessories and access panels. Show all water heaters and pumps.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.5 FIELD CONDITIONS

A. Interruption of Existing Water Service: Do not interrupt water service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water service according to requirements indicated:
1. Notify Owner no fewer than four days in advance of proposed interruption of water service.
2. Do not interrupt water service without Owner's written permission.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

B. Potable-water piping and components shall comply with NSF 14 and NSF 61. Plastic piping components shall be marked with "NSF-pw."

2.2 COPPER TUBE AND FITTINGS

A. Hard Copper Tube: ASTM B 88, Type L water tube, drawn temper.

B. Cast-Copper, Solder-Joint Fittings: ASME B16.18, pressure fittings.

C. Wrought-Copper, Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.

D. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends.

E. Copper Unions:
1. MSS SP-123.
2. Cast-copper-alloy, hexagonal-stock body.
3. Ball-and-socket, metal-to-metal seating surfaces.
4. Solder-joint or threaded ends.

F. Copper-Tube, Extruded-Tee Connections:
1. Manufacturers: Subject to compliance with requirements, provide products by the following:
   a. T-Drill Industries Inc.
2. Description: Tee formed in copper tube according to ASTM F 2014.

2.3 PIPING JOINING MATERIALS

A. Pipe-Flange Gasket Materials:
1. AWWA C110/A21.10, rubber, flat face, 1/8 inch thick or ASME B16.21, nonmetallic and asbestos free unless otherwise indicated.
2. Full-face or ring type unless otherwise indicated.

B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.

C. Solder Filler Metals: ASTM B 32, lead-free alloys.

D. Flux: ASTM B 813, water flushable.

E. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated.

2.4 DIELECTRIC FITTINGS

A. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.

B. Dielectric Unions:
1. Standard: ASSE 1079.
2. Pressure Rating: 125 psig minimum at 180 deg F.
3. End Connections: Solder-joint copper alloy and threaded ferrous.

C. Dielectric Flanges:
1. Standard: ASSE 1079.
2. Factory-fabricated, bolted, companion-flange assembly.
3. Pressure Rating: 125 psig minimum at 180 deg F.

4. End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Comply with requirements in Section 31 2000 "Earth Moving" for excavating, trenching, and backfilling.

3.2 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.

B. Install copper tubing under building slab according to CDA's "Copper Tube Handbook."

C. Install shutoff valve, hose-end drain valve, strainer, pressure gage, and test tee with valve inside the building at each domestic water-service entrance. Comply with requirements for pressure gages in Section 22 0519 "Meters and Gages for Plumbing Piping" and with requirements for drain valves and strainers in Section 22 1119 "Domestic Water Piping Specialties."

D. Install shutoff valve immediately upstream of each dielectric fitting.

E. Install water-pressure-reducing valves downstream from shutoff valves. Comply with requirements for pressure-reducing valves in Section 22 1119 "Domestic Water Piping Specialties."

F. Install domestic water piping level and plumb.

G. Rough-in domestic water piping for water-meter installation according to utility company's requirements.

H. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.

I. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

J. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.

K. Install piping to permit valve servicing.

L. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than the system pressure rating used in applications below unless otherwise indicated.

M. Install piping free of sags and bends.

N. Install fittings for changes in direction and branch connections.

O. Install unions in copper tubing at final connection to each piece of equipment, machine, and specialty.

P. Install pressure gages on suction and discharge piping for each plumbing pump and packaged booster pump. Comply with requirements for pressure gages in Section 22 0519 "Meters and Gages for Plumbing Piping."

Q. Install thermostats in hot-water circulation piping. Comply with requirements for thermostats in Section 22 1123 "Domestic Water Pumps."

R. Install thermometers on inlet and outlet piping from each water heater. Comply with requirements for thermometers in Section 22 0519 "Meters and Gages for Plumbing Piping."

S. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 22 0517 "Sleeves and Sleeve Seals for Plumbing Piping."

T. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 22 0517 "Sleeves and Sleeve Seals for Plumbing Piping."

U. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 22 0518 "Escutcheons for Plumbing Piping."

3.3 JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.

C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
   1. Apply appropriate tape or thread compound to external pipe threads.
   2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.

D. Brazed Joints for Copper Tubing: Comply with CDA's "Copper Tube Handbook," "Brazed Joints" chapter.

E. Soldered Joints for Copper Tubing: Apply ASTM B 813, water-flushable flux to end of tube. Join copper tube and fittings according to ASTM B 828 or CDA's "Copper Tube Handbook."

F. Extruded-Tee Connections: Form tee in copper tube according to ASTM F 2014. Use tool designed for copper tube; drill pilot hole, form collar for outlet, dimple tube to form seating stop, and braze branch tube into collar.

G. Flanged Joints: Select appropriate asbestos-free, nonmetallic gasket material in size, type, and thickness suitable for domestic water service. Join flanges with gasket and bolts according to ASME B31.9.

H. Joints for Dissimilar-Material Piping: Make joints using adapters compatible with materials of both piping systems.

3.4 DIELECTRIC FITTING INSTALLATION

A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.

B. Dielectric Fittings for NPS 2 and Smaller: Use dielectric unions.

C. Dielectric Fittings for NPS 2-1/2 to NPS 4: Use dielectric flange kits.

D. Dielectric Fittings for NPS 5 and Larger: Use dielectric flange kits.

3.5 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements for pipe hanger, support products, and installation in Section 22 0529 "Hangers and Supports for Plumbing Piping and Equipment."
   1. Vertical Piping: MSS Type 8 or 42, clamps.
   2. Individual, Straight, Horizontal Piping Runs:
      a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
      b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
      c. Longer Than 100 Feet if Indicated: MSS Type 49, spring cushion rolls.
   3. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
   4. Base of Vertical Piping: MSS Type 52, spring hangers.

B. Support vertical piping and tubing at base and at each floor.

C. Rod diameter may be reduced one size for double-rod hangers, to a minimum of 3/8 inch.

D. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
   1. NPS 3/4 and Smaller: 60 inches with 3/8-inch rod.
   2. NPS 1 and NPS 1-1/4: 72 inches with 3/8-inch rod.
   3. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.
   4. NPS 2-1/2: 108 inches with 1/2-inch rod.
   5. NPS 3 to NPS 5: 10 feet with 1/2-inch rod.
   6. NPS 6: 10 feet with 5/8-inch rod.
   7. NPS 8: 10 feet with 3/4-inch rod.

E. Install supports for vertical copper tubing every 10 feet.

F. Support piping and tubing not listed in this article according to MSS SP-69 and manufacturer's written instructions.

3.6 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. When installing piping adjacent to equipment and machines, allow space for service and maintenance.

C. Connect domestic water piping to exterior water-service piping. Use transition fitting to join dissimilar piping materials.

D. Connect domestic water piping to water-service piping with shutoff valve; extend and connect to the following:
   1. Domestic Water Booster Pumps: Cold-water suction and discharge piping.
   2. Water Heaters: Cold-water inlet and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.
   3. Plumbing Fixtures: Cold- and hot-water-supply piping in sizes indicated, but not smaller than that required by plumbing code.
   4. Equipment: Cold- and hot-water-supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection. Use flanges instead of unions for NPS 2-1/2 and larger.

3.7 IDENTIFICATION

A. Identify system components. Comply with requirements for identification materials and installation in Section 22 0553 "Identification for Plumbing Piping and Equipment."

B. Label pressure piping with system operating pressure.

3.8 ADJUSTING

A. Perform the following adjustments before operation:
   1. Close drain valves, hydrants, and hose bibbs.
   2. Open shutoff valves to fully open position.
   3. Open throttling valves to proper setting.
   4. Adjust balancing valves in hot-water-circulation return piping to provide adequate flow.
      a. Manually adjust ball-type balancing valves in hot-water-circulation return piping to provide hot-water flow in each branch.
      b. Adjust calibrated balancing valves to flows indicated.
   5. Remove plugs used during testing of piping and for temporary sealing of piping during installation.
   6. Remove and clean strainer screens. Close drain valves and replace drain plugs.
   7. Remove filter cartridges from housings and verify that cartridges are as specified for application where used and are clean and ready for use.
   8. Check plumbing specialties and verify proper settings, adjustments, and operation.

3.9 CLEANING

A. Clean and disinfect potable domestic water piping as follows:
   1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
   2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction; if methods are not prescribed, use procedures described in either AWWA C651 or AWWA C652 or follow procedures described below:
      a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
      b. Fill and isolate system according to either of the following:
         1) Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours.
         2) Fill system or part thereof with water/chlorine solution with at least 200 ppm of chlorine. Isolate and allow to stand for three hours.

c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
d. Repeat procedures if biological examination shows contamination.
e. Submit water samples in sterile bottles to authorities having jurisdiction.

B. Clean non-potable domestic water piping as follows:
1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
2. Use purging procedures prescribed by authorities having jurisdiction or; if methods are not prescribed, follow procedures described below:
a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
b. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.

C. Prepare and submit reports of purging and disinfecting activities. Include copies of water-sample approvals from authorities having jurisdiction.

D. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

3.10 PIPING SCHEDULE

A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.

B. Flanges and unions may be used for aboveground piping joints unless otherwise indicated.

C. Fitting Option: Extruded-tee connections and brazed joints may be used on aboveground copper tubing.

D. Under-building-slab, domestic water piping, NPS 2 and smaller, shall be the following:
1. Soft copper tube, ASTM B 88, Type K; no joints.

E. Aboveground domestic water piping, NPS 2 and smaller, shall be the following:
1. Hard copper tube, ASTM B 88, Type L; cast- or wrought-copper, solder-joint fittings; and soldered joints.

F. Aboveground domestic water piping, NPS 2-1/2 to NPS 4, shall be the following:
1. Hard copper tube, ASTM B 88, Type L; cast- or wrought-copper, solder-joint fittings; and soldered joints.

G. Aboveground domestic water piping, NPS 5 to NPS 8, shall be the following:
1. Hard copper tube, ASTM B 88, Type L; cast- or wrought-copper, solder-joint fittings; and soldered joints.

END OF SECTION 22 1116

SECTION 22 1119

DOMESTIC WATER PIPING SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
1. Backflow preventers.
2. Strainers.
3. Outlet Boxes
4. Hose stations.
5. Hose bibbs.
6. Roof Hydrant
7. Drain valves.
8. Water-hammer arresters.
9. Air vents.
10. Trap-seal primer valves.
11. Trap-seal primer systems.
12. Flexible connectors.

B. Related Requirements:
1. Section 22 0519 "Meters and Gages for Plumbing Piping" for thermometers, pressure gages, and flow meters in domestic water piping.
2. Section 22 1116 "Domestic Water Piping" for water meters.
3. Section 22 4716 "Pressure Water Coolers" for water filters for water coolers.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For domestic water piping specialties to include in emergency, operation, and maintenance manuals.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR PIPING SPECIALTIES

A. Potable-water piping and components shall comply with NSF 61.

2.2 PERFORMANCE REQUIREMENTS

A. Minimum Working Pressure for Domestic Water Piping Specialties: 125 psig unless otherwise indicated.

2.3 BACKFLOW PREVENTERS

A. Reduced-Pressure-Principle Backflow Preventers:
1. Manufacturers: Subject to compliance with requirements:
   a. Watts; a division of Watts Water Technologies, Inc.; Watts Regulator Company.
2. Standard: ASSE 1013.
3. Operation: Continuous-pressure applications.
4. Pressure Loss: 12 psig maximum, through middle third of flow range.
5. Body: Bronze for NPS 2 and smaller; cast iron with interior lining that complies with AWWA C550 or that is FDA approved for NPS 2-1/2 and larger.
6. End Connections: Threaded for NPS 2 and smaller; flanged for NPS 2-1/2 and larger.
7. Configuration: Designed for horizontal, straight-through flow.
8. Accessories:
   a. Valves NPS 2 and Smaller: Ball type with threaded ends on inlet and outlet.
   b. Valves NPS 2-1/2 and Larger: Outside-screw and yoke-gate type with flanged ends on inlet and outlet.
   c. Air-Gap Fitting: ASME A112.1.2, matching backflow-preventer connection.

2.4 STRAINERS FOR DOMESTIC WATER PIPING

A. Y-Pattern Strainers:
1. Pressure Rating: 125 psig minimum unless otherwise indicated.
2. Body: Bronze for NPS 2 and smaller; cast iron with interior lining that complies with AWWA C550 or that is FDA approved, epoxy coated and for NPS 2-1/2 and larger.
3. End Connections: Threaded for NPS 2 and smaller; flanged for NPS 2-1/2 and larger.
4. Screen: Stainless steel with round perforations unless otherwise indicated.
5. Perforation Size:
   a. Strainers NPS 2 and Smaller: 0.020 inch.
   b. Strainers NPS 2-1/2 to NPS 4: 0.045 inch.
   c. Strainers NPS 5 and Larger: 0.10 inch.
6. Drain: Factory-installed, hose-end drain valve.

2.5 OUTLET BOXES

A. Clothes Washer Outlet Boxes:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. IPS Corporation.
2. Mounting: Recessed.
3. Material and Finish: Enameled-steel or epoxy-painted-steel box and faceplate.
4. Faucet: Combination valved fitting or separate hot- and cold-water valved fittings complying with ASME A112.18.1. Include garden-hose thread complying with ASME B1.20.7 on outlets.
5. Supply Shutoff Fittings: NPS 1/2 gate, globe, or ball valves and NPS 1/2 copper, water tubing.
6. Drain: NPS 2 standpipe and P-trap for direct waste connection to drainage piping.
7. Inlet Hoses: Two 60-inch- long, rubber household clothes washer inlet hoses with female, garden-hose-thread couplings. Include rubber washers.
8. Drain Hose: One 48-inch- long, rubber household clothes washer drain hose with hooked end.

B. Icemaker Outlet Boxes:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. LSP Products Group, Inc.
   2. Mounting: Recessed.
   3. Material and Finish: Enameled-steel or epoxy-painted-steel box and faceplate.
   4. Faucet: Valved fitting complying with ASME A112.18.1. Include NPS 1/2 or smaller copper tube outlet.
   5. Supply Shutoff Fitting: NPS 1/2 gate, globe, or ball valve and NPS 1/2 copper, water tubing.

2.6 HOSE STATIONS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. T & S Brass.

B. Hot- and Cold-Water Hose Stations:
   1. Standard: ASME A112.18.1.
   2. Faucet Type: Blending valve.
   3. Cabinet: Stainless-steel enclosure with exposed valve handles, hose connection, and hose rack. Include thermometer in front.
   4. Hose-Rack Material: Stainless steel.
   5. Body Material: Bronze.
   6. Body Finish: Rough bronze.
   7. Mounting: Wall, with reinforcement.
   8. Supply Fittings: Two NPS 1/2 gate, globe, or ball valves and check valves and NPS 1/2 copper, water tubing. Omit check valves if check stops are included with fitting.
   9. Hose: Manufacturer's standard, for service fluid, temperature, and pressure; 25 feet long.
   10. Nozzle: With hand-squeeze, on-off control.
   11. Vacuum Breaker: Integral or factory-installed, nonremovable, manual-drain-type, hose-connection vacuum breaker complying with ASSE 1011 or backflow preventer complying with ASSE 1052; and garden-hose thread complying with ASME B1.20.7 on outlet.

2.7 HOSE BIBBS

A. Hose Bibbs:
   1. Standard: ASME A112.18.1 for sediment faucets.
   2. Body Material: Bronze.
   3. Seat: Bronze, replaceable.
   4. Supply Connections: NPS 1/2 or NPS 3/4 threaded or solder-joint inlet.
   5. Outlet Connection: Garden-hose thread complying with ASME B1.20.7.
   6. Pressure Rating: 125 psig.
   7. Vacuum Breaker: Integral nonremovable, drainable, hose-connection vacuum breaker complying with ASSE 1011.
   8. Finish for Equipment Rooms: Rough bronze, or chrome or nickel plated.
   9. Finish for Service Areas: Chrome or nickel plated.
   10. Finish for Finished Rooms: Chrome or nickel plated.
   11. Operation for Equipment Rooms: Wheel handle or operating key.
   12. Operation for Service Areas: Operating key.
   13. Operation for Finished Rooms: Operating key.
   14. Include operating key with each operating-key hose bibb.

15. Include integral wall flange with each chrome- or nickel-plated hose bibb.

2.8 ROOF HYDRANTS

A. Nonfreeze Roof Hydrants:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Woodford Manufacturing Company; a division of WCM Industries, Inc.

2. Standard: ASME A112.21.3M.
3. Type: Nonfreeze, exposed-outlet post hydrant.
4. Operation: Loose key.
5. Casing and Operating Rod: Of at least length required for burial of valve below frost line.
6. Inlet: NPS 3/4.
7. Outlet: Garden-hose thread complying with ASME B1.20.7.
8. Vacuum Breaker:
   a. Nonremovable, drainable, hose-connection vacuum breaker complying with ASSE 1011 or backflow preventer complying with ASSE 1052.
   b. Garden-hose thread complying with ASME B1.20.7 on outlet.

2.9 DRAIN VALVES

A. Ball-Valve-Type, Hose-End Drain Valves:
1. Standard: MSS SP-110 for standard-port, two-piece ball valves.
2. Pressure Rating: 400-psig minimum CWP.
3. Size: NPS 3/4.
4. Body: Copper alloy.
5. Ball: Chrome-plated brass.
6. Seats and Seals: Replaceable.
7. Handle: Vinyl-covered steel.
8. Inlet: Threaded or solder joint.
9. Outlet: Threaded, short nipple with garden-hose thread complying with ASME B1.20.7 and cap with brass chain.

2.10 WATER-HAMMER ARRESTERS

A. Water-Hammer Arresters:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Precision Plumbing Products, Inc.
   b. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
   c. Tyler Pipe; Wade Div.
   d. Zurn Industries, LLC; Plumbing Products Group; Specification Drainage Products.
2. Standard: ASSE 1010 or PDI-WH 201.
3. Type: Metal bellows.
4. Size: ASSE 1010, Sizes AA and A through F, or PDI-WH 201, Sizes A through F.

2.11 AIR VENTS

A. Bolted-Construction Automatic Air Vents:
1. Body: Bronze.

2. Pressure Rating and Temperature: 125-psig minimum pressure rating at 140 deg F.
3. Float: Replaceable, corrosion-resistant metal.
4. Mechanism and Seat: Stainless steel.
5. Size: NPS 3/8 minimum inlet.
6. Inlet and Vent Outlet End Connections: Threaded.

2.12 TRAP-SEAL PRIMER DEVICE

A. Supply-Type, Trap-Seal Primer Device:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Precision Plumbing Products, Inc.
   b. Watts; a division of Watts Water Technologies, Inc.; Watts Regulator Company.
2. Standard: ASSE 1018.
3. Pressure Rating: 125 psig minimum.
4. Body: Bronze.
5. Inlet and Outlet Connections: NPS 1/2 threaded, union, or solder joint.
6. Gravity Drain Outlet Connection: NPS 1/2 threaded or solder joint.
7. Finish: Chrome plated, or rough bronze for units used with pipe or tube that is not chrome finished.

2.13 TRAP-SEAL PRIMER SYSTEMS

A. Trap-Seal Primer Systems:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Precision Plumbing Products, Inc.
2. Standard: ASSE 1044.
3. Piping: NPS 3/4, ASTM B 88, Type L; copper, water tubing.
4. Cabinet: Surface-mounted steel box with stainless-steel cover.
5. Electric Controls: 24-hour timer, solenoid valve, and manual switch for 120-V ac power.
   a. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
6. Vacuum Breaker: ASSE 1001.

2.14 FLEXIBLE CONNECTORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Hyspan Precision Products, Inc.
2. Metraflex, Inc.

B. Bronze-Hose Flexible Connectors: Corrugated-bronze tubing with bronze wire-braid covering and ends brazed to inner tubing.
1. Working-Pressure Rating: Minimum 200 psig.
2. End Connections NPS 2 and Smaller: Threaded copper pipe or plain-end copper tube.
3. End Connections NPS 2-1/2 and Larger: Flanged copper alloy.

C. Stainless-Steel-Hose Flexible Connectors: Corrugated-stainless-steel tubing with stainless-steel wire-braid covering and ends welded to inner tubing.
1. Working-Pressure Rating: Minimum 200 psig.
2. End Connections NPS 2 and Smaller: Threaded steel-pipe nipple.

3. End Connections NPS 2-1/2 and Larger: Flanged steel nipple.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install backflow preventers in each water supply to mechanical equipment and systems and to other equipment and water systems that may be sources of contamination. Comply with authorities having jurisdiction.
   1. Locate backflow preventers in same room as connected equipment or system.
   2. Install drain for backflow preventers with atmospheric-vent drain connection with air-gap fitting, fixed air-gap fitting, or equivalent positive pipe separation of at least two pipe diameters in drain piping and pipe-to-floor drain. Locate air-gap device attached to or under backflow preventer. Simple air breaks are unacceptable for this application.
   3. Do not install bypass piping around backflow preventers.

B. Install water regulators with inlet and outlet shutoff valves. Install pressure gages on inlet and outlet.

C. Install water-control valves with inlet and outlet shutoff valves and bypass with globe valve. Install pressure gages on inlet and outlet.

D. Install Y-pattern strainers for water on supply side of each control valve and pump.

E. Install outlet boxes recessed in wall or surface mounted on wall. Install 2-by-4-inch fire-retardant-treated-wood blocking, wall reinforcement between studs. Comply with requirements for fire-retardant-treated-wood blocking in Section 06 1000 "Rough Carpentry."

F. Install hose stations with check stops or shutoff valves on inlets and with thermometer on outlet.
   1. Install cabinet-type units recessed in or surface mounted on wall as specified. Install 2-by-4-inch fire-retardant-treated-wood blocking, wall reinforcement between studs. Comply with requirements for fire-retardant-treated-wood blocking in Section 06 1000 "Rough Carpentry."

G. Install water-hammer arresters in water piping according to PDI-WH 201.

H. Install air vents at high points of water piping.

I. Install supply-type, trap-seal primer valves with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting. Adjust valve for proper flow.

J. Install trap-seal primer systems with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting. Adjust system for proper flow.

3.2 CONNECTIONS

A. Comply with requirements for ground equipment in Section 26 0526 "Grounding and Bonding for Electrical Systems."

B. Fire-retardant-treated-wood blocking is specified in Section 26 0519 "Low-Voltage Electrical Power Conductors and Cables" for electrical connections.

3.3 LABELING AND IDENTIFYING

A. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplate or sign on or near each of the following:
   1. Reduced-pressure-principle backflow preventers.
   2. Hose stations.
   3. Supply-type, trap-seal primer valves.
   4. Trap-seal primer systems.

B. Distinguish among multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to identifying unit. Nameplates and signs are specified in Section 22 0553 "Identification for Plumbing Piping and Equipment."

END OF SECTION 22 1119

SECTION 22 1413

FACILITY STORM DRAINAGE PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Pipe, tube, and fittings.

B. Related Sections:
   1. Section 22 1429 "Sump Pumps" for storm drainage pumps.
   2. Section 33 4100 "Storm Utility Drainage Piping" for storm drainage piping outside the building.

1.3 PERFORMANCE REQUIREMENTS

A. Components and installation shall be capable of withstanding the following minimum working pressure unless otherwise indicated:
   1. Storm Drainage Piping: 10-foot head of water.
   2. Storm Drainage, Force-Main Piping: 50 psig.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For storm drainage system. Include plans, elevations, sections, and details. Show all required cleanouts and other accessories.

1.5 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

B. Comply with NSF/ANSI 14, "Plastics Piping System Components and Related Materials," for plastic piping components. Include marking with "NSF-drain" for plastic drain piping and "NSF-sewer" for plastic sewer piping.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

2.2 HUB-AND-SPIGOT, CAST-IRON SOIL PIPE AND FITTINGS

A. Pipe and Fittings: ASTM A 74, Service classes.

B. Gaskets: ASTM C 564, rubber.

C. Calking Materials: ASTM B 29, pure lead and oakum or hemp fiber.

2.3 HUBLESS, CAST-IRON SOIL PIPE AND FITTINGS

A. Pipe and Fittings: ASTM A 888 or CISPI 301.

B. Sovent Stack Fittings: ASME B16.45 or ASSE 1043, hubless, cast-iron aerator and deaerator drainage fittings.

C. Heavy-Duty, Hubless-Piping Couplings:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. ANACO-Husky.
   b. Tyler Pipe.
2. Standards: ASTM C 1277 and ASTM C 1540.
3. Description: Stainless-steel shield with stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.

PART 3 - EXECUTION

3.1 EARTH MOVING

A. Comply with requirements for excavating, trenching, and backfilling specified in Section 31 2000 "Earth Moving."

3.2 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations from layout are approved on coordination drawings.

B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

E. Install piping to permit valve servicing.

F. Install piping at indicated slopes.

G. Install piping free of sags and bends.

H. Install fittings for changes in direction and branch connections.

I. Install piping to allow application of insulation.

J. Make changes in direction for storm drainage piping using appropriate branches, bends, and long-sweep bends. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.

K. Lay buried building storm drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.

L. Install storm drainage piping at the following minimum slopes unless otherwise indicated:
1. Building Storm Drain: 1 percent downward in direction of flow for piping NPS 3 and smaller; 1 percent downward in direction of flow for piping NPS 4 and larger.
2. Horizontal Storm-Drainage Piping: 2 percent downward in direction of flow.

M. Install steel piping according to applicable plumbing code.

N. Install aboveground copper tubing according to CDA's "Copper Tube Handbook."

O. Install engineered controlled-flow drain specialties and storm drainage piping in locations indicated.

P. Install underground, ductile-iron, force-main piping according to AWWA C600. Install buried piping inside building between wall and floor penetrations and connection to storm sewer piping outside building with restrained joints. Anchor pipe to wall or floor. Install thrust-block supports at vertical and horizontal offsets.

Q. Install force mains at elevations indicated.

R. Plumbing Specialties:
1. Install backwater valves in storm drainage gravity-flow piping. Comply with requirements for backwater valves specified in Section 22 1423 "Storm Drainage Piping Specialties."
2. Install cleanouts at grade and extend to where building storm drains connect to building storm sewers in storm drainage gravity-flow piping. Install cleanout fitting with closure plug inside the building in storm drainage force-main piping. Comply with requirements for cleanouts specified in Section 22 1423 "Storm Drainage Piping Specialties."
3. Install drains in storm drainage gravity-flow piping. Comply with requirements for drains specified in Section 22 1423 "Storm Drainage Piping Specialties."

S. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

T. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 22 0517 "Sleeves and Sleeve Seals for Plumbing Piping."

U. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 22 0517 "Sleeves and Sleeve Seals for Plumbing Piping."

V. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 22 0518 "Escutcheons for Plumbing Piping."

3.3 JOINT CONSTRUCTION

A. Hub-and-Spigot, Cast-Iron Soil Piping Gasketed Joints: Join according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.

B. Hub-and-Spigot, Cast-Iron Soil Piping Calked Joints: Join according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for lead-and-oakum calked joints.

C. Hubless, Cast-Iron Soil Piping Coupled Joints: Join according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-piping coupling joints.

D. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

E. Join copper tube and fittings with soldered joints according to ASTM B 828 procedure. Use ASTM B 813, water-flushable, lead-free flux and ASTM B 32, lead-free-alloy solder.

F. Flanged Joints: Align bolt holes. Select appropriate gasket material, size, type, and thickness. Install gasket concentrically positioned. Use suitable lubricants on bolt threads. Torque bolts in cross pattern.

3.4 VALVE INSTALLATION

A. General valve installation requirements are specified in Section 22 0523 "General-Duty Valves for Plumbing Piping."

B. Backwater Valves: Install backwater valves in piping subject to backflow.
1. Horizontal Piping: Horizontal backwater valves. Use normally closed type unless otherwise indicated.
2. Install backwater valves in accessible locations.
3. Comply with requirements for backwater valves specified in Section 22 1423 "Storm Drainage Piping Specialties."

3.5 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements for pipe hanger and support devices and installation specified in Section 22 0529 "Hangers and Supports for Plumbing Piping and Equipment."
1. Install carbon-steel pipe hangers for horizontal piping in noncorrosive environments.
2. Install stainless-steel pipe hangers for horizontal piping in corrosive environments.
3. Install carbon-steel pipe support clamps for vertical piping in noncorrosive environments.
4. Install stainless-steel pipe support clamps for vertical piping in corrosive environments.
5. Vertical Piping: MSS Type 8 or Type 42, clamps.
6. Individual, Straight, Horizontal Piping Runs:
   a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.

b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
c. Longer Than 100 Feet if Indicated: MSS Type 49, spring cushion rolls.

7. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
8. Base of Vertical Piping: MSS Type 52, spring hangers.

B. Support horizontal piping and tubing within 12 inches of each fitting, valve, and coupling.

C. Support vertical piping and tubing at base and at each floor.

D. Rod diameter may be reduced one size for double-rod hangers, with 3/8-inch minimum rods.

E. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:
1. NPS 1-1/2 and NPS 2: 60 inches with 3/8-inch rod.
2. NPS 3: 60 inches with 1/2-inch rod.
3. NPS 4 and NPS 5: 60 inches with 5/8-inch rod.
4. NPS 6 and NPS 8: 60 inches with 3/4-inch rod.
5. NPS 10 and NPS 12: 60 inches with 7/8-inch rod.
6. Spacing for 10-foot pipe lengths may be increased to 10 feet. Spacing for fittings is limited to 60 inches.

F. Install supports for vertical cast-iron soil piping every 15 feet.

G. Install hangers for steel piping with the following maximum horizontal spacing and minimum rod diameters:
1. NPS 1-1/4: 84 inches with 3/8-inch rod.
2. NPS 1-1/2: 108 inches with 3/8-inch rod.
3. NPS 2: 10 feet with 3/8-inch rod.
4. NPS 2-1/2: 11 feet with 1/2-inch rod.
5. NPS 3: 12 feet with 1/2-inch rod.
6. NPS 4 and NPS 5: 12 feet with 5/8-inch rod.
7. NPS 6 and NPS 8: 12 feet with 3/4-inch rod.
8. NPS 10 and NPS 12: 12 feet with 7/8-inch rod.

H. Install supports for vertical steel piping every 15 feet.

I. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
1. NPS 1-1/4: 72 inches with 3/8-inch rod.
2. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.
3. NPS 2-1/2: 108 inches with 1/2-inch rod.
4. NPS 3 to NPS 5: 10 feet with 1/2-inch rod.
5. NPS 6: 10 feet with 5/8-inch rod.
6. NPS 8: 10 feet with 3/4-inch rod.

J. Install supports for vertical copper tubing every 10 feet.

K. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.6 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect interior storm drainage piping to exterior storm drainage piping. Use transition fitting to join dissimilar piping materials.

C. Connect storm drainage piping to roof drains and storm drainage specialties.
1. Install test tees (wall cleanouts) in conductors near floor, and floor cleanouts with cover flush with floor.
2. Install horizontal backwater valves with cleanout cover flush with floor.
3. Comply with requirements for backwater valves, cleanouts and drains specified in Section 22 1423 "Storm Drainage Piping Specialties."

D. Connect force-main piping to the following:
1. Sump Pumps: To sump pump discharge.

E. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.

3.7 IDENTIFICATION

A. Identify exposed storm drainage piping. Comply with requirements for identification specified in Section 22 0553 "Identification for Plumbing Piping and Equipment."

3.8 PIPING SCHEDULE

A. Flanges and unions may be used on aboveground pressure piping unless otherwise indicated.

B. Aboveground storm drainage piping NPS 6 and smaller shall be the following:
1. Hubless, cast-iron soil pipe and fittings; heavy-duty hubless-piping couplings; and coupled joints.

C. Aboveground, storm drainage piping NPS 8 and larger shall be the following:
1. Hubless, cast-iron soil pipe and fittings; heavy-duty hubless-piping couplings; and coupled joints.

D. Underground storm drainage piping NPS 6 and smaller shall be the following:
1. Service class, cast-iron soil piping; gaskets; and gasketed joints.

E. Underground, storm drainage piping NPS 8 and larger shall be the following:
1. Service class, cast-iron soil piping; gaskets; and gasketed joints.

F. Aboveground storm drainage force mains NPS 1-1/2 and NPS 2 shall be the following:
1. Solid wall PVC pipe, PVC socket fittings, and solvent-cemented joints.

G. Aboveground storm drainage force mains NPS 2-1/2 to NPS 6 shall be the following:
1. Solid wall PVC pipe, PVC socket fittings, and solvent-cemented joints.

H. Underground storm drainage force mains NPS 4 and smaller shall be the following:
1. Solid wall PVC pipe, PVC socket fittings, and solvent-cemented joints.

I. Underground storm drainage force mains NPS 5 and larger shall be the following:
1. Solid wall PVC pipe, PVC socket fittings, and solvent-cemented joints.

END OF SECTION 22 1413

SECTION 22 1423

STORM DRAINAGE PIPING SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Roof drains.
   2. Cleanouts.
   3. Trench drains.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.4 QUALITY ASSURANCE

A. Drainage piping specialties shall bear label, stamp, or other markings of specified testing agency.

PART 2 - PRODUCTS

2.1 METAL ROOF DRAINS

A. Cast-Iron, Medium-Sump, General-Purpose Roof Drains:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Josam Company.
      b. Smith, Jay R. Mfg. Co.
      c. Tyler Pipe.
      d. Watts Water Technologies, Inc.
   2. Standard: ASME A112.6.4, for general-purpose roof drains.
   3. Body Material: Cast iron.
   4. Dimension of Body: 8- to 12-inch diameter.
   5. Combination Flashing Ring and Gravel Stop: Required.
   6. Outlet: Bottom.
   7. Extension Collars: Required.
   8. Underdeck Clamp: Required.
   9. Sump Receiver Plate: Required.
   10. Dome Material: Cast iron.
   11. Perforated Gravel Guard: Stainless steel.
   12. Water Dam: 2 inches high.

2.2 CLEANOUTS

A. Floor Cleanouts:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Josam Company.
      b. Smith, Jay R. Mfg. Co.
      c. Tyler Pipe.
      d. Watts Water Technologies, Inc.
   2. Standard: ASME A112.36.2M, for adjustable housing cleanouts.
   3. Size: Same as connected branch.
   4. Type: Threaded, adjustable housing.
   5. Body or Ferrule Material: Cast iron.
   6. Closure: Brass plug with straight threads and gasket.
   7. Adjustable Housing Material: Cast iron with threads.
   8. Frame and Cover Material and Finish: Nickel-bronze, copper alloy.
   9. Frame and Cover Shape: Round.
   10. Top-Loading Classification: Light Duty.
   11. Riser: ASTM A 74, Service class, cast-iron drainage pipe fitting and riser to cleanout.

B. Test Tees:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Josam Company.
      b. Smith, Jay R. Mfg. Co.
      c. Tyler Pipe.
      d. Watts Water Technologies, Inc.
   2. Standard: ASME A112.36.2M and ASTM A 74, ASTM A 888, or CISPI 301, for cleanout test tees.
   3. Size: Same as connected drainage piping.
   4. Body Material: Hub-and-spigot, cast-iron soil-pipe T-branch or hubless, cast-iron soil-pipe test tee as required to match connected piping.
   5. Closure Plug: Countersunk, brass.
   6. Closure Plug Size: Same as or not more than one size smaller than cleanout size.

C. Wall Cleanouts:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Josam Company.
      b. Smith, Jay R. Mfg. Co.
      c. Tyler Pipe.
      d. Watts Water Technologies, Inc.
   2. Standard: ASME A112.36.2M, for cleanouts. Include wall access.
   3. Size: Same as connected drainage piping.
   4. Body Material: Hubless, cast-iron soil-pipe test tee as required to match connected piping.
   5. Closure: Countersunk, drilled-and-threaded brass plug.
   6. Closure Plug Size: Same as or not more than one size smaller than cleanout size.
   7. Wall Access: Round, flat, chrome-plated brass or stainless-steel cover plate with screw.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install roof drains at low points of roof areas according to roof membrane manufacturer's written installation instructions.
   1. Install flashing collar or flange of roof drain to prevent leakage between drain and adjoining roofing. Maintain integrity of waterproof membranes where penetrated.
   2. Install expansion joints, if indicated, in roof drain outlets.
   3. Position roof drains for easy access and maintenance.

B. Install cleanouts in aboveground piping and building drain piping according to the following instructions unless otherwise indicated:
   1. Use cleanouts the same size as drainage piping up to NPS 4. Use NPS 4 for larger drainage piping unless larger cleanout is indicated.
   2. Locate cleanouts at each change in direction of piping greater than 45 degrees.
   3. Locate cleanouts at minimum intervals of 50 feet for piping NPS 4 and smaller and 100 feet for larger piping.
   4. Locate cleanouts at base of each vertical soil and waste stack.

C. For floor cleanouts for piping below floors, install cleanout deck plates with top flush with finished floor.

D. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.

E. Install test tees in vertical conductors and near floor.

F. Install wall cleanouts in vertical conductors. Install access door in wall if indicated.

G. Install trench drains at low points of surface areas to be drained. Set grates of drains flush with finished surface unless otherwise indicated.

3.2 CONNECTIONS

A. Comply with requirements for piping specified in Section 22 1413 "Facility Storm Drainage Piping." Drawings indicate general arrangement of piping, fittings, and specialties.

3.3 PROTECTION

A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.

B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION 22 1423

SECTION 22 45 00

BWA N16001

EMERGENCY PLUMBING FIXTURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Combination units.
   2. Water-tempering equipment.

1.3 DEFINITIONS

A. Accessible Fixture: Emergency plumbing fixture that can be approached, entered, and used by people with disabilities.

B. Tepid: Moderately warm.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. Include flow rates and capacities, furnished specialties, and accessories.

B. Operation and Maintenance Data: For emergency plumbing fixtures to include in operation and maintenance manuals.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. ANSI Standard: Comply with ANSI Z358.1, "Emergency Eyewash and Shower Equipment."

C. NSF Standard: Comply with NSF 61, "Drinking Water System Components - Health Effects," for fixture materials that will be in contact with potable water.

D. Regulatory Requirements: Comply with requirements in ICC/ANSI A117.1, "Accessible and Usable Buildings and Facilities" for plumbing fixtures for people with disabilities.

PART 2 - PRODUCTS

2.1 EMERGENCY SHOWER and EYE/FACE WASH UNITS

A. Accessible, Plumbed Emergency Shower Eye/Face Wash Combination Units,:

1. Manufacturers: Subject to compliance with requirements,:
   a. Basis of Design: Haws Corporation Model 8300-8309 combination shower and eye/face wash.
   b. Equal by Acorn Safety; a division of Acorn Engineering Company.
   c. Equal by Speakman Company.

2. Piping:
   a. Material: Chrome-plated brass or stainless steel.
   b. Unit Supply: NPS 1-1/4 minimum.
   c. Unit Drain: Outlet at back or side near bottom.

3. Emergency Shower Eye/Face Wash Unit:
   a. Model 8300-8309 combination shower and eye/face wash shall include a stainless steel 11" (27.9 cm) round bowl, an AXION® MSR eye/face wash head shall feature inverted directional laminar flow which achieves zero vertical velocity supplied by an integral flow control. Unit shall also include the AXION MSR hydrodynamic designed ABS plastic showerhead with flow control, chrome-plated brass stay-open ball valve equipped with stainless steel ball and stem, and chrome-plated brass in-line 50 x 50 mesh water strainer. Unit shall also include Schedule 40 hot-dipped galvanized steel pipe and fittings, powder-coated cast-iron 9" (22.9 cm) diameter floor flange, self-adhesive high visibility safety green and bright yellow stripes, universal sign, and 1-1/4" IPS supply.
   b. Eye/Face Wash Portion of Emergency Unit:
      1. Capacity: Not less than 3 gpm for at least 15 minutes.
      2. Supply Piping: NPS 1/2 with flow regulator and stay-open control valve.
      3. Control-Valve Actuator: Paddle.
      4. Spray-Head Assembly: Two or four receptor-mounted spray heads.
      5. Receptor: Chrome-plated brass or stainless-steel bowl.
      6. Mounting: Attached to shower pedestal.

2.2 WATER-TEMPERING EQUIPMENT

A. Hot- and Cold-Water, Water-Tempering Equipment,:
   1. Manufacturers: Subject to compliance with requirements,:
      a. Acorn Safety; a division of Acorn Engineering Company.
      b. Haws Corporation.
      c. Speakman Company.
   2. Description: Factory-fabricated equipment with thermostatic mixing valve.
      a. Thermostatic Mixing Valve: Designed to provide 85 deg F tepid, potable water at emergency plumbing fixtures, to maintain temperature at plus or minus 5 deg F throughout required 15-minute test period, and in case of unit failure to continue cold-water flow, with union connections, controls, metal piping, and corrosion-resistant enclosure.
      b. Supply Connections: For hot and cold water.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in for water and waste piping systems to verify actual locations of piping connections before plumbed emergency plumbing fixture installation.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 EMERGENCY PLUMBING FIXTURE INSTALLATION

A. Assemble emergency plumbing fixture piping, fittings, control valves, and other components.

B. Install fixtures level and plumb.

C. Fasten fixtures to substrate.

D. Install dielectric fitting in supply piping to emergency equipment if piping and equipment connections are made of different metals. Comply with requirements for dielectric fittings specified in Division 22 Section "Domestic Water Piping."

E. Install thermometers in supply and outlet piping connections to water-tempering equipment. Comply with requirements for thermometers specified in Division 22 Section "Meters and Gages for Plumbing Piping."

F. Install trap and waste piping on drain outlet of emergency equipment receptors that are indicated to be directly connected to drainage system. Comply with requirements for waste piping specified in Division 22 Section "Sanitary Waste and Vent Piping."

G. Install indirect waste piping on drain outlet of emergency equipment receptors that are indicated to be indirectly connected to drainage system. Comply with requirements for waste piping specified in Division 22 Section "Sanitary Waste and Vent Piping."

H. Install escutcheons on piping wall and ceiling penetrations in exposed, finished locations. Comply with requirements for escutcheons specified in Division 22 Section "Escutcheons for Plumbing Piping."

3.3 CONNECTIONS

A. Connect cold-water-supply piping to plumbed emergency plumbing fixtures not having water-tempering equipment. Comply with requirements for cold-water piping specified in Division 22 Section "Domestic Water Piping."

B. Connect hot- and cold-water-supply piping to hot- and cold-water, water-tempering equipment. Connect output from water-tempering equipment to emergency plumbing fixtures. Comply with requirements for hot- and cold-water piping specified in Division 22 Section "Domestic Water Piping."

C. Directly connect emergency plumbing fixture receptors with trapped drain outlet to sanitary waste and vent piping. Comply with requirements for waste piping specified in Division 22 Section "Sanitary Waste and Vent Piping."

D. Indirectly connect emergency plumbing fixture receptors without trapped drain outlet to sanitary waste or storm drainage piping.

E. Where installing piping adjacent to emergency plumbing fixtures, allow space for service and maintenance of fixtures.

3.4 IDENTIFICATION

A. Install equipment nameplates or equipment markers on emergency plumbing fixtures and equipment and equipment signs on water-tempering equipment. Comply with requirements for identification materials specified in Division 22 Section "Identification for Plumbing Piping and Equipment."

3.5 ADJUSTING

A. Adjust or replace fixture flow regulators for proper flow.

B. Adjust equipment temperature settings.

END OF SECTION

SECTION 230000

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.

B. Specifications throughout all Divisions of the Project Manual are directly applicable to this Section, and this Section is directly applicable to them.

1.2 SUMMARY

A. Warranty

B. Quality Assurance

C. Delivery, Storage, and Handling

D. General Requirements

E. Special Conditions

F. Electronic Submittals

G. Demolition

1.3 REFERENCE STANDARDS

A. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.

B. All reference amendments adopted prior to the effective date of this Contract shall be applicable to this Project.

C. All materials, installation and workmanship shall comply with the applicable requirements and standards addressed within the Contract Documents.

1.4 DEFINITIONS

A. These definitions are included to clarify the direction and intention of these Specifications. For further clarification, contact the Architect/Engineer.
   1. Concealed / Exposed: "Concealed" areas are those areas that cannot be seen by the building occupants. "Exposed" areas are all areas, which are exposed to view by the building occupants, including under counters, inside cabinets and closets, plus all mechanical rooms. “Exterior” areas are those that are outside the building exterior envelope and exposed to the outdoors.

2. Furnish: The term "furnish" is used to mean "supply and deliver to the Project Site, ready for unloading, unpacking, assembly, installation, and similar operations.

3. Install: The term "install" is used to describe operations at Project Site including the actual "unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

4. Provide: The term "provide" means "to furnish and install, complete and ready for the intended use.

5. Mechanical: The term "mechanical" is inclusive of all Fire Protection, Plumbing, HVAC and Division 15 systems and equipment.

PART 2 - PRODUCTS

2.1 WARRANTY

A. The contractor shall provide a warranty to owner, through Architect, for all work and equipment for a period of 1 year after the date of substantial completion. This warranty shall be on the contractors letter head and state the substantial completion date and the expiration date. This letter shall provide contractor's contact information.

B. This warranty shall include that all systems and equipment will perform as specified. Warranty shall also provide guarantee to keep the entire system, as installed by this contractor or subcontractors to this contractor, in repair and perfect working order for the warranty time period. This warranty shall cover all costs including but not limited to labor and materials.

2.2 QUALITY ASSURANCE

A. Fire Suppression, Plumbing and HVAC systems shall be coordinated with other systems and trades to include but not be limited to: Electrical systems, fire alarm, security systems, transport systems, telephone and data systems.

B. Verification of Dimensions: The Contractor shall be responsible for the coordination and proper relation of Contractor’s Work to the building structure and to the Work of all trades. The Contractor shall visit the premises and become thoroughly familiar with all details of the Work and working conditions, to verify all dimensions in the field, and to advise the Architect/Engineer of any discrepancy before performing any Work. Adjustments to the Work required in order to facilitate a coordinated installation shall be made at no additional cost to the Owner or the Architect/Engineer.

C. All dimensional information related to new structures shall be taken from the appropriate Drawings. All dimensional information related to existing facilities shall be taken from actual measurements made by the Contractor on the Site.

D. The Drawings are subject to the requirements of Reference Standards, structural and architectural conditions. The Contractor shall carefully investigate structural and finish conditions and shall coordinate the separate trades in order to avoid interference between the various phases of Work. Work shall be organized and laid out so that it will be concealed in furred chases and suspended ceilings, etc., in finished portions of the building, unless

specifically noted to be exposed. All exposed Work shall be installed parallel or perpendicular to the lines of the building unless otherwise noted.

E. When the Drawings do not give exact details as to the elevation of pipe and ducts, the Contractor shall physically arrange the systems to fit in the space available at the elevations intended with proper grades for the functioning of the system involved. Piping and duct systems are generally intended to be installed true and square to the building construction, and located as high as possible against the structure in a neat and workmanlike manner. The Drawings do not show all required offsets, control lines, pilot lines and other location details. Work shall be concealed in all finished areas.

F. Where core drilling of floor or wall penetrations is required, Work shall be performed in accordance with Division 03 Specifications. Where applicable Division 03 Specifications are not included in the Project, core drilling shall be in accordance with generally accepted standards, and be performed by licensed personnel where applicable.

2.3 DELIVERY, STORAGE AND HANDLING

A. All equipment, ductwork, and materials shall be delivered to the Project Site clean and sealed for protection.

B. Take particular care not to damage the existing construction in performing Work. All finished floors, step treads and finished surfaces shall be covered to prevent any damage by workers or their tools and equipment during the construction of the Project.

C. Equipment and materials shall be protected from rust and dust/debris both before and after installation. Any equipment or materials found in a rusty condition at the time of final inspection must be cleaned of rust and repainted as specified elsewhere in these Specifications.

D. All material affected by weather shall be covered and protected to keep the material free from damage while material is being transported to the Site and while stored at the Project Site.

E. During the execution of the Work, open ends of all piping and conduit, and all openings in equipment shall be closed when Work is not in progress, and shall be capped and sealed prior to completion of final connections, so as to prevent the entrance of foreign matter.

F. All equipment shall be protected during the execution of the Work. All ductwork and equipment shall be sealed with heavy plastic and tape to prevent build-up of dust and debris.

G. All ductwork and air handling equipment shall be wiped down with a damp cloth immediately before installation to ensure complete removal of accumulated dusts and foreign matter.

H. All plumbing fixtures shall be protected and covered to prohibit usage. All drains shall be covered until placed in service to prevent the entrance of foreign matter.

2.4 GENERAL REQUIREMENTS

A. Comply with all bidding requirements, general conditions, and Division 1 requirements contained in Architectural specifications.

B. All materials shall meet or exceed all applicable referenced standards, federal, state and local requirements, and conform to codes and ordinances of authorities having jurisdiction.

C. This contractor shall furnish, deliver, erect, and connect complete all the materials and appliances described herein and also all the materials, appliances, tools and transportation, etc., required to make the work complete in accordance with the true intent of the plans and specifications, and as required to leave the system in first-class operating condition, excluding those items stated as work and materials by others. If one contractor is responsible for both heating, ventilating, air conditioning and plumbing, it shall be his responsibility to insure that all equipment is connected to their proper utility. If two separate contractors are used, the plumbing contractor shall review the heating, ventilating, air conditioning plans to insure that all utilities are provided for the equipment furnished by the heating, ventilating, and air conditioning contractor. This shall include all gas lines, condensate drain lines, floor drains, flue vents from all plumbing and HVAC gas-fired equipment, and other items as necessary to make a complete first-class operating system.

D. It is the intent of these specifications that the building be totally watertight. This includes all mechanical penetrations to the exterior of the building, whether roof, wall, or underground. The Contractor shall use standard products of the HVAC industry to provide this. Field fabricated products will not be acceptable.

E. Standards: Notwithstanding any reference in the specifications to any article, device, product, material, fixture, form, or type of construction by name, make, or catalog number, such references shall be interpreted as establishing a standard of quality and shall not be construed as limiting competition. Request for approval of substitutions shall be submitted to the architect/engineer, in form in sufficient detail to demonstrate the quality and performance standard of the proposed substitution, within ten (10) days prior to the bid date.

F. Substitutions proposed shall be equivalent in such features as noise level, power requirements, metal gages, vibration attenuation, finish, appearance, certification of recognized testing agencies and standards bureaus, allowable working pressures, physical size and arrangement so far as affects installation in the available space, factory applied insulation, electrical devices, controls, access to internal parts, water and air pressure drops, operating speeds, coil face areas, fan diameters, operating efficiencies, and features and capacities specified herein.

G. In case the specifications or plans conflict with such ordinances, laws or regulations, the conflicting portion of work affected shall be installed in strict accordance with the regulations above mentioned; the remainder of the plans and specifications, however, shall remain in full force. In no case will work or materials inferior to these specifications be accepted even if permitted by code. In places where codes conflict, the local code shall have preference.

H. The Mechanical Contractor shall have experience in this field of construction. The Contractor shall have performed at least five such projects, shall have a minimum of three years experience installing these systems, or receive permission from the Owner's Representative 10 days prior to the bid opening date. The Owner’s Representative shall furnish proof upon request.

I. The Mechanical Contractor shall provide the General Contractor or Construction Manager with a Performance Bond in the amount of 100% of the Contract Sum. The attorney-in-fact who executes the bonds shall affix thereto a certified and current copy of his power of attorney. This shall comply with Division 1 requirements. The General Contractor or Construction Manager will not be allowed to bond the mechanical portion of this project for any Mechanical Contractor.

J. The General Contractor or Construction Manager shall provide the name of the Mechanical Contractor who is the low bidder on the bid form/proposal. This shall be the Mechanical Contractor of record for this project.

2.5 SPECIAL CONDITIONS

A. All equipment installed shall have local representation, local factory authorized service, and a local stock of repair parts.

B. Responsibility for furnishing proper equipment and/or material and ensuring that equipment and/or material is installed as intended by the manufacturer, rests entirely upon the Contractor. Contractor shall request advice and supervisory assistance from the representative of specific manufacturers during the installation.

C. All materials, unless otherwise specified, shall be new, free from all defects, suitable for the intended use and of the best quality of their respective kinds. Materials and equipment shall be installed in accordance with the manufacturer's recommendations and the best standard practice for the type of Work involved. All Work shall be executed by mechanics skilled in their respective trades, and the installations shall provide a neat, precise appearance. Materials and/or equipment damaged in shipment or otherwise damaged prior to installation shall not be repaired at the job Site but shall be replaced with new materials and/or equipment.

D. Materials and equipment manufactured domestically are preferred when possible. Materials and equipment that are not available from a domestic manufacturer may be by a non-domestic manufacturer provided they fully comply with Contract Documents.

E. Prevention of Rust: Standard factory finish will be acceptable on equipment specified by model number; otherwise, surfaces of ferrous metal shall be given a rust inhibiting coating.

2.6 ELECTRONIC SUBMITTALS

A. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:

1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.

2. Name file with submittal number or other unique identifier, including revision identifier.

a. File name shall use project identifier and Specification Division number followed by a decimal point and then a sequential number (e.g., LNHS.15.01). Resubmittals shall include an revision suffix after another decimal point (e.g., LNHS.15.01.R1).

3. Provide space to permanently record Contractor's review and approval markings and action taken by Engineer and Construction Manager or General Contractor.

4. Transmittal Form for Electronic Submittals: Use electronic form acceptable to Architect, containing the following information:

5. The submittal shall consist of all the items in the specifications, and shall include the following for each item or group of similar items:

a. Outline arranged as follows: Item name and number shown on plans; manufacturer's name, model and size number; capacity and performance data corresponding to that set forth in the specifications and shown in the schedule on

the plans. Submittal data shall be arranged in the same order as the specifications.

b. Printed descriptive literature and cuts showing general arrangement and design of the equipment submitted. Complete catalogs are not desired or acceptable. Include only the sheets pertaining the exact equipment submitted.

c. The submittal shall be delivered to the Owners representative within thirty (30) days after signing of the contract. Any questions regarding submittals shall be referred to the Owners representative promptly, following signing of the contract. Partial submittals will only be accepted when construction schedule is short enough to require it. This will be determined by the Architect or Engineer.

d. Cover Sheet:
   1) Project name.
   2) Date.
   3) Name of Construction Manager or General Contractor.
   4) Name of firm or entity that prepared submittal.
   5) Names of subcontractor, manufacturer, and supplier.
   6) Category and type of submittal.
   7) Submittal description.
   8) Specification Section number and title.
   9) Drawing designation and generic name for each of multiple items.
   10) Drawing number and detail references, as appropriate.
   11) Location(s) where product is to be installed, as appropriate.
   12) Related physical samples submitted directly.
   13) Indication of full or partial submittal.
   14) Transmittal number[, numbered consecutively].
   15) Submittal and transmittal distribution record.
   16) Other necessary identification.
   17) Remarks.

e. Options: Identify options requiring selection by Architect.

f. Deviations and Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect or Engineer on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.

6. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

   a. Note date and content of previous submittal.

   b. Note date and content of revision in label or title block and clearly indicate extent of revision.

   c. Resubmit submittals until they are marked with approval notation or approved as noted but not requiring resubmittal.

7. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities.

8. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Engineer and Construction Manager's stamp.

B. Record Copies: The Contractor shall submit two (2) printed copies, bound in two (2) hard plastic, three-ring binders with clear plastic envelope on cover and spline and one (1) electronic copy, of final approved submittal to the Owners representative for approval.

C. Operation and Maintenance Manual: The Contractor shall submit two (2) copies, of typewritten instructions for operating and maintaining all systems and equipment included in this contract, bound in two (2) hard plastic, three-ring binders with clear plastic envelope on cover and spline and one (1) electronic copy, to the Owners representative for approval. Manufacturer's advertising literature or catalogs will not be acceptable for operating and maintenance instructions. The Contractor shall include the maintenance schedule and procedure for the principal items of equipment furnished under this contract.

D. Record Submittal Copy and Operation and Maintenance Manual may be submitted together in same binder.

2.7 DEMOLITION

A. The extent of demolition work is indicated on the drawings and by the requirements of this section.

B. Provide all demolition work required for the removal and/or relocation of mechanical equipment, mechanical piping, ductwork, domestic cold water, domestic hot water and sanitary waste piping, plumbing fixtures, floor drains, etc. to provide a complete and operable system upon completion of the project.

C. Work shall at all times be in compliance with local and national safety codes. Great care shall be taken to avoid leaving hazardous conditions unattended.

D. Where devices or equipment are indicated or required to be removed by the architectural layout, the associated ductwork or piping serving such shall be removed back to their source.

E. Where devices or equipment are indicated or required to be relocated by the architectural layout, the associated ductwork or piping shall be removed back to a main line or main duct and new products shall be used to extend the service to the new location.

F. Where devices or equipment are served from under a concrete floor, the piping shall be cut off below finish floor level and capped. Grout concrete shall be provided to level the finished floor.

G. Where ductwork or piping is run above inaccessible ceilings or in walls, which are to remain undisturbed, the ductwork or piping shall be capped and abandoned in place.

H. Where the removal of devices or equipment renders equipment downstream inoperable, services shall be extended to the downstream device or equipment so that the device or equipment is left in operating condition.

I. This Contractor shall remove all abandoned ductwork or piping in the areas where construction is taking place.

J. Some of the ductwork or piping which is to remain may have to be rerouted to accommodate the new construction. This shall be done at no additional cost to the Owner.

K. Where devices or equipment are served with piping penetrating the basement wall, the piping shall be cut off outside the basement wall, capped and the basement wall penetration shall be sealed and made watertight.

L. Where a new roof is being installed on the Architectural drawings or specifications, all mechanical devices on the roof shall be replaced with all new to match existing sizes, quality, and capacities. This shall include, but not limited too, the following:

1. Plumbing vents shall be extended above the new roof with new flashing and/or roof portals.

2. Exhaust fans and controls shall be replaced and new curbs installed to match the new roof construction. Ductwork shall be extended as necessary to the new fans. Electrical service with new fused, disconnect switch shall be extended as necessary for all motors.

3. Outside air intake and relief/exhaust hoods shall be replaced and new curbs installed to match the new roof construction. Electrical service with new fused, disconnect switch shall be extended as necessary for all motors.

4. Rooftop mounted equipment, i.e., packaged rooftop units, make-up air units, etc., shall be removed, stored carefully, and reinstalled on new curbs. If there is a note on the plans for new equipment to be purchased, the above sentence shall be modified to delete the "stored carefully" phrase and replace "reinstalled" with "installed." Extend gas lines, electrical service with new fused, disconnect switch, and ductwork to the new or relocated equipment.

5. Condensing units or other rooftop mechanical equipment mounted on 4x4 redwood screeds or equipment rails shall be removed, stored carefully, and reinstalled on new equipment rails. Equipment rails shall be flashed, mopped, or installed as directed by the Architect. Extend gas lines, piping, ductwork ,and electrical service with new fused, disconnect switch to the new or relocated equipment.

PART 3 - EXECUTION

3.1 PREPARATION

A. Cooperate with trades of adjacent, related or affected materials or operations, and with trades performing continuations of this Work in order to effect timely and accurate placing of Work and to coordinate, in proper and correct sequence, the Work of such trades.

B. The size of equipment indicated on the Drawings is based on the dimensions of a particular manufacturer. While other manufacturers may be acceptable, it is the responsibility of the Contractor to determine that the equipment proposed will fit in the space. Fabrication Drawings shall be prepared when required by the Architect/Engineer or Owner to indicate a suitable arrangement.

C. All equipment shall be installed in a manner to permit access to all surfaces. All valves, motors, drives, filters, and other accessory items shall be installed in a position to allow removal for service without disassembly of another part.

D. Space Requirements:

1. Consider space limitations imposed by contiguous Work in location of equipment and material. Do not provide equipment or material which is not suitable in this respect.

2. Make changes in material and equipment locations of up to five (5) feet, to allow for field conditions prior to actual installation, and as directed by the Architect/Engineer at no additional cost to the Owner.

E. Contractor shall note that the electrical design and Drawings are based on the equipment scheduled and indicated on the Drawings. Should any equipment be provided requiring changes to the electrical design, the required electrical changes shall be made at no cost to the Owner.

F. Connections for equipment other than Divisions 15 and 16:

1. Rough-in and provide all gas, air, water, steam, sewer, etc. connections to all fixtures, equipment, machinery, etc., furnished by the Owner and/or other trades in accordance with detailed rough-in Drawings provided by the equipment suppliers, by actual measurements of the equipment connections, or as detailed.

2. After the equipment is set in place, make all final connections and provide all required pipe, fittings, valves, traps, etc.

3. Provide all backflow preventers and air gap fittings required, using approved devices. In each service line connected to an item of equipment or piece of machinery, provide a shutoff valve. On each drain not provided with a trap, provide a suitable trap.

4. Provide all ductwork, transition pieces, etc., required for a complete installation of vent hoods, fume hoods, etc.

3.2 INSTALLATION

A. Installation shall meet or exceed all applicable federal, state and local requirements, referenced standards and conform to codes and ordinances of authorities having jurisdiction.

B. All installation shall be in accordance with manufacturer’s published recommendations.

C. Piping may be run exposed in rooms typically without ceilings such as mechanical rooms, janitor's closets, tight against pan soffits in exposed "tee" structures, or storage spaces, but only where necessary. Shutoff and isolation valves shall be easily accessible.

D. All pipe, conduits, etc., shall be cut accurately to measurements established at the building and shall be worked into place without springing or forcing. All ducts, pipes and conduits run exposed in machinery and equipment rooms shall be installed parallel to the building lines, except that piping shall be sloped to obtain the proper pitch. Piping and ducts run in furred ceilings, etc., shall be similarly installed, except as otherwise shown. All pipe openings shall be kept closed until the systems are closed with final connections.

E. Prior to the installation of any ceiling material, gypsum, plaster or acoustical board, the Contractor shall notify Owner’s Project Manager so that arrangement can be made for an inspection of the above-ceiling area about to be "sealed" off. The Contractor shall provide written notification to the Owner at least five (5) calendar days prior to the inspection.

F. Precedence of Materials:

1. The Specifications determine the nature and setting of materials and equipment. The Drawings establish quantities, dimensions and details.

2. If interference is encountered, the following installation precedence of materials shall guide the Contractor to determine which trade shall be given the "Right of Way":

   a. Building lines

   b. Structural members

   c. Structural support frames supporting ceiling equipment

   d. Electric tracked vehicle system

   e. Pneumatic trash and linen system

   f. Pneumatic tube system

   g. Soil and drain piping

   h. Vent piping

   i. Supply, return and outside air ductwork

   j. Exhaust ductwork

   k. HVAC water and steam piping

   l. Condensate piping

   m. Fire protection piping

   n. Natural gas piping

   o. Medical/Laboratory gases

   p. Domestic water (cold and hot, softened, treated)

   q. Refrigerant piping

   r. Electrical conduit

3. Coordinate fire suppression, plumbing and HVAC systems with transport systems as required to maintain transport system right-of-way.

3.3 TESTING

A. When any piece of mechanical equipment is operable and it is to the advantage of the Contractor to operate the equipment, Contractor may do so, provided that Contractor properly supervises the operation, and has the Owner's written permission to do so. The warranty period shall, however, not commence until such time as the equipment is operated for the beneficial use of the Owner, or date of Substantial Completion, whichever occurs first.

B. Regardless of whether or not the equipment has or has not been operated, the Contractor shall properly clean the equipment, install clean filter media, properly adjust, and complete all deficiency list items before final acceptance by the Owner. The date of acceptance and performance certification will be the same date.

C. Before the Work is accepted, an authorized representative of the manufacturer of the installed materials and/or equipment shall personally inspect the installation and operation of manufacturer's materials and/or equipment to determine that materials and/or equipment are properly installed and in proper operating order. The qualifications of the manufacturer's representative shall be appropriate to the technical requirements of the installation. The qualifications of the manufacturer's representative shall be submitted to the Owner for approval. The decision of the Owner concerning the appropriateness of the manufacturer's representative shall be final. Testing and checking shall be accomplished during the course of the Work where required by Work being concealed, and at the completion of the Work. In addition, the Contractor shall submit to the Architect/Engineer a signed statement from each manufacturer's representative certifying as follows: "I certify that the materials and/or equipment listed below have been personally inspected by the undersigned authorized manufacturer's representative and is properly installed and operating in accordance with the manufacturer's recommendations."

D. Check inspections shall include piping, equipment, heating, air conditioning, insulation, ventilating equipment, controls, mechanical equipment and such other items hereinafter specified or specifically designated by the Architect/Engineer.

E. The Contractor shall execute, at no additional cost to the Owner, any tests required by the Owner or the National Fire Protection Association, ASTM, etc. Standards listed. The Contractor shall provide all equipment, materials and labor for making such tests. The Owner will pay reasonable amounts of fuel and electrical energy costs for system tests. Fuel and electrical energy costs for system adjustment and tests, which follow Substantial Completion by the Owner, will be borne by the Owner.

F. Notify the Owner's Project Manager and the Architect/Engineer in writing at least seven (7) calendar days prior to each test and prior to other Specification requirements requiring Owner and Architect/Engineer to observe and/or approve tests.

G. All tests shall have pertinent data logged by the Contractor at the time of testing. Data shall include date, time, personnel performing, observing and inspecting, description of the test and extent of system tested, test conditions, test results, specified results an other pertinent data. Data shall be delivered to the Architect/Engineer as specified under "Requirements for Final Acceptance." The Contractor or Contractor's authorized job superintendent shall legibly sign all Test Log entries.

H. Refer to Commissioning Specification Sections for additional Start-up, prefunctional and operational checkout, and for functional performance test procedures.

3.4 TRAINING

A. Operating and Maintenance Manuals and instruction shall be provided as specified under the Division 01 Section entitled "Project Closeout Procedures."

B. Specific training and operating instructions for individual equipment components shall be as specified in the individual Specification Sections.

END OF SECTION 230000

SECTION 230010

COMMON WORK RESULTS FOR MECHANICAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
1. General Motor Characteristics.
2. Polyphase Motors.
3. Polyphase Motors With Additional Requirements.
4. Single-Phase Motors.
5. Motor Starters.
6. Sleeves.
7. Sleeve-seal systems.
8. Grout.
9. Escutcheons.
10. Floor plates.
11. Liquid-in-glass thermometers.
12. Thermowells.
13. Dial-type pressure gages.
14. Gage attachments.
15. Test plugs.

1.3 COORDINATION

A. Coordinate features of motors, installed units, and accessory devices to be compatible with the following:
1. Motor controllers.
2. Torque, speed, and horsepower requirements of the load.
3. Ratings and characteristics of supply circuit and required control sequence.
4. Ambient and environmental conditions of installation location.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 GENERAL MOTOR CHARACTERISTICS

A. Comply with NEMA MG 1 unless otherwise indicated.

B. Duty: Continuous duty at ambient temperature of 40 deg C and at altitude of 3300 feet above sea level.

C. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.

2.2 POLYPHASE MOTORS

A. Description: NEMA MG 1, Design B, medium induction motor.

B. Efficiency: Energy efficient, as defined in NEMA MG 1.

C. Service Factor: 1.15.

D. Multispeed Motors: Variable torque.
1. For motors with 2:1 speed ratio, consequent pole, single winding.
2. For motors with other than 2:1 speed ratio, separate winding for each speed.

E. Rotor: Random-wound, squirrel cage.

F. Bearings: Regreasable, shielded, antifriction ball bearings suitable for radial and thrust loading.

G. Temperature Rise: Match insulation rating.

H. Insulation: Class F.

I. Code Letter Designation:
1. Motors 15 HP and Larger: NEMA starting Code F or Code G.
2. Motors Smaller than 15 HP: Manufacturer's standard starting characteristic.

J. Enclosure Material: Cast iron for motor frame sizes 324T and larger; rolled steel for motor frame sizes smaller than 324T.

2.3 POLYPHASE MOTORS WITH ADDITIONAL REQUIREMENTS

A. Motors Used with Variable Frequency Controllers: Ratings, characteristics, and features coordinated with and approved by controller manufacturer.
1. Windings: Copper magnet wire with moisture-resistant insulation varnish, designed and tested to resist transient spikes, high frequencies, and short time rise pulses produced by pulse-width modulated inverters.
2. Energy- and Premium-Efficient Motors: Class B temperature rise; Class F insulation.
3. Inverter-Duty Motors: Class F temperature rise; Class H insulation.
4. Thermal Protection: Comply with NEMA MG 1 requirements for thermally protected motors.

2.4 SINGLE-PHASE MOTORS

A. Motors larger than 1/20 hp shall be one of the following, to suit starting torque and requirements of specific motor application:
1. Capacitor start, capacitor run.

B. Multispeed Motors: Variable-torque, permanent-split-capacitor type.

C. Bearings: Prelubricated, antifriction ball bearings or sleeve bearings suitable for radial and thrust loading.

D. Motors 1/20 HP and Smaller: Shaded-pole type.

E. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device shall automatically reset when motor temperature returns to normal range.

2.5 MOTOR STARTERS

A. Motor Starter Characteristics: Comply with NEMA Standards and NEC. Provide NEMA Type 1, general purpose enclosures, or Type 3R, weatherproof enclosures, with padlock ears and with frames and supports for mounting on wall or panel. Provide the type and size of starter for the applicable protection and startup condition, refer to individual equipment for basic load requirements.

B. Magnetic Starters: Provide NEMA rated magnetic starters for motors 1/2 HP and larger and for smaller motors where interlock or automatic operation is required. Magnetic motor starters shall not be smaller than size 1. Equip motor starters with the following:
1. Integral disconnecting means to open all phase conductors simultaneously.
2. Instantaneous trip motor circuit protector, or other overcurrent protective device as noted.
3. Red "run" and green "stop" pilot lights, and "Hand-Off-Auto" switch mounted on the cover.
4. For two-speed motors provide "Fast-Slow-Off-Auto" switch and red Fast, amber Slow and green Stop pilot lights.
5. Trip free ambient compensated thermal overload relays in each phase with externally operated manual reset.
6. Individual 120 VAC control transformer for each motor circuit. Transformer shall be provided with primary and secondary fusing, and shall be sized for the control scheme indicated.
7. Under voltage release or protection (phase failure).
8. Provide auxiliary relays as required for the control scheme indicated including push button stations, pilot lights, DDC monitoring and control, etc. Provide one additional unused N.O. and one additional unused N.C. contact beyond what is required for the indicated control scheme.

C. Manual Starter: Provide manual motor starters having motor overload protection and pilot light for all single phase fractional horsepower motors, unless noted otherwise. Provide extra switch positions and pilot lights for multi-speed motors.

2.6 SLEEVES

A. Galvanized-Steel-Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, with plain ends.

2.7 SLEEVE-SEAL SYSTEMS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Metraflex Company (The).
2. Pipeline Seal and Insulator, Inc.

B. Description: Modular sealing-element unit, designed for field assembly, for filling annular space between piping and sleeve.
   1. Sealing Elements: EPDM-rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
   2. Pressure Plates: Stainless steel.
   3. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements.

2.8 GROUT

A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

B. Characteristics: Nonshrink; recommended for interior and exterior applications.

C. Design Mix: 5000-psi, 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

2.9 ESCUTCHEONS

A. One-Piece, Cast-Brass Type: With polished, chrome-plated finish and setscrew fastener.

B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with chrome-plated finish and spring-clip fasteners.

C. One-Piece, Stamped-Steel Type: With chrome-plated finish and spring-clip fasteners.

D. Split-Casting Brass Type: With polished, chrome-plated finish and with concealed hinge and setscrew.

E. Split-Plate, Stamped-Steel Type: With chrome-plated finish, concealed hinge, and spring-clip fasteners.

2.10 FLOOR PLATES

A. One-Piece Floor Plates: Cast-iron flange with holes for fasteners.

2.11 LIQUID-IN-GLASS THERMOMETERS

A. Metal-Case, Industrial-Style, Liquid-in-Glass Thermometers:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Weiss Instruments, Inc.
      b. Winters Instruments - U.S.
   2. Standard: ASME B40.200.
   3. Case: Cast aluminum; 9-inch nominal size unless otherwise indicated.
   4. Case Form: Adjustable angle unless otherwise indicated.
   5. Tube: Glass with magnifying lens and blue or red organic liquid.
   6. Tube Background: Nonreflective aluminum with permanently etched scale markings graduated in deg F.
   7. Window: Glass.

8. Stem: Aluminum and of length to suit installation.
   a. Design for Air-Duct Installation: With ventilated shroud
   b. Design for Thermowell Installation: Bare stem.
9. Connector: 1-1/4 inches, with ASME B1.1 screw threads.
10. Accuracy: Plus or minus 1 percent of scale range or one scale division, to a maximum of 1.5 percent of scale range.

2.12 DUCT-THERMOMETER MOUNTING BRACKETS

A. Description: Flanged bracket with screw holes, for attachment to air duct and made to hold thermometer stem.

2.13 THERMOWELLS

A. Thermowells:

1. Standard: ASME B40.200.
2. Description: Pressure-tight, socket-type fitting made for insertion into piping tee fitting.
3. Material for Use with Copper Tubing: CNR or CUNI.
4. Material for Use with Steel Piping: CRES or CSA.
5. Type: Stepped shank unless straight or tapered shank is indicated.
6. External Threads: NPS 1/2, NPS 3/4, or NPS 1, ASME B1.20.1 pipe threads.
7. Internal Threads: 1/2, 3/4, and 1 inch , with ASME B1.1 screw threads.
8. Bore: Diameter required to match thermometer bulb or stem.
9. Insertion Length: Length required to match thermometer bulb or stem.
10. Lagging Extension: Include on thermowells for insulated piping and tubing.
11. Bushings: For converting size of thermowell's internal screw thread to size of thermometer connection.

B. Heat-Transfer Medium: Mixture of graphite and glycerin.

2.14 PRESSURE GAGES

A. Direct-Mounted, Metal-Case, Dial-Type Pressure Gages:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Ashcroft Inc.
   b. Weiss Instruments, Inc.
   c. Winters Instruments - U.S.
2. Standard: ASME B40.100.
3. Case: Liquid-filled type(s); cast aluminum or drawn steel; 4-1/2-inch nominal diameter.
4. Pressure-Element Assembly: Bourdon tube unless otherwise indicated.
5. Pressure Connection: Brass, with NPS 1/4, ASME B1.20.1 pipe threads and bottom-outlet type unless back-outlet type is indicated.
6. Movement: Mechanical, with link to pressure element and connection to pointer.
7. Dial: Nonreflective aluminum with permanently etched scale markings graduated in psi.
8. Pointer: Dark-colored metal.
9. Window: Glass.
10. Ring: Stainless steel.
11. Accuracy: Grade A, plus or minus 1 percent of middle half of scale range.

2.15 GAGE ATTACHMENTS

A. Snubbers: ASME B40.100, brass; with NPS 1/4, ASME B1.20.1 pipe threads and piston-type surge-dampening device. Include extension for use on insulated piping.

B. Valves: Brass ball, with NPS 1/4, ASME B1.20.1 pipe threads.

2.16 TEST PLUGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Flow Design, Inc.
2. Weiss Instruments, Inc.

B. Description: Test-station fitting made for insertion into piping tee fitting.

C. Body: Brass or stainless steel with core inserts and gasketed and threaded cap. Include extended stem on units to be installed in insulated piping.

D. Thread Size: NPS 1/4 or NPS 1/2, ASME B1.20.1 pipe thread.

E. Minimum Pressure and Temperature Rating: 500 psig at 200 deg F.

F. Core Inserts: EPDM self-sealing rubber.

PART 3 - EXECUTION

3.1 MOTOR INSTALLATION

A. Motors and starters provided by equipment suppliers or mechanical contractor. Where indicated variable frequency drives to be provided by the controls contractor.

B. Installation of starters and variable frequency drives by electrical contractor.

3.2 SLEEVE INSTALLATION

A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.

B. For sleeves that will have sleeve-seal system installed, select sleeves of size large enough to provide 1-inch annular clear space between piping and concrete slabs and walls.
1. Sleeves are not required for core-drilled holes.

C. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.
1. Cut sleeves to length for mounting flush with both surfaces.
a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level.
2. Using grout, seal the space outside of sleeves in slabs and walls without sleeve-seal system.

D. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified in Section 07 8413 "Penetration Firestopping."

3.3 SLEEVE-SEAL-SYSTEM INSTALLATION

A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at service piping entries into building.

B. Select type, size, and number of sealing elements required for piping material and size and for sleeve ID or hole size. Position piping in center of sleeve. Center piping in penetration, assemble sleeve-seal system components, and install in annular space between piping and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make a watertight seal.

3.4 SLEEVE AND SLEEVE-SEAL SCHEDULE

A. Use sleeves and sleeve seals for the following piping-penetration applications:
1. Exterior Concrete Walls above Grade:
a. Piping Smaller Than NPS 6: Galvanized-steel-pipe sleeves with sleeve-seal system.
1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.
b. Piping NPS 6 and Larger: Galvanized-steel-pipe sleeves with sleeve-seal system.
1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.
2. Exterior Concrete Walls below Grade:
a. Piping Smaller Than NPS 6: Galvanized-steel-pipe sleeves with sleeve-seal system.
1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.
b. Piping NPS 6 and Larger: Galvanized-steel-pipe sleeves with sleeve-seal system.
1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.
3. Concrete Slabs-on-Grade:
a. Piping Smaller Than NPS 6: Galvanized-steel-pipe sleeves with sleeve-seal system.
1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.
b. Piping NPS 6 and Larger: Galvanized-steel-pipe sleeves with sleeve-seal system.
1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.
4. Concrete Slabs above Grade:
a. Piping Smaller Than NPS 6: Galvanized-steel-pipe sleeves.
b. Piping NPS 6 and Larger: Galvanized-steel-pipe sleeves.

3.5 ESCUTCHEON AND FLOOR PLATE INSTALLATION

A. Install escutcheons for piping penetrations of walls, ceilings, and finished floors.

B. Install escutcheons with ID to closely fit around pipe, tube, and insulation of insulated piping and with OD that completely covers opening.

1. Escutcheons for New Piping:

a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.

b. Insulated Piping: One-piece, stamped-steel type or split-plate, stamped-steel type with concealed hinge.
c. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, cast-brass or split-casting brass type with polished, chrome-plated finish.
d. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece, cast-brass or split-casting brass type with polished, chrome-plated finish.

C. Install floor plates for piping penetrations of equipment-room floors.

D. Install floor plates with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.

1. New Piping: One-piece, floor-plate type.

3.6 METER AND GAGE INSTALLATION

A. Install thermowells with socket extending a minimum of 2 inches into fluid or one-third of pipe diameter to center of pipe and in vertical position in piping tees.

B. Install thermowells of sizes required to match thermometer connectors. Include bushings if required to match sizes.

C. Install thermowells with extension on insulated piping.

D. Fill thermowells with heat-transfer medium.

E. Install direct-mounted thermometers in thermowells and adjust vertical and tilted positions.

F. Install remote-mounted thermometer bulbs in thermowells and install cases on panels; connect cases with tubing and support tubing to prevent kinks. Use minimum tubing length.

G. Install duct-thermometer mounting brackets in walls of ducts. Attach to duct with screws.

H. Install direct-mounted pressure gages in piping tees with pressure gage located on pipe at the most readable position.

I. Install valve and snubber in piping for each pressure gage for fluids (except steam).

J. Install valve and syphon fitting in piping for each pressure gage for steam.

K. Install test plugs in piping tees.

L. Install flow indicators in piping systems in accessible positions for easy viewing.

M. Install permanent indicators on walls or brackets in accessible and readable positions.

N. Install connection fittings in accessible locations for attachment to portable indicators.

O. Install thermometers in the following locations:
1. As indicated by piping diagrams and details.
2. Inlets and outlets of each domestic water heat exchanger.

P. Install pressure gages in the following locations:
1. As indicated by piping diagrams and details.
2. Discharge of each pressure-reducing valve.
3. Building domestic water service entrance into building.
4. Suction and discharge of each domestic water pump.

3.7 CONNECTIONS FOR METERS AND GAGES

A. Install meters and gages adjacent to machines and equipment to allow service and maintenance of meters, gages, machines, and equipment.

3.8 ADJUSTING METERS AND GAGES

A. After installation, calibrate meters according to manufacturer's written instructions.

B. Adjust faces of meters and gages to proper angle for best visibility.

3.9 THERMOMETER SCALE-RANGE SCHEDULE

A. Scale Range for Domestic Cold-Water Piping: 0 to 100 deg F.

B. Scale Range for Chilled Water Piping: 0 to 100 deg F.

C. Scale Range for Condenser Water Piping: 0 to 120 deg F.

D. Scale Range for Domestic Hot-Water Piping: 0 to 250 deg F.

E. Scale Range for Heating Water Piping: 0 to 200 deg F.

3.10 PRESSURE-GAGE SCALE-RANGE SCHEDULE

A. Scale Range for Domestic Water Service Piping: 0 to 100 psi.

B. Scale Range for Domestic Hot Water Piping: 0 to 100 psi.

C. Scale Range for Chilled Water Piping: 0 to 150 psi.

D. Scale Range for Heating Water Piping: 0 to 150 psi.

E. Scale Range for Steam Piping: 0 to 150 psi.

END OF SECTION 230010

SECTION 23 0516

EXPANSION FITTINGS AND LOOPS FOR HVAC PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
1. Flexible, ball-joint, packed expansion joints.
2. Slip-joint packed expansion joints.
3. Flexible-hose packless expansion joints.
4. Metal-bellows packless expansion joints.
5. Pipe loops and swing connections.
6. Alignment guides and anchors.

1.3 PERFORMANCE REQUIREMENTS

A. Compatibility: Products shall be suitable for piping service fluids, materials, working pressures, and temperatures.

B. Capability: Products to absorb 200 percent of maximum axial movement between anchors.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.5 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For expansion joints to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to the following:
1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. ASME Boiler and Pressure Vessel Code: Section IX.

PART 2 - PRODUCTS

2.1 PACKED EXPANSION JOINTS

A. Flexible, Ball-Joint, Packed Expansion Joints:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Advanced Thermal Systems, Inc.
   b. Hyspan Precision Products, Inc.
2. Standards: ASME Boiler and Pressure Vessel Code: Section II, "Materials"; and ASME B31.9, "Building Services Piping," for materials and design of pressure-containing parts and bolting.
3. Material: Carbon-steel assembly with asbestos-free composition packing.
4. Design: For 360-degree rotation and angular deflection.
5. Minimum Pressure Rating: 250 psig at 400 deg F.
6. Angular Deflection for NPS 6 and Smaller: 30 degree minimum.
7. Angular Deflection for NPS 8 and Larger: 15 degree minimum.
8. End Connections for NPS 2 and Smaller: Threaded.
9. End Connections for NPS 2-1/2 and Larger: Flanged.

B. Slip-Joint Packed Expansion Joints:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Advanced Thermal Systems, Inc.
   b. Hyspan Precision Products, Inc.
2. Standard: ASTM F 1007.
3. Material: Carbon steel with asbestos-free PTFE packing.
4. Design: With internal guide and injection device for repacking under pressure. Include drip connection if used for steam piping.
5. Configuration: Single joint with base and double joint with base class(es) unless otherwise indicated.
6. End Connections: Flanged or weld ends to match piping system.

2.2 PACKLESS EXPANSION JOINTS

A. Flexible-Hose Packless Expansion Joints:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Flex-Hose Co., Inc.
   b. Flex Pression Ltd.
   c. Metraflex, Inc.
2. Description: Manufactured assembly with inlet and outlet elbow fittings and two flexible-metal-hose legs joined by long-radius, 180-degree return bend or center section of flexible hose.
3. Flexible Hose: Corrugated-metal inner hoses and braided outer sheaths.
4. Expansion Joints for Copper Tubing NPS 2 and Smaller: Copper-alloy fittings with solder-joint end connections.
   a. Bronze hoses and double-braid bronze sheaths with 700 psig at 70 deg F and 500 psig at 450 deg F ratings.
5. Expansion Joints for Copper Tubing NPS 2-1/2 to NPS 4: Copper-alloy fittings with threaded end connections.
   a. Stainless-steel hoses and double-braid, stainless-steel sheaths with 420 psig at 70 deg F and 315 psig at 450 deg F ratings.
6. Expansion Joints for Steel Piping NPS 2 and Smaller: Carbon-steel fittings with threaded end connections.
   a. Stainless-steel hoses and double-braid, stainless-steel sheaths with 700 psig at 70 deg F and 515 psig at 600 deg F ratings.

7. Expansion Joints for Steel Piping NPS 2-1/2 to NPS 6: Carbon-steel fittings with flanged or weld end connections.
   a. Stainless-steel hoses and double-braid, stainless-steel sheaths with 275 psig at 70 deg F and 200 psig at 600 deg F ratings.
8. Expansion Joints for Steel Piping NPS 8 to NPS 12: Carbon-steel fittings with flanged or weld end connections.
   a. Stainless-steel hoses and double-braid, stainless-steel sheaths with 165 psig at 70 deg F and 120 psig at 600 deg F ratings.
9. Expansion Joints for Steel Piping NPS 14 and Larger: Carbon-steel fittings with flanged or weld end connections.
   a. Stainless-steel hoses and double-braid, stainless-steel sheaths with 165 psig at 70 deg F and 120 psig at 600 deg F ratings.

B. Metal-Bellows Packless Expansion Joints:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Hyspan Precision Products, Inc.
   b. U.S. Bellows, Inc.
2. Standards: ASTM F 1120 and EJMA's "Standards of the Expansion Joint Manufacturers Association, Inc."
3. Type: Circular, corrugated bellows with external tie rods.
4. Minimum Pressure Rating: 175 psig unless otherwise indicated.
5. Configuration: Single joint with base and double joint with base class(es) unless otherwise indicated.
6. Expansion Joints for Steel Piping: Single- or multi-ply stainless-steel bellows, steel pipe ends, and carbon-steel shroud.
   a. End Connections for Steel Pipe NPS 2-1/2 and Larger: Flanged or Weld.

2.3 ALIGNMENT GUIDES AND ANCHORS

A. Alignment Guides:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Hyspan Precision Products, Inc.
   b. U.S. Bellows, Inc.
2. Description: Steel, factory-fabricated alignment guide, with bolted two-section outer cylinder and base for attaching to structure; with two-section guiding spider for bolting to pipe.

B. Anchor Materials:
1. Steel Shapes and Plates: ASTM A 36/A 36M.
2. Bolts and Nuts: ASME B18.10 or ASTM A 183, steel hex head.
3. Washers: ASTM F 844, steel, plain, flat washers.
4. Mechanical Fasteners: Insert-wedge-type stud with expansion plug anchor for use in hardened portland cement concrete, with tension and shear capacities appropriate for application.
   a. Stud: Threaded, zinc-coated carbon steel.
   b. Expansion Plug: Zinc-coated steel.
   c. Washer and Nut: Zinc-coated steel.
5. Chemical Fasteners: Insert-type-stud, bonding-system anchor for use with hardened portland cement concrete, with tension and shear capacities appropriate for application.

a. Bonding Material: ASTM C 881/C 881M, Type IV, Grade 3, two-component epoxy resin suitable for surface temperature of hardened concrete where fastener is to be installed.
b. Stud: ASTM A 307, zinc-coated carbon steel with continuous thread on stud unless otherwise indicated.
c. Washer and Nut: Zinc-coated steel.

PART 3 - EXECUTION

3.1 EXPANSION-JOINT INSTALLATION

A. Install expansion joints of sizes matching sizes of piping in which they are installed.

B. Install packed-type expansion joints with packing suitable for fluid service.

C. Install metal-bellows expansion joints according to EJMA's "Standards of the Expansion Joint Manufacturers Association, Inc."

D. Install rubber packless expansion joints according to FSA-NMEJ-702.

E. Install grooved-joint expansion joints to grooved-end steel piping

3.2 PIPE LOOP AND SWING CONNECTION INSTALLATION

A. Install pipe loops cold-sprung in tension or compression as required to partly absorb tension or compression produced during anticipated change in temperature.

B. Connect risers and branch connections to mains with at least five pipe fittings including tee in main.

C. Connect risers and branch connections to terminal units with at least four pipe fittings including tee in riser.

D. Connect mains and branch connections to terminal units with at least four pipe fittings including tee in main.

3.3 ALIGNMENT-GUIDE AND ANCHOR INSTALLATION

A. Install alignment guides to guide expansion and to avoid end-loading and torsional stress.

B. Install one guide(s) on each side of pipe expansion fittings and loops. Install guides nearest to expansion joint not more than four pipe diameters from expansion joint.

C. Attach guides to pipe and secure guides to building structure.

D. Install anchors at locations to prevent stresses from exceeding those permitted by ASME B31.9 and to prevent transfer of loading and stresses to connected equipment.

E. Anchor Attachments:
1. Anchor Attachment to Steel Pipe: Attach by welding. Comply with ASME B31.9 and ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

2. Anchor Attachment to Copper Tubing: Attach with pipe hangers. Use MSS SP-69, Type 24, U-bolts bolted to anchor.

F. Fabricate and install steel anchors by welding steel shapes, plates, and bars. Comply with ASME B31.9 and AWS D1.1/D1.1M.
1. Anchor Attachment to Steel Structural Members: Attach by welding.
2. Anchor Attachment to Concrete Structural Members: Attach by fasteners. Follow fastener manufacturer's written instructions.

G. Use grout to form flat bearing surfaces for guides and anchors attached to concrete.

END OF SECTION 23 0516

SECTION 23 05 29

HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Metal pipe hangers and supports.
2. Trapeze pipe hangers.
3. Metal framing systems.
4. Thermal-hanger shield inserts.
5. Fastener systems.
6. Pipe stands.
7. Equipment supports.

B. Related Sections:

1. Division 05 Section "Metal Fabrications" for structural-steel shapes and plates for trapeze hangers for pipe and equipment supports.
2. Division 23 Section "Expansion Fittings and Loops for HVAC Piping" for pipe guides and anchors.
3. Division 23 Section "Vibration and Seismic Controls for HVAC Piping and Equipment" for vibration isolation devices.
4. Division 23 Section(s) "Metal Ducts" for duct hangers and supports.

1.3 DEFINITIONS

A. MSS: Manufacturers Standardization Society of The Valve and Fittings Industry Inc.

1.4 PERFORMANCE REQUIREMENTS

A. Structural Performance: Hangers and supports for HVAC piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.

1. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.
2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
3. Design seismic-restraint hangers and supports for piping and equipment.

1.5 SUBMITTALS

A. Product Data: For each type of product indicated.

1.6 QUALITY ASSURANCE

A. Structural Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

PART 2 - PRODUCTS

2.1 METAL PIPE HANGERS AND SUPPORTS

A. Carbon-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Galvanized Metallic Coatings: Pregalvanized or hot dipped.
3. Nonmetallic Coatings: Plastic coating, jacket, or liner.
4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
5. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.

B. Copper Pipe Hangers:

1. Description: MSS SP-58, Types 1 through 58, copper-coated-steel, factory-fabricated components.
2. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel.

2.2 TRAPEZE PIPE HANGERS

A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural carbon-steel shapes with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts.

2.3 METAL FRAMING SYSTEMS

A. MFMA Manufacturer Metal Framing Systems:

1. Description: Shop- or field-fabricated pipe-support assembly for supporting multiple parallel pipes.
2. Standard: MFMA-4.
3. Channels: Continuous slotted steel channel with inturned lips.
4. Channel Nuts: Formed or stamped steel nuts or other devices designed to fit into channel slot and, when tightened, prevent slipping along channel.
5. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.
6. Metallic Coating: Hot-dipped galvanized.
7. Paint Coating: Epoxy.
8. Plastic Coating: `` Polyurethane..

2.4 THERMAL-HANGER SHIELD INSERTS

A. Insulation-Insert Material for Cold Piping: ASTM C 552, Type II cellular glass with 100-psig or ASTM C 591, Type VI, Grade 1 polyisocyanurate with 125-psig minimum compressive strength and vapor barrier.

B. Insulation-Insert Material for Hot Piping: ASTM C 552, Type II cellular glass with 100-psig or ASTM C 591, Type VI, Grade 1 polyisocyanurate with 125-psig minimum compressive strength.

C. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.

D. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.

E. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.5 FASTENER SYSTEMS

A. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel anchors, for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

2.6 PIPE STANDS

A. General Requirements for Pipe Stands: Shop- or field-fabricated assemblies made of manufactured corrosion-resistant components to support roof-mounted piping.

B. Compact Pipe Stand: One-piece plastic unit with integral-rod roller, pipe clamps, or V-shaped cradle to support pipe, for roof installation without membrane penetration.

C. High-Type, Single-Pipe Stand:

1. Description: Assembly of base, vertical and horizontal members, and pipe support, for roof installation without membrane penetration.
2. Base: Plastic.
3. Vertical Members: Two or more cadmium-plated-steel or stainless-steel, continuous-thread rods.
4. Horizontal Member: Cadmium-plated-steel or stainless-steel rod with plastic or stainless-steel, roller-type pipe support.

2.7 EQUIPMENT SUPPORTS

A. Description: Welded, shop- or field-fabricated equipment support made from structural carbon-steel shapes.

2.8 MISCELLANEOUS MATERIALS

A. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.

B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.

1. Properties: Nonstaining, noncorrosive, and nongaseous.
2. Design Mix: 5000-psi , 28-day compressive strength.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT INSTALLATION

A. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.

B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.

1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.
2. Field fabricate from ASTM A 36/A 36M, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.

C. Metal Framing System Installation: Arrange for grouping of parallel runs of piping, and support together on field-assembled metal framing systems.

D. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.

E. Fastener System Installation:

1. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

F. Pipe Stand Installation:

1. Pipe Stand Types except Curb-Mounted Type: Assemble components and mount on smooth roof surface. Do not penetrate roof membrane.

G. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.

H. Equipment Support Installation: Fabricate from welded-structural-steel shapes.

I. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

J. Install lateral bracing with pipe hangers and supports to prevent swaying.

K. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

L. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

M. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.

N. Insulated Piping:

1. Attach clamps and spacers to piping.

   a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
   b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
   c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.

2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.

   a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.

3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.

   a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.

4. Shield Dimensions for Pipe: Not less than the following:

   a. NPS 1/4 to NPS 3-1/2 : 12 inches long and 0.048 inch thick.

   b. NPS 4 : 12 inches long and 0.06 inch thick.

   c. NPS 5 and NPS 6 : 18 inches long and 0.06 inch thick.

   d. NPS 8 to NPS 14 : 24 inches long and 0.075 inch thick.

   e. NPS 16 to NPS 24 : 24 inches long and 0.105 inch thick.

5. Pipes NPS 8 and Larger: Include wood or reinforced calcium-silicate-insulation inserts of length at least as long as protective shield.
6. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.2 EQUIPMENT SUPPORTS

A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.

B. Grouting: Place grout under supports for equipment and make bearing surface smooth.

C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.3 METAL FABRICATIONS

A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.

B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and 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. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.4 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.5 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils .

B. Touchup: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Division 09 painting Sections.

C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

3.6 HANGER AND SUPPORT SCHEDULE

A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.

B. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in piping system Sections.

C. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

D. Use carbon-steel pipe hangers and supports metal trapeze pipe hangers and metal framing systems and attachments for general service applications.

E. Use copper-plated pipe hangers and copper or stainless-steel attachments for copper piping and tubing.

F. Use padded hangers for piping that is subject to scratching.

G. Use thermal-hanger shield inserts for insulated piping and tubing.

H. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes NPS 1/2 to NPS 30 .
2. Adjustable, Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8 .
3. Pipe Stanchion Saddles (MSS Type 37): For support of pipes NPS 4 to NPS 36 , with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate, and with U-bolt to retain pipe.
4. Single-Pipe Rolls (MSS Type 41): For suspension of pipes NPS 1 to NPS 30 , from two rods if longitudinal movement caused by expansion and contraction might occur.
5. Adjustable Roller Hangers (MSS Type 43): For suspension of pipes NPS 2-1/2 to NPS 24 , from single rod if horizontal movement caused by expansion and contraction might occur.
6. Complete Pipe Rolls (MSS Type 44): For support of pipes NPS 2 to NPS 42 if longitudinal movement caused by expansion and contraction might occur but vertical adjustment is not necessary.

I. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers NPS 3/4 to NPS 24 if longer ends are required for riser clamps.

J. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.
3. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.
4. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.

K. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction, to attach to top flange of structural shape.
3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.

4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
5. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
6. C-Clamps (MSS Type 23): For structural shapes.
7. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
8. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
9. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.
10. Welded-Steel Brackets: For support of pipes from below or for suspending from above by using clip and rod. Use one of the following for indicated loads:

    a. Light (MSS Type 31): 750 lb .
    b. Medium (MSS Type 32): 1500 lb .
    c. Heavy (MSS Type 33): 3000 lb .

L. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.

M. Comply with MSS SP-69 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.

N. Comply with MFMA-103 for metal framing system selections and applications that are not specified in piping system Sections.

O. Use mechanical-expansion anchors instead of building attachments where required in concrete construction.

END OF SECTION 23 05 29

SECTION 23 05 53

IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Equipment labels.
2. Warning signs and labels.
3. Pipe labels.
4. Duct labels.
5. Stencils.
6. Valve tags.
7. Warning tags.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.

1.4 COORDINATION

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

B. Coordinate installation of identifying devices with locations of access panels and doors.

C. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

A. Plastic Labels for Equipment:

1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/16 inch thick, and having predrilled holes for attachment hardware.
2. Letter Color: White.
3. Background Color: Black.
4. Maximum Temperature: Able to withstand temperatures up to 160 deg F .

5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch .
6. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches , 1/2 inch for viewing distances up to 72 inches , and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
7. Fasteners: Stainless-steel rivets or self-tapping screws.
8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

B. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified.

C. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch bond paper. Tabulate equipment identification number and identify Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

2.2 WARNING SIGNS AND LABELS

A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/16 inch thick, and having predrilled holes for attachment hardware.

B. Letter Color: White.

C. Background Color: Red.

D. Maximum Temperature: Able to withstand temperatures up to 160 deg F .

E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch .

F. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches , 1/2 inch for viewing distances up to 72 inches , and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

G. Fasteners: Stainless-steel rivets or self-tapping screws.

H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

I. Label Content: Include caution and warning information, plus emergency notification instructions.

2.3 PIPE LABELS

A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.

B. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to cover full circumference of pipe and to attach to pipe without fasteners or adhesive.

C. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.

1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions, or as separate unit on each pipe label to indicate flow direction.
2. Lettering Size: At least 1-1/2 inches .

2.4 DUCT LABELS

A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/16 inch thick, and having predrilled holes for attachment hardware.

B. Letter Color: White.

C. Background Color: Black.

D. Maximum Temperature: Able to withstand temperatures up to 160 deg F .

E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch .

F. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches , 1/2 inch for viewing distances up to 72 inches , and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

G. Fasteners: Stainless-steel rivets or self-tapping screws.

H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

I. Duct Label Contents: Include identification of duct service using same designations or abbreviations as used on Drawings, duct size, and an arrow indicating flow direction.

1. Flow-Direction Arrows: Integral with duct system service lettering to accommodate both directions, or as separate unit on each duct label to indicate flow direction.
2. Lettering Size: At least 1-1/2 inches .

2.5 STENCILS

A. Stencils: Prepared with letter sizes according to ASME A13.1 for piping; minimum letter height of 1-1/4 inches for ducts; and minimum letter height of 3/4 inch for access panel and door labels, equipment labels, and similar operational instructions.

1. Stencil Paint: Exterior, gloss, acrylic enamel black unless otherwise indicated. Paint may be in pressurized spray-can form.
2. Identification Paint: Exterior, acrylic enamel in colors according to ASME A13.1 unless otherwise indicated.

2.6 VALVE TAGS

A. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers.

1. Tag Material: Brass, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
2. Fasteners: Brass wire-link or beaded chain; or S-hook.

B. Valve Schedules: For each piping system, on 8-1/2-by-11-inch bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.

1. Valve-tag schedule shall be included in operation and maintenance data.

2.7 WARNING TAGS

A. Warning Tags: Preprinted or partially preprinted, accident-prevention tags, of plasticized card stock with matte finish suitable for writing.

1. Size: Approximately 4 by 7 inches.
2. Fasteners: Brass grommet and wire.
3. Nomenclature: Large-size primary caption such as "DANGER," "CAUTION," or "DO NOT OPERATE."
4. Color: Yellow background with black lettering.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 EQUIPMENT LABEL INSTALLATION

A. Install or permanently fasten labels on each major item of mechanical equipment.

B. Locate equipment labels where accessible and visible.

3.3 PIPE LABEL INSTALLATION

A. Piping Color-Coding: Painting of piping is specified in Division 09 Section Section "Interior Painting."

B. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:

1. Near each valve and control device.
2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
4. At access doors, manholes, and similar access points that permit view of concealed piping.
5. Near major equipment items and other points of origination and termination.

6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.

C. Pipe Label Color Schedule:

1. Chilled-Water Piping:

   a. Background Color: White.
   b. Letter Color: Black.

2. Condenser-Water Piping:

   a. Background Color: White.
   b. Letter Color: Black.

3. Heating Water Piping:

   a. Background Color: White.
   b. Letter Color: Black.

4. Steam and Steam-Condensate Piping:

   a. Background Color: White.
   b. Letter Color: Black.

3.4 VALVE-TAG INSTALLATION

A. Install tags on valves and control devices in piping systems, except check valves; valves within factory-fabricated equipment units; shutoff valves; faucets; convenience and lawn-watering hose connections; and HVAC terminal devices and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.

B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following subparagraphs:

1. Valve-Tag Size and Shape:

   a. Chilled Water: 1-1/2 inches, round square Insert shape.
   b. Condenser Water: 1-1/2 inches, round.
   c. Hot Water: 1-1/2 inches, round.
   d. Gas: 1-1/2 inches, round.

2. Valve-Tag Color:

   a. Chilled Water: Natural.
   b. Condenser Water: Natural.
   c. Hot Water: Natural.
   d. Gas: Natural.

3. Letter Color:

a. Chilled Water: Black.
b. Condenser Water: Black.
c. Hot Water: Black.
d. Gas: Black.

3.5 WARNING-TAG INSTALLATION

A. Write required message on, and attach warning tags to, equipment and other items where required.

END OF SECTION 23 05 53

SECTION 23 0593

TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Balancing Air Systems:

   a. Constant-air -volume systems.
   b. Variable-air-volume systems.

2. Balancing Hydronic Piping Systems:

   a. Constant-flow hydronic systems.
   b. Primary-secondary hydronic systems.

1.3 DEFINITIONS

A. AABC: Associated Air Balance Council.

B. NEBB: National Environmental Balancing Bureau.

C. TAB: Testing, adjusting, and balancing.

D. TABB: Testing, Adjusting, and Balancing Bureau.

E. TAB Specialist: An entity engaged to perform TAB Work.

1.4 SUBMITTALS

A. Certified TAB reports.

B. Instrument calibration reports, to include the following:

1. Instrument type and make.
2. Serial number.
3. Application.
4. Dates of use.
5. Dates of calibration.

1.5 QUALITY ASSURANCE

A. TAB Contractor Qualifications: Engage a TAB entity certified by NEBB and in good standing with O.E.B.B.

1. TAB Field Supervisor: Employee of the TAB contractor and certified by NEBB.
2. TAB Technician: Employee of the TAB contractor and who is certified by NEBB.

B. TAB Conference: Meet with Architect, Owner, and Commissioning Authority on approval of the TAB strategies and procedures plan to develop a mutual understanding of the details. Require the participation of the TAB field supervisor and technicians. Provide seven days' advance notice of scheduled meeting time and location.

1. Agenda Items:

a. The Contract Documents examination report.
b. The TAB plan.
c. Coordination and cooperation of trades and subcontractors.
d. Coordination of documentation and communication flow.

C. Certify TAB field data reports and perform the following:

1. Review field data reports to validate accuracy of data and to prepare certified TAB reports.
2. Certify that the TAB team complied with the approved TAB plan and the procedures specified and referenced in this Specification.

D. TAB Report Forms: Use standard NEBB forms.

E. Instrumentation Type, Quantity, Accuracy, and Calibration: As described in ASHRAE 111, Section 5, "Instrumentation."

1.6 PROJECT CONDITIONS

A. Full Owner Occupancy: Owner will occupy the site and existing building during entire TAB period. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.

B. Partial Owner Occupancy: Owner may occupy completed areas of building before Substantial Completion. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.

1.7 COORDINATION

A. Notice: Provide seven days' advance notice for each test. Include scheduled test dates and times.

B. Perform TAB after leakage and pressure tests on air and water distribution systems have been satisfactorily completed.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 TAB SPECIALISTS

A. Subject to compliance with requirements, available TAB contractors that may be engaged include, but are not limited to, the following:

3.2 EXAMINATION

A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems' designs that may preclude proper TAB of systems and equipment.

B. Examine systems for installed balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Verify that locations of these balancing devices are accessible.

C. Examine the approved submittals for HVAC systems and equipment.

D. Examine design data including HVAC system descriptions, statements of design assumptions for environmental conditions and systems' output, and statements of philosophies and assumptions about HVAC system and equipment controls.

E. Examine ceiling plenums and underfloor air plenums used for supply, return, or relief air to verify that they meet the leakage class of connected ducts as specified in Division 23 Section "Metal Ducts" and are properly separated from adjacent areas. Verify that penetrations in plenum walls are sealed and fire-stopped if required.

F. Examine equipment performance data including fan and pump curves.

1. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.
2. Calculate system-effect factors to reduce performance ratings of HVAC equipment when installed under conditions different from the conditions used to rate equipment performance. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," or in SMACNA's "HVAC Systems - Duct Design." Compare results with the design data and installed conditions.

G. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.

H. Examine test reports specified in individual system and equipment Sections.

I. Examine HVAC equipment and filters and verify that bearings are greased, belts are aligned and tight, and equipment with functioning controls is ready for operation.

J. Examine terminal units, such as variable-air-volume boxes, and verify that they are accessible and their controls are connected and functioning.

K. Examine strainers. Verify that startup screens are replaced by permanent screens with indicated perforations.

L. Examine three-way valves for proper installation for their intended function of diverting or mixing fluid flows.

M. Examine heat-transfer coils for correct piping connections and for clean and straight fins.

N. Examine system pumps to ensure absence of entrained air in the suction piping.

O. Examine operating safety interlocks and controls on HVAC equipment.

P. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

3.3 PREPARATION

A. Prepare a TAB plan that includes strategies and step-by-step procedures.

B. Complete system-readiness checks and prepare reports. Verify the following:

1. Permanent electrical-power wiring is complete.
2. Hydronic systems are filled, clean, and free of air.
3. Automatic temperature-control systems are operational.
4. Equipment and duct access doors are securely closed.
5. Balance, smoke, and fire dampers are open.
6. Isolating and balancing valves are open and control valves are operational.
7. Ceilings are installed in critical areas where air-pattern adjustments are required and access to balancing devices is provided.
8. Windows and doors can be closed so indicated conditions for system operations can be met.

3.4 GENERAL PROCEDURES FOR TESTING AND BALANCING

A. Perform testing and balancing procedures on each system according to the procedures contained in NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems" and in this Section.

1. Comply with requirements in ASHRAE 62.1-2004, Section 7.2.2, "Air Balancing."

B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary for TAB procedures.

1. After testing and balancing, patch probe holes in ducts with same material and thickness as used to construct ducts.
2. After testing and balancing, install test ports and duct access doors that comply with requirements in Division 23 Section "Air Duct Accessories."
3. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish according to Division 23 Section "HVAC Insulation."

C. Mark equipment and balancing devices, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.

D. Take and report testing and balancing measurements in inch-pound (IP) units.

3.5 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.

B. Prepare schematic diagrams of systems' "as-built" duct layouts.

C. For variable-air-volume systems, develop a plan to simulate diversity.

D. Determine the best locations in main and branch ducts for accurate duct-airflow measurements.

E. Check airflow patterns from the outdoor-air louvers and dampers and the return- and exhaust-air dampers through the supply-fan discharge and mixing dampers.

F. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.

G. Verify that motor starters are equipped with properly sized thermal protection.

H. Check dampers for proper position to achieve desired airflow path.

I. Check for airflow blockages.

J. Check condensate drains for proper connections and functioning.

K. Check for proper sealing of air-handling-unit components.

L. Verify that air duct system is sealed as specified in Division 23 Section "Metal Ducts."

3.6 PROCEDURES FOR VARIABLE-AIR-VOLUME SYSTEMS

A. Compensating for Diversity: When the total airflow of all terminal units is more than the indicated airflow of the fan, place a selected number of terminal units at a minimum set-point airflow with the remainder at maximum-airflow condition until the total airflow of the terminal units equals the indicated airflow of the fan. Select the reduced-airflow terminal units so they are distributed evenly among the branch ducts.

B. Pressure-Independent, Variable-Air-Volume Systems: After the fan systems have been adjusted, adjust the variable-air-volume systems as follows:

1. Set outdoor-air dampers at minimum, and set return- and exhaust-air dampers at a position that simulates full-cooling load.
2. Select the terminal unit that is most critical to the supply-fan airflow and static pressure. Measure static pressure. Adjust system static pressure so the entering static pressure for the critical terminal unit is not less than the sum of the terminal-unit manufacturer's recommended minimum inlet static pressure plus the static pressure needed to overcome terminal-unit discharge system losses.
3. Measure total system airflow. Adjust to within indicated airflow.
4. Set terminal units at maximum airflow and adjust controller or regulator to deliver the designed maximum airflow. Use terminal-unit manufacturer's written instructions to make this adjustment. When total airflow is correct, balance the air outlets downstream from terminal units the same as described for constant-volume air systems.

5. Set terminal units at minimum airflow and adjust controller or regulator to deliver the designed minimum airflow. Check air outlets for a proportional reduction in airflow the same as described for constant-volume air systems.

    a. If air outlets are out of balance at minimum airflow, report the condition but leave outlets balanced for maximum airflow.

6. Remeasure the return airflow to the fan while operating at maximum return airflow and minimum outdoor airflow.

    a. Adjust the fan and balance the return-air ducts and inlets the same as described for constant-volume air systems.

7. Measure static pressure at the most critical terminal unit and adjust the static-pressure controller at the main supply-air sensing station to ensure that adequate static pressure is maintained at the most critical unit.
8. Record final fan-performance data.

C. Pressure-Dependent, Variable-Air-Volume Systems without Diversity: After the fan systems have been adjusted, adjust the variable-air-volume systems as follows:

1. Balance variable-air-volume systems the same as described for constant-volume air systems.
2. Set terminal units and supply fan at full-airflow condition.
3. Adjust inlet dampers of each terminal unit to indicated airflow and verify operation of the static-pressure controller. When total airflow is correct, balance the air outlets downstream from terminal units the same as described for constant-volume air systems.
4. Readjust fan airflow for final maximum readings.
5. Measure operating static pressure at the sensor that controls the supply fan if one is installed, and verify operation of the static-pressure controller.
6. Set supply fan at minimum airflow if minimum airflow is indicated. Measure static pressure to verify that it is being maintained by the controller.
7. Set terminal units at minimum airflow and adjust controller or regulator to deliver the designed minimum airflow. Check air outlets for a proportional reduction in airflow the same as described for constant-volume air systems.

    a. If air outlets are out of balance at minimum airflow, report the condition but leave the outlets balanced for maximum airflow.

8. Measure the return airflow to the fan while operating at maximum return airflow and minimum outdoor airflow.

    a. Adjust the fan and balance the return-air ducts and inlets the same as described for constant-volume air systems.

D. Pressure-Dependent, Variable-Air-Volume Systems with Diversity: After the fan systems have been adjusted, adjust the variable-air-volume systems as follows:

1. Set system at maximum indicated airflow by setting the required number of terminal units at minimum airflow. Select the reduced-airflow terminal units so they are distributed evenly among the branch ducts.
2. Adjust supply fan to maximum indicated airflow with the variable-airflow controller set at maximum airflow.

3. Set terminal units at full-airflow condition.
4. Adjust terminal units starting at the supply-fan end of the system and continuing progressively to the end of the system. Adjust inlet dampers of each terminal unit to indicated airflow. When total airflow is correct, balance the air outlets downstream from terminal units the same as described for constant-volume air systems.
5. Adjust terminal units for minimum airflow.
6. Measure static pressure at the sensor.
7. Measure the return airflow to the fan while operating at maximum return airflow and minimum outdoor airflow. Adjust the fan and balance the return-air ducts and inlets the same as described for constant-volume air systems.

3.7 GENERAL PROCEDURES FOR HYDRONIC SYSTEMS

A. Prepare test reports with pertinent design data, and number in sequence starting at pump to end of system. Check the sum of branch-circuit flows against the approved pump flow rate. Correct variations that exceed plus or minus 5 percent.

B. Prepare schematic diagrams of systems' "as-built" piping layouts.

C. Prepare hydronic systems for testing and balancing according to the following, in addition to the general preparation procedures specified above:

1. Open all manual valves for maximum flow.
2. Check liquid level in expansion tank.
3. Check makeup water-station pressure gage for adequate pressure for highest vent.
4. Check flow-control valves for specified sequence of operation, and set at indicated flow.
5. Set differential-pressure control valves at the specified differential pressure. Do not set at fully closed position when pump is positive-displacement type unless several terminal valves are kept open.
6. Set system controls so automatic valves are wide open to heat exchangers.
7. Check pump-motor load. If motor is overloaded, throttle main flow-balancing device so motor nameplate rating is not exceeded.
8. Check air vents for a forceful liquid flow exiting from vents when manually operated.

3.8 PROCEDURES FOR CONSTANT-FLOW HYDRONIC SYSTEMS

A. Measure water flow at pumps. Use the following procedures except for positive-displacement pumps:

1. Verify impeller size by operating the pump with the discharge valve closed. Read pressure differential across the pump. Convert pressure to head and correct for differences in gage heights. Note the point on manufacturer's pump curve at zero flow and verify that the pump has the intended impeller size.

    a. If impeller sizes must be adjusted to achieve pump performance, obtain approval from Architect and comply with requirements in Division 23 Section "Hydronic Pumps."

2. Check system resistance. With all valves open, read pressure differential across the pump and mark pump manufacturer's head-capacity curve. Adjust pump discharge valve until indicated water flow is achieved.

a. Monitor motor performance during procedures and do not operate motors in overload conditions.

3. Verify pump-motor brake horsepower. Calculate the intended brake horsepower for the system based on pump manufacturer's performance data. Compare calculated brake horsepower with nameplate data on the pump motor. Report conditions where actual amperage exceeds motor nameplate amperage.
4. Report flow rates that are not within plus or minus 10 percent of design.

B. Measure flow at all automatic flow control valves to verify that valves are functioning as designed.

C. Measure flow at all pressure-independent characterized control valves, with valves in fully open position, to verify that valves are functioning as designed.

D. Set calibrated balancing valves, if installed, at calculated presettings.

E. Measure flow at all stations and adjust, where necessary, to obtain first balance.

1. System components that have Cv rating or an accurately cataloged flow-pressure-drop relationship may be used as a flow-indicating device.

F. Measure flow at main balancing station and set main balancing device to achieve flow that is 5 percent greater than indicated flow.

G. Adjust balancing stations to within specified tolerances of indicated flow rate as follows:

1. Determine the balancing station with the highest percentage over indicated flow.
2. Adjust each station in turn, beginning with the station with the highest percentage over indicated flow and proceeding to the station with the lowest percentage over indicated flow.
3. Record settings and mark balancing devices.

H. Measure pump flow rate and make final measurements of pump amperage, voltage, rpm, pump heads, and systems' pressures and temperatures including outdoor-air temperature.

I. Measure the differential-pressure-control-valve settings existing at the conclusion of balancing.

J. Check settings and operation of each safety valve. Record settings.

3.9 PROCEDURES FOR PRIMARY-SECONDARY HYDRONIC SYSTEMS

A. Balance the primary circuit flow first and then balance the secondary circuits.

3.10 PROCEDURES FOR MOTORS

A. Motors, 1/2 HP and Larger: Test at final balanced conditions and record the following data:

1. Manufacturer's name, model number, and serial number.
2. Motor horsepower rating.
3. Motor rpm.
4. Efficiency rating.

5. Nameplate and measured voltage, each phase.
6. Nameplate and measured amperage, each phase.
7. Starter thermal-protection-element rating.

B. Motors Driven by Variable-Frequency Controllers: Test for proper operation at speeds varying from minimum to maximum. Test the manual bypass of the controller to prove proper operation. Record observations including name of controller manufacturer, model number, serial number, and nameplate data.

3.11 PROCEDURES FOR CHILLERS

A. Balance water flow through each evaporator and condenser to within specified tolerances of indicated flow with all pumps operating. With only one chiller operating in a multiple chiller installation, do not exceed the flow for the maximum tube velocity recommended by the chiller manufacturer. Measure and record the following data with each chiller operating at design conditions:

1. Evaporator-water entering and leaving temperatures, pressure drop, and water flow.
2. For water-cooled chillers, condenser-water entering and leaving temperatures, pressure drop, and water flow.
3. Evaporator and condenser refrigerant temperatures and pressures, using instruments furnished by chiller manufacturer.
4. Power factor if factory-installed instrumentation is furnished for measuring kilowatts.
5. Kilowatt input if factory-installed instrumentation is furnished for measuring kilowatts.
6. Capacity: Calculate in tons of cooling.
7. For air-cooled chillers, verify condenser-fan rotation and record fan and motor data including number of fans and entering- and leaving-air temperatures.

3.12 PROCEDURES FOR COOLING TOWERS

A. Shut off makeup water for the duration of the test, and verify that makeup and blowdown systems are fully operational after tests and before leaving the equipment. Perform the following tests and record the results:

1. Measure condenser-water flow to each cell of the cooling tower.
2. Measure entering- and leaving-water temperatures.
3. Measure wet- and dry-bulb temperatures of entering air.
4. Measure wet- and dry-bulb temperatures of leaving air.
5. Measure condenser-water flow rate recirculating through the cooling tower.
6. Measure cooling-tower spray pump discharge pressure.
7. Adjust water level and feed rate of makeup water system.
8. Measure flow through bypass.

3.13 PROCEDURES FOR BOILERS

A. Hydronic Boilers: Measure and record entering- and leaving-water temperatures and water flow.

B. Steam Boilers: Measure and record entering-water temperature and flow and leaving-steam pressure, temperature, and flow.

3.14 TOLERANCES

A. Set HVAC system's air flow rates and water flow rates within the following tolerances:

1. Supply, Return, and Exhaust Fans and Equipment with Fans: Plus or minus 10 percent.
2. Air Outlets and Inlets: Plus or minus 10 percent.
3. Heating-Water Flow Rate: Plus or minus 10 percent.
4. Cooling-Water Flow Rate: Plus or minus 10 percent.

3.15 REPORTING

A. Initial Construction-Phase Report: Based on examination of the Contract Documents as specified in "Examination" Article, prepare a report on the adequacy of design for systems' balancing devices. Recommend changes and additions to systems' balancing devices to facilitate proper performance measuring and balancing. Recommend changes and additions to HVAC systems and general construction to allow access for performance measuring and balancing devices.

B. Status Reports: Prepare monthly Insert time interval progress reports to describe completed procedures, procedures in progress, and scheduled procedures. Include a list of deficiencies and problems found in systems being tested and balanced. Prepare a separate report for each system and each building floor for systems serving multiple floors.

3.16 FINAL REPORT

A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.

1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer.
2. Include a list of instruments used for procedures, along with proof of calibration.

B. Final Report Contents: In addition to certified field-report data, include the following:

1. Pump curves.
2. Fan curves.
3. Manufacturers' test data.
4. Field test reports prepared by system and equipment installers.
5. Other information relative to equipment performance; do not include Shop Drawings and product data.

C. General Report Data: In addition to form titles and entries, include the following data:

1. Title page.
2. Name and address of the TAB contractor.
3. Project name.
4. Project location.
5. Architect's name and address.
6. Engineer's name and address.
7. Contractor's name and address.
8. Report date.
9. Signature of TAB supervisor who certifies the report.
10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
11. Summary of contents including the following:

a. Indicated versus final performance.
b. Notable characteristics of systems.
c. Description of system operation sequence if it varies from the Contract Documents.

12. Nomenclature sheets for each item of equipment.
13. Data for terminal units, including manufacturer's name, type, size, and fittings.
14. Notes to explain why certain final data in the body of reports vary from indicated values.
15. Test conditions for fans and pump performance forms including the following:

a. Settings for outdoor-, return-, and exhaust-air dampers.
b. Conditions of filters.
c. Cooling coil, wet- and dry-bulb conditions.
d. Face and bypass damper settings at coils.
e. Fan drive settings including settings and percentage of maximum pitch diameter.
f. Inlet vane settings for variable-air-volume systems.
g. Settings for supply-air, static-pressure controller.
h. Other system operating conditions that affect performance.

D. System Diagrams: Include schematic layouts of air and hydronic distribution systems. Present each system with single-line diagram and include the following:

1. Quantities of outdoor, supply, return, and exhaust airflows.
2. Water and steam flow rates.
3. Duct, outlet, and inlet sizes.
4. Pipe and valve sizes and locations.
5. Terminal units.
6. Balancing stations.
7. Position of balancing devices.

E. Air-Handling-Unit Test Reports: For air-handling units with coils, include the following:

1. Unit Data:

a. Unit identification.
b. Location.
c. Make and type.
d. Model number and unit size.
e. Manufacturer's serial number.
f. Unit arrangement and class.
g. Discharge arrangement.
h. Sheave make, size in inches , and bore.
i. Center-to-center dimensions of sheave, and amount of adjustments in inches .
j. Number, make, and size of belts.
k. Number, type, and size of filters.

2. Motor Data:

a. Motor make, and frame type and size.
b. Horsepower and rpm.
c. Volts, phase, and hertz.
d. Full-load amperage and service factor.
e. Sheave make, size in inches , and bore.

f. Center-to-center dimensions of sheave, and amount of adjustments in inches .

3. Test Data (Indicated and Actual Values):

a. Total air flow rate in cfm .
b. Total system static pressure in inches wg .
c. Fan rpm.
d. Discharge static pressure in inches wg .
e. Filter static-pressure differential in inches wg .
f. Preheat-coil static-pressure differential in inches wg .
g. Cooling-coil static-pressure differential in inches wg .
h. Heating-coil static-pressure differential in inches wg .
i. Outdoor airflow in cfm .
j. Return airflow in cfm .
k. Outdoor-air damper position.
l. Return-air damper position.
m. Vortex damper position.

F. Apparatus-Coil Test Reports:

1. Coil Data:

a. System identification.
b. Location.
c. Coil type.
d. Number of rows.
e. Fin spacing in fins per inch o.c.
f. Make and model number.
g. Face area in sq. ft. .
h. Tube size in NPS .
i. Tube and fin materials.
j. Circuiting arrangement.

2. Test Data (Indicated and Actual Values):

a. Air flow rate in cfm .
b. Average face velocity in fpm .
c. Air pressure drop in inches wg .
d. Outdoor-air, wet- and dry-bulb temperatures in deg F .
e. Return-air, wet- and dry-bulb temperatures in deg F .
f. Entering-air, wet- and dry-bulb temperatures in deg F .
g. Leaving-air, wet- and dry-bulb temperatures in deg F .
h. Water flow rate in gpm .
i. Water pressure differential in feet of head or psig .
j. Entering-water temperature in deg F .
k. Leaving-water temperature in deg F .
l. Refrigerant expansion valve and refrigerant types.
m. Refrigerant suction pressure in psig .
n. Refrigerant suction temperature in deg F .
o. Inlet steam pressure in psig .

G. Gas- and Oil-Fired Heat Apparatus Test Reports: In addition to manufacturer's factory startup equipment reports, include the following:

1. Unit Data:

    a. System identification.
    b. Location.
    c. Make and type.
    d. Model number and unit size.
    e. Manufacturer's serial number.
    f. Fuel type in input data.
    g. Output capacity in Btu/h .
    h. Ignition type.
    i. Burner-control types.
    j. Motor horsepower and rpm.
    k. Motor volts, phase, and hertz.
    l. Motor full-load amperage and service factor.
    m. Sheave make, size in inches , and bore.
    n. Center-to-center dimensions of sheave, and amount of adjustments in inches .

2. Test Data (Indicated and Actual Values):

    a. Total air flow rate in cfm .
    b. Entering-air temperature in deg F .
    c. Leaving-air temperature in deg F .
    d. Air temperature differential in deg F .
    e. Entering-air static pressure in inches wg .
    f. Leaving-air static pressure in inches wg .
    g. Air static-pressure differential in inches wg .
    h. Low-fire fuel input in Btu/h .
    i. High-fire fuel input in Btu/h .
    j. Manifold pressure in psig .
    k. High-temperature-limit setting in deg F .
    l. Operating set point in Btu/h .
    m. Motor voltage at each connection.
    n. Motor amperage for each phase.
    o. Heating value of fuel in Btu/h .

H. Electric-Coil Test Reports: For electric furnaces, duct coils, and electric coils installed in central-station air-handling units, include the following:

1. Unit Data:

    a. System identification.
    b. Location.
    c. Coil identification.
    d. Capacity in Btu/h .
    e. Number of stages.
    f. Connected volts, phase, and hertz.
    g. Rated amperage.
    h. Air flow rate in cfm .
    i. Face area in sq. ft. .
    j. Minimum face velocity in fpm .

2. Test Data (Indicated and Actual Values):

a. Heat output in Btu/h .
b. Air flow rate in cfm .
c. Air velocity in fpm .
d. Entering-air temperature in deg F .
e. Leaving-air temperature in deg F .
f. Voltage at each connection.
g. Amperage for each phase.

I. Fan Test Reports: For supply, return, and exhaust fans, include the following:

1. Fan Data:

a. System identification.
b. Location.
c. Make and type.
d. Model number and size.
e. Manufacturer's serial number.
f. Arrangement and class.
g. Sheave make, size in inches , and bore.
h. Center-to-center dimensions of sheave, and amount of adjustments in inches .

2. Motor Data:

a. Motor make, and frame type and size.
b. Horsepower and rpm.
c. Volts, phase, and hertz.
d. Full-load amperage and service factor.
e. Sheave make, size in inches , and bore.
f. Center-to-center dimensions of sheave, and amount of adjustments in inches .
g. Number, make, and size of belts.

3. Test Data (Indicated and Actual Values):

a. Total airflow rate in cfm .
b. Total system static pressure in inches wg .
c. Fan rpm.
d. Discharge static pressure in inches wg .
e. Suction static pressure in inches wg .

J. Round, Flat-Oval, and Rectangular Duct Traverse Reports: Include a diagram with a grid representing the duct cross-section and record the following:

1. Report Data:

a. System and air-handling-unit number.
b. Location and zone.
c. Traverse air temperature in deg F .
d. Duct static pressure in inches wg .
e. Duct size in inches .
f. Duct area in sq. ft. .
g. Indicated air flow rate in cfm .
h. Indicated velocity in fpm .
i. Actual air flow rate in cfm .

j. Actual average velocity in fpm .
k. Barometric pressure in psig .

K. Air-Terminal-Device Reports:

1. Unit Data:

a. System and air-handling unit identification.
b. Location and zone.
c. Apparatus used for test.
d. Area served.
e. Make.
f. Number from system diagram.
g. Type and model number.
h. Size.
i. Effective area in sq. ft. .

2. Test Data (Indicated and Actual Values):

a. Air flow rate in cfm .
b. Air velocity in fpm .
c. Preliminary air flow rate as needed in cfm .
d. Preliminary velocity as needed in fpm .
e. Final air flow rate in cfm .
f. Final velocity in fpm .
g. Space temperature in deg F .

L. System-Coil Reports: For reheat coils and water coils of terminal units, include the following:

1. Unit Data:

a. System and air-handling-unit identification.
b. Location and zone.
c. Room or riser served.
d. Coil make and size.
e. Flowmeter type.

2. Test Data (Indicated and Actual Values):

a. Air flow rate in cfm .
b. Entering-water temperature in deg F .
c. Leaving-water temperature in deg F .
d. Water pressure drop in feet of head or psig .
e. Entering-air temperature in deg F .
f. Leaving-air temperature in deg F .

M. Pump Test Reports: Calculate impeller size by plotting the shutoff head on pump curves and include the following:

1. Unit Data:

a. Unit identification.

b. Location.
c. Service.
d. Make and size.
e. Model number and serial number.
f. Water flow rate in gpm .
g. Water pressure differential in feet of head or psig .
h. Required net positive suction head in feet of head or psig .
i. Pump rpm.
j. Impeller diameter in inches .
k. Motor make and frame size.
l. Motor horsepower and rpm.
m. Voltage at each connection.
n. Amperage for each phase.
o. Full-load amperage and service factor.
p. Seal type.

2. Test Data (Indicated and Actual Values):

a. Static head in feet of head or psig .
b. Pump shutoff pressure in feet of head or psig .
c. Actual impeller size in inches .
d. Full-open flow rate in gpm .
e. Full-open pressure in feet of head or psig .
f. Final discharge pressure in feet of head or psig .
g. Final suction pressure in feet of head or psig .
h. Final total pressure in feet of head or psig .
i. Final water flow rate in gpm .
j. Voltage at each connection.
k. Amperage for each phase.

N. Instrument Calibration Reports:

1. Report Data:

a. Instrument type and make.
b. Serial number.
c. Application.
d. Dates of use.
e. Dates of calibration.

3.17 INSPECTIONS

A. Initial Inspection:

1. After testing and balancing are complete, operate each system and randomly check measurements to verify that the system is operating according to the final test and balance readings documented in the final report.
2. Check the following for each system:

a. Measure airflow of at least 10 percent of air outlets.
b. Measure water flow of at least 5 percent of terminals.
c. Measure room temperature at each thermostat/temperature sensor. Compare the reading to the set point.

d. Verify that balancing devices are marked with final balance position.
e. Note deviations from the Contract Documents in the final report.

B. Final Inspection:

1. After initial inspection is complete and documentation by random checks verifies that testing and balancing are complete and accurately documented in the final report, request that a final inspection be made by Architect and Commissioning Authority.
2. The TAB contractor's test and balance engineer shall conduct the inspection in the presence of Architect and Commissioning Authority.
3. Architect and Commissioning Authority shall randomly select measurements, documented in the final report, to be rechecked. Rechecking shall be limited to either 10 percent of the total measurements recorded or the extent of measurements that can be accomplished in a normal 8-hour business day.
4. If rechecks yield measurements that differ from the measurements documented in the final report by more than the tolerances allowed, the measurements shall be noted as "FAILED."
5. If the number of "FAILED" measurements is greater than 10 percent of the total measurements checked during the final inspection, the testing and balancing shall be considered incomplete and shall be rejected.

C. TAB Work will be considered defective if it does not pass final inspections. If TAB Work fails, proceed as follows:

1. Recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes; resubmit the final report and request a second final inspection.
2. If the second final inspection also fails, Owner may contract the services of another TAB contractor to complete TAB Work according to the Contract Documents and deduct the cost of the services from the original TAB contractor's final payment.

D. Prepare test and inspection reports.

3.18 ADDITIONAL TESTS

A. Within 90 days of completing TAB, perform additional TAB to verify that balanced conditions are being maintained throughout and to correct unusual conditions.

B. Seasonal Periods: If initial TAB procedures were not performed during near-peak summer and winter conditions, perform additional TAB during near-peak summer and winter conditions.

END OF SECTION 23 0593

SECTION 23 0713

DUCT INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes insulating the following duct services:
1. Indoor, concealed supply and outdoor air.
2. Indoor, concealed return located in unconditioned space.
3. Indoor, concealed, Type I, commercial, kitchen hood exhaust.
4. Indoor, concealed oven and warewash exhaust.
5. Indoor, concealed exhaust between isolation damper and penetration of building exterior.

B. Related Sections:
1. Section 23 0719 "HVAC Piping Insulation."
2. Section 23 3113 "Metal Ducts" for duct liners.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory- and field-applied if any).

B. LEED Submittals:
1. Product Data for Credit IEQ 4.1: For adhesives and sealants, documentation including printed statement of VOC content.

C. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
2. Detail insulation application at elbows, fittings, dampers, specialties and flanges for each type of insulation.
3. Detail application of field-applied jackets.
4. Detail application at linkages of control devices.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.

B. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84, by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.6 COORDINATION

A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Section 23 0529 "Hangers and Supports for HVAC Piping and Equipment."

B. Coordinate clearance requirements with duct Installer for duct insulation application. Before preparing ductwork Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

C. Coordinate installation and testing of heat tracing.

1.7 SCHEDULING

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

A. Comply with requirements in "Duct Insulation Schedule, General," "Indoor Duct and Plenum Insulation Schedule," and "Aboveground, Outdoor Duct and Plenum Insulation Schedule" articles for where insulating materials shall be applied.

B. Products shall not contain asbestos, lead, mercury, or mercury compounds.

C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.

D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.

E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

F. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II and ASTM C 1290, Type III with factory-applied FSK jacket. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
   1. Products: Subject to compliance with requirements, provide the following:
      a. CertainTeed Corp.; SoftTouch Duct Wrap.
      b. Johns Manville; Microlite.
      c. Knauf Insulation; Friendly Feel Duct Wrap.
      d. Manson Insulation Inc.; Alley Wrap.
      e. Owens Corning; SOFTR All-Service Duct Wrap.

2.2 FIRE-RATED INSULATION SYSTEMS

A. Fire-Rated Blanket: High-temperature, flexible, blanket insulation with FSK jacket that is tested and certified to provide a 2-hour fire rating by an NRTL acceptable to authorities having jurisdiction.
   1. Products: Subject to compliance with requirements, provide the following:
      a. CertainTeed Corp.; FlameChek.
      b. Johns Manville; Firetemp Wrap.
      c. Thermal Ceramics; FireMaster Duct Wrap.
      d. 3M; Fire Barrier Wrap Products.
      e. Unifrax Corporation; FyreWrap.

2.3 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.

B. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.
   1. For indoor applications, adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.4 MASTICS

A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.
   1. For indoor applications, use mastics that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Vapor-Barrier Mastic: Water based; suitable for indoor use on below ambient services.
   1. Water-Vapor Permeance: ASTM E 96/E 96M, Procedure B, 0.013 perm at 43-mil dry film thickness.
   2. Service Temperature Range: Minus 20 to plus 180 deg F.
   3. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.
   4. Color: White.

2.5 SEALANTS

A. FSK and Metal Jacket Flashing Sealants:
   1. Materials shall be compatible with insulation materials, jackets, and substrates.
   2. Fire- and water-resistant, flexible, elastomeric sealant.
   3. Service Temperature Range: Minus 40 to plus 250 deg F.
   4. Color: Aluminum.

5. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.6 FACTORY-APPLIED JACKETS

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:
   1. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.

2.7 TAPES

A. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136.
   1. Width: 3 inches.
   2. Thickness: 6.5 mils.
   3. Adhesion: 90 ounces force/inch in width.
   4. Elongation: 2 percent.
   5. Tensile Strength: 40 lbf/inch in width.
   6. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.

2.8 SECUREMENTS

A. Bands:
   1. Aluminum: ASTM B 209, Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch thick, 1/2 inch wide with wing seal.

B. Insulation Pins and Hangers:
   1. Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.106-inch- diameter shank, length to suit depth of insulation indicated.
   2. Cupped-Head, Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.106-inch- diameter shank, length to suit depth of insulation indicated with integral 1-1/2-inch galvanized carbon-steel washer.
   3. Metal Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- thick, aluminum sheet, with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.
      a. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in exposed locations.

C. Staples: Outward-clinching insulation staples, nominal 3/4-inch- wide, stainless steel or Monel.

D. Wire: 0.062-inch soft-annealed, stainless steel.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.
   1. Verify that systems to be insulated have been tested and are free of defects.
   2. Verify that surfaces to be insulated are clean and dry.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

3.3 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of ducts and fittings.

B. Install insulation materials, vapor barriers or retarders, jackets, and thicknesses required for each item of duct system as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Keep insulation materials dry during application and finishing.

G. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

H. Install insulation with least number of joints practical.

I. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
   1. Install insulation continuously through hangers and around anchor attachments.
   2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
   3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.

J. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

K. Install insulation with factory-applied jackets as follows:
   1. Draw jacket tight and smooth.
   2. Cover circumferential joints with 3-inch- wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
   3. Overlap jacket longitudinal seams at least 1-1/2 inches. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 2 inches o.c.
      a. For below ambient services, apply vapor-barrier mastic over staples.

4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to duct flanges and fittings.

L. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

M. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

N. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

3.4 PENETRATIONS

A. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

B. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Terminate insulation at fire damper sleeves for fire-rated wall and partition penetrations. Externally insulate damper sleeves to match adjacent insulation and overlap duct insulation at least 2 inches.
1. Comply with requirements in Section 07 8413 "Penetration Firestopping" for firestopping and fire-resistive joint sealers.

C. Insulation Installation at Floor Penetrations:
1. Duct: For penetrations through fire-rated assemblies, terminate insulation at fire damper sleeves and externally insulate damper sleeve beyond floor to match adjacent duct insulation. Overlap damper sleeve and duct insulation at least 2 inches.
2. Seal penetrations through fire-rated assemblies. Comply with requirements in Section 07 8413 "Penetration Firestopping."

3.5 INSTALLATION OF MINERAL-FIBER INSULATION

A. Blanket Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.
1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 percent coverage of duct and plenum surfaces.
2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
3. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:
    a. On duct sides with dimensions 18 inches and smaller, place pins along longitudinal centerline of duct. Space 3 inches maximum from insulation end joints, and 16 inches o.c.
    b. On duct sides with dimensions larger than 18 inches, place pins 16 inches o.c. each way, and 3 inches maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
    c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
    d. Do not over compress insulation during installation.
    e. Impale insulation over pins and attach speed washers.

f. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.

4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches from one edge and one end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch outward-clinching staples, 1 inch o.c. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.
   a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
   b. Install vapor stops for ductwork and plenums operating below 50 deg F at 18-foot intervals. Vapor stops shall consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to two times the insulation thickness, but not less than 3 inches.
5. Overlap unfaced blankets a minimum of 2 inches on longitudinal seams and end joints. At end joints, secure with steel bands spaced a maximum of 18 inches o.c.
6. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
7. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch- wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches o.c.

3.6 FIRE-RATED INSULATION SYSTEM INSTALLATION

A. Where fire-rated insulation system is indicated, secure system to ducts and duct hangers and supports to maintain a continuous fire rating.

B. Insulate duct access panels and doors to achieve same fire rating as duct.

C. Install firestopping at penetrations through fire-rated assemblies. Fire-stop systems are specified in Section 07 8413 "Penetration Firestopping."

3.7 FINISHES

A. Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Section 09 9113 "Exterior Painting" and Section 09 9123 "Interior Painting."
   1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.
      a. Finish Coat Material: Interior, flat, latex-emulsion size.

B. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.

C. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.

D. Do not field paint aluminum or stainless-steel jackets.

3.8 DUCT INSULATION SCHEDULE, GENERAL

A. All ductwork is to be insulated. Ductwork indicated as not externally insulated shall be lined or double wall. Refer to 23 3113 Metal Ducts for additional information.

B. Plenums and Ducts Requiring Insulation:
   1. Indoor, concealed supply and outdoor air.
   2. Indoor, concealed return located in unconditioned space.
   3. Indoor, concealed, Type I, commercial, kitchen hood exhaust.
   4. Indoor, concealed oven and warewash exhaust.
   5. Indoor, concealed exhaust between isolation damper and penetration of building exterior.

C. Items Not Insulated:
   1. Metal ducts with duct liner of sufficient thickness to comply with energy code and ASHRAE/IESNA 90.1.
   2. Factory-insulated flexible ducts.

3.9 INDOOR DUCT AND PLENUM INSULATION SCHEDULE

A. Concealed, round, flat-oval, and rectangular supply-air duct and plenum insulation shall be Mineral-Fiber Blanket: 1-1/2 inches thick and 0.75-lb/cu. ft. nominal density except the following:
   1. Downstream of air handling units for 20 feet.
   2. Variable Air Volume Terminal Unit plenums.
   3. Fan Coil Unit plenums.
   4. Exposed ducts in finished areas.

B. Concealed, round, flat-oval, and rectangular return-air duct and plenum insulation shall be Mineral-Fiber Blanket: 1-1/2 inches thick and 0.75-lb/cu. ft. nominal density except the following:
   1. Upstream of air handling units for 20 feet.
   2. Fan Coil Unit return air plenums.
   3. Air transfer ducts.
   4. Exposed ducts in finished areas.

C. Concealed, round, flat-oval, and rectangular outside-air duct and plenum insulation shall be Mineral-Fiber Blanket: 1-1/2 inches thick and 0.75-lb/cu. ft. nominal density except the following:
   1. Exposed ducts in finished areas.

D. Concealed, round, flat-oval, and rectangular exhaust-air duct and plenum insulation shall be Mineral-Fiber Blanket: 1-1/2 inches thick and 0.75-lb/cu. ft. nominal density except the following:
   1. Exposed ducts in finished areas.

E. Concealed, Type I, Commercial, Kitchen Hood Exhaust Duct and Plenum Insulation: Fire-rated blanket; thickness as required to achieve 2-hour fire rating.

F. Concealed oven and warewash exhaust insulation shall be Mineral-Fiber Blanket: 1-1/2 inches thick and 0.75-lb/cu. ft. nominal density.

END OF SECTION 23 0713

SECTION 23 07 19

HVAC PIPING INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes insulating the following HVAC piping systems:
1. Condensate drain piping.
2. Refrigerant suction and hot-gas piping, indoors and outdoors.
3. Chilled-water and brine piping.
4. Condenser-water piping.
5. Heating hot-water piping.

B. Related Sections:
1. Division 23 Section "HVAC Equipment Insulation."
2. Division 23 Section "Duct Insulation."

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory and field applied if any).

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.

B. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.
1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.6 COORDINATION

A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Division 23 Section "Hangers and Supports for HVAC Piping and Equipment."

B. Coordinate clearance requirements with piping Installer for piping insulation application. Before preparing piping Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

C. Coordinate installation and testing of heat tracing.

1.7 SCHEDULING

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

A. Comply with requirements in "Piping Insulation Schedule, General," "Indoor Piping Insulation Schedule," "Outdoor, Aboveground Piping Insulation Schedule," and "Outdoor, Underground Piping Insulation Schedule" articles for where insulating materials shall be applied.

B. Products shall not contain asbestos, lead, mercury, or mercury compounds.

C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.

D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.

E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

F. Cellular Glass: Inorganic, incombustible, foamed or cellulated glass with annealed, rigid, hermetically sealed cells. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
   1. Block Insulation: ASTM C 552, Type I.
   2. Special-Shaped Insulation: ASTM C 552, Type III.
   3. Board Insulation: ASTM C 552, Type IV.
   4. Preformed Pipe Insulation with Factory-Applied ASJ: Comply with ASTM C 552, Type II, Class 2.
   5. Factory fabricate shapes according to ASTM C 450 and ASTM C 585.

G. Flexible Elastomeric Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials.

H. Mineral-Fiber, Preformed Pipe Insulation:

1. Type I, 850 deg F Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, with factory-applied ASJ-SSL. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

I. Mineral-Fiber, Pipe and Tank Insulation: Mineral or glass fibers bonded with a thermosetting resin. Semirigid board material with factory-applied FSK jacket complying with ASTM C 1393, Type II or Type IIIA Category 2, or with properties similar to ASTM C 612, Type IB. Nominal density is 2.5 lb/cu. ft. or more. Thermal conductivity (k-value) at 100 deg F is 0.29 Btu x in./h x sq. ft. x deg F or less. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

2.2 INSULATING CEMENTS

A. Mineral-Fiber Insulating Cement: Comply with ASTM C 195.

B. Mineral-Fiber, Hydraulic-Setting Insulating and Finishing Cement: Comply with ASTM C 449.

2.3 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.

B. Cellular-Glass Adhesive: Two-component, thermosetting urethane adhesive containing no flammable solvents, with a service temperature range of minus 100 to plus 200 deg F .
1. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

C. Flexible Elastomeric and Polyolefin Adhesive: Comply with MIL-A-24179A, Type II, Class I.
1. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

D. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.
1. For indoor applications, adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

E. ASJ Adhesive, and FSK and PVDC Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.
1. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

F. PVC Jacket Adhesive: Compatible with PVC jacket.
1. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.4 MASTICS

A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.
1. For indoor applications, use mastics that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Vapor-Barrier Mastic: Water based; suitable for indoor use on below-ambient services.

1. Water-Vapor Permeance: ASTM E 96/E 96M, Procedure B, 0.013 perm at 43-mil dry film thickness.
2. Service Temperature Range: Minus 20 to plus 180 deg F .
3. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.
4. Color: White.

C. Vapor-Barrier Mastic: Solvent based; suitable for outdoor use on below-ambient services.
1. Water-Vapor Permeance: ASTM F 1249, 0.05 perm at 30-mil dry film thickness.
2. Service Temperature Range: Minus 50 to plus 220 deg F .
3. Solids Content: ASTM D 1644, 33 percent by volume and 46 percent by weight.
4. Color: White.

D. Breather Mastic: Water based; suitable for indoor and outdoor use on above-ambient services.
1. Water-Vapor Permeance: ASTM F 1249, 1.8 perms at 0.0625-inch dry film thickness.
2. Service Temperature Range: Minus 20 to plus 180 deg F .
3. Solids Content: 60 percent by volume and 66 percent by weight.
4. Color: White.

2.5 LAGGING ADHESIVES

A. Description: Comply with MIL-A-3316C, Class I, Grade A and shall be compatible with insulation materials, jackets, and substrates.
1. For indoor applications, use lagging adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Fire-resistant, water-based lagging adhesive and coating for use indoors to adhere fire-resistant lagging cloths over pipe insulation.
3. Service Temperature Range: 0 to plus 180 deg F .
4. Color: White.

2.6 SEALANTS

A. FSK and Metal Jacket Flashing Sealants:
1. Materials shall be compatible with insulation materials, jackets, and substrates.
2. Fire- and water-resistant, flexible, elastomeric sealant.
3. Service Temperature Range: Minus 40 to plus 250 deg F .
4. Color: Aluminum.
5. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. ASJ Flashing Sealants, and Vinyl, PVDC, and PVC Jacket Flashing Sealants:
1. Materials shall be compatible with insulation materials, jackets, and substrates.
2. Fire- and water-resistant, flexible, elastomeric sealant.
3. Service Temperature Range: Minus 40 to plus 250 deg F .
4. Color: White.
5. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.7 FACTORY-APPLIED JACKETS

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:
1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.

2. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.
3. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.

2.8 FIELD-APPLIED FABRIC-REINFORCING MESH

A. Woven Glass-Fiber Fabric: Approximately 2 oz./sq. yd. with a thread count of 10 strands by 10 strands/sq. in. for covering pipe and pipe fittings.

B. Woven Polyester Fabric: Approximately 1 oz./sq. yd. with a thread count of 10 strands by 10 strands/sq. in. , in a Leno weave, for pipe.

2.9 FIELD-APPLIED CLOTHS

A. Woven Glass-Fiber Fabric: Comply with MIL-C-20079H, Type I, plain weave, and presized a minimum of 8 oz./sq. yd. .

2.10 FIELD-APPLIED JACKETS

A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.

B. FSK Jacket: Aluminum-foil-face, fiberglass-reinforced scrim with kraft-paper backing.

C. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.
1. Adhesive: As recommended by jacket material manufacturer.
2. Factory-fabricated fitting covers to match jacket if available; otherwise, field fabricate.
   a. Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, unions, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories.

D. Metal Jacket:
1. Stainless-Steel Jacket: ASTM A 167 or ASTM A 240/A 240M.
   a. Factory cut and rolled to size.
   b. Material, finish, and thickness are indicated in field-applied jacket schedules.
   c. Moisture Barrier for Indoor Applications: 3-mil- thick, heat-bonded polyethylene and kraft paper.
   d. Moisture Barrier for Outdoor Applications: 3-mil- thick, heat-bonded polyethylene and kraft paper.
   e. Factory-Fabricated Fitting Covers:
      1) Same material, finish, and thickness as jacket.
      2) Preformed 2-piece or gore, 45- and 90-degree, short- and long-radius elbows.
      3) Tee covers.
      4) Flange and union covers.
      5) End caps.
      6) Beveled collars.
      7) Valve covers.
      8) Field fabricate fitting covers only if factory-fabricated fitting covers are not available.

2.11 TAPES

A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.
   1. Width: 3 inches .
   2. Thickness: 11.5 mils .
   3. Adhesion: 90 ounces force/inch in width.
   4. Elongation: 2 percent.
   5. Tensile Strength: 40 lbf/inch in width.
   6. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

B. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136.
   1. Width: 3 inches .
   2. Thickness: 6.5 mils .
   3. Adhesion: 90 ounces force/inch in width.
   4. Elongation: 2 percent.
   5. Tensile Strength: 40 lbf/inch in width.
   6. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.

C. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive; suitable for indoor and outdoor applications.
   1. Width: 2 inches .
   2. Thickness: 6 mils .
   3. Adhesion: 64 ounces force/inch in width.
   4. Elongation: 500 percent.
   5. Tensile Strength: 18 lbf/inch in width.

D. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive.
   1. Width: 2 inches .
   2. Thickness: 3.7 mils .
   3. Adhesion: 100 ounces force/inch in width.
   4. Elongation: 5 percent.
   5. Tensile Strength: 34 lbf/inch in width.

2.12 SECUREMENTS

A. Bands:
   1. Stainless Steel: ASTM A 167 or ASTM A 240/A 240M, Type 304 or Type 316; 0.015 inch thick, 1/2 inch wide with wing seal or closed seal.

B. Staples: Outward-clinching insulation staples, nominal 3/4-inch- wide, stainless steel or Monel.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.
   1. Verify that systems to be insulated have been tested and are free of defects.
   2. Verify that surfaces to be insulated are clean and dry.
   3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Surface Preparation: Clean and prepare surfaces to be insulated. Before insulating, apply a corrosion coating to insulated surfaces as follows:
   1. Stainless Steel: Coat 300 series stainless steel with an epoxy primer 5 mils thick and an epoxy finish 5 mils thick if operating in a temperature range between 140 and 300 deg F . Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.
   2. Carbon Steel: Coat carbon steel operating at a service temperature between 32 and 300 deg F with an epoxy coating. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.

C. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.

D. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.3 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping including fittings, valves, and specialties.

B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of pipe system as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

G. Keep insulation materials dry during application and finishing.

H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

I. Install insulation with least number of joints practical.

J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
   1. Install insulation continuously through hangers and around anchor attachments.
   2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.

3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

L. Install insulation with factory-applied jackets as follows:
1. Draw jacket tight and smooth.
2. Cover circumferential joints with 3-inch- wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
3. Overlap jacket longitudinal seams at least 1-1/2 inches . Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 2 inches o.c.
   a. For below-ambient services, apply vapor-barrier mastic over staples.
4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.

M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

P. For above-ambient services, do not install insulation to the following:
1. Vibration-control devices.
2. Testing agency labels and stamps.
3. Nameplates and data plates.
4. Manholes.
5. Handholes.
6. Cleanouts.

3.4 PENETRATIONS

A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.
1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches below top of roof flashing.
4. Seal jacket to roof flashing with flashing sealant.

B. Insulation Installation at Underground Exterior Wall Penetrations: Terminate insulation flush with sleeve seal. Seal terminations with flashing sealant.

C. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.
   1. Seal penetrations with flashing sealant.
   2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
   3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches .
   4. Seal jacket to wall flashing with flashing sealant.

D. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

E. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.
   1. Comply with requirements in Division 07 Section "Penetration Firestopping" for firestopping and fire-resistive joint sealers.

F. Insulation Installation at Floor Penetrations:
   1. Pipe: Install insulation continuously through floor penetrations.
   2. Seal penetrations through fire-rated assemblies. Comply with requirements in Division 07 Section "Penetration Firestopping."

3.5 GENERAL PIPE INSULATION INSTALLATION

A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.

B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:
   1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.
   2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
   3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
   4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
   5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe

diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below-ambient services, provide a design that maintains vapor barrier.

6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below-ambient services and a breather mastic for above-ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
8. For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.
9. Stencil or label the outside insulation jacket of each union with the word "union." Match size and color of pipe labels.

C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

D. Install removable insulation covers at locations indicated. Installation shall conform to the following:
1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.
2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.
3. Construct removable valve insulation covers in same manner as for flanges, except divide the two-part section on the vertical center line of valve body.
4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless-steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.
5. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.

3.6 INSTALLATION OF CELLULAR-GLASS INSULATION

A. Insulation Installation on Straight Pipes and Tubes:
1. Secure each layer of insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above-ambient services, secure laps with outward-clinched staples at 6 inches o.c.

4. For insulation with factory-applied jackets on below-ambient services, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:
1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of cellular-glass block insulation of same thickness as pipe insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch , and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:
1. Install preformed sections of same material as straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.
2. When preformed sections of insulation are not available, install mitered sections of cellular-glass insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:
1. Install preformed sections of cellular-glass insulation to valve body.
2. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.

3.7 INSTALLATION OF FLEXIBLE ELASTOMERIC INSULATION

A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

B. Insulation Installation on Pipe Flanges:
1. Install pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of sheet insulation of same thickness as pipe insulation.
4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

C. Insulation Installation on Pipe Fittings and Elbows:
1. Install mitered sections of pipe insulation.
2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

D. Insulation Installation on Valves and Pipe Specialties:
1. Install preformed valve covers manufactured of same material as pipe insulation when available.
2. When preformed valve covers are not available, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.

4. Secure insulation to valves and specialties and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.8 INSTALLATION OF MINERAL-FIBER INSULATION

A. Insulation Installation on Straight Pipes and Tubes:
1. Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above-ambient surfaces, secure laps with outward-clinched staples at 6 inches o.c.
4. For insulation with factory-applied jackets on below-ambient surfaces, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:
1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with mineral-fiber blanket insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch , and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:
1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:
1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
4. Install insulation to flanges as specified for flange insulation application.

3.9 FIELD-APPLIED JACKET INSTALLATION

A. Where glass-cloth jackets are indicated, install directly over bare insulation or insulation with factory-applied jackets.
1. Draw jacket smooth and tight to surface with 2-inch overlap at seams and joints.
2. Embed glass cloth between two 0.062-inch- thick coats of lagging adhesive.
3. Completely encapsulate insulation with coating, leaving no exposed insulation.

B. Where FSK jackets are indicated, install as follows:
1. Draw jacket material smooth and tight.
2. Install lap or joint strips with same material as jacket.

3. Secure jacket to insulation with manufacturer's recommended adhesive.
4. Install jacket with 1-1/2-inch laps at longitudinal seams and 3-inch- wide joint strips at end joints.
5. Seal openings, punctures, and breaks in vapor-retarder jackets and exposed insulation with vapor-barrier mastic.

C. Where PVC jackets are indicated, install with 1-inch overlap at longitudinal seams and end joints; for horizontal applications. Seal with manufacturer's recommended adhesive.
1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.

D. Where metal jackets are indicated, install with 2-inch overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless-steel bands 12 inches o.c. and at end joints.

3.10 FINISHES

A. Pipe Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Division 09 painting Sections.
1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.
a. Finish Coat Material: Interior, flat, latex-emulsion size.

B. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.

C. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.

D. Do not field paint aluminum or stainless-steel jackets.

3.11 PIPING INSULATION SCHEDULE, GENERAL

A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.

B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:
1. Drainage piping located in crawl spaces.
2. Underground piping.
3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

3.12 INDOOR PIPING INSULATION SCHEDULE

A. Condensate and Equipment Drain Water below 60 Deg F :
1. NPS 1-1/2 and Smaller: Insulation shall be the following:
a. Mineral-Fiber: 1/2 inches thick.
2. NPS 2 and Larger: Insulation shall be the following:
a. Mineral-Fiber: 1 inches thick.

B. Refrigerant Suction and Hot-Gas Piping:

1. All Pipe Sizes: Insulation shall be the following:
   a. Flexible Elastomeric: 1 inch thick.

C. Chilled Water and Brine, above 40 Deg F :
1. NPS 12 and Smaller: Insulation shall be the following:
   a. Mineral-Fiber: 1-1/2 inches thick.
2. NPS 14 and Larger: Insulation shall be the following:
   a. Mineral-Fiber: 2 inches thick.

D. Condenser-Water Supply and Return:
1. NPS 12 and Smaller: Insulation shall be the following:
   a. Mineral-Fiber: 1 inches thick.
2. NPS 14 and Larger: Insulation shall be the following:
   a. Mineral-Fiber: 1 inches thick.

E. Heating-Hot-Water Supply and Return, 200 Deg F and Below:
1. NPS 12 and Smaller: Insulation shall be the following:
   a. Mineral-Fiber: 1-1/2 inches thick.
2. NPS 14 and Larger: Insulation shall be the following:
   a. Mineral-Fiber: 2 inches thick.

3.13 OUTDOOR, ABOVEGROUND PIPING INSULATION SCHEDULE

A. Refrigerant Suction and Hot-Gas Piping:
1. All Pipe Sizes: Insulation shall be the following:
   a. Flexible Elastomeric: 1 inch thick.

B. Condenser-Water Supply and Return:
1. All Pipe Sizes: Insulation shall be the following:
   a. Mineral-Fiber: 2 inches thick.

3.14 INDOOR, FIELD-APPLIED JACKET SCHEDULE

A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.

B. If more than one material is listed, selection from materials listed is Contractor's option.

C. Piping, Concealed:
1. None.

D. Piping, Exposed:
1. PVC, Color-Coded by System: 30 mils thick.

3.15 OUTDOOR, FIELD-APPLIED JACKET SCHEDULE

A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.

B. If more than one material is listed, selection from materials listed is Contractor's option.

C. Piping, Concealed:

1. None.

D. Piping, Exposed:
   1. Stainless Steel, Type 304 or 316, Corrugated with Z-Shaped Locking Seam: 0.016 inch thick.

END OF SECTION 23 07 19

SECTION 230900

INSTRUMENTATION AND CONTROL FOR HVAC

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 APPROVED CONTROL VENDORS

A. Automated Building Systems, Inc - Distech Controls

B. Earthsmart Controls - Delta Controls

C. Engineered Systems & Energy Solutions, Inc – Automated Logic

D. Johnson Controls – Metasys

E. Panco Inc - Honeywell

F. Trane - Tracer

1.3 SUMMARY

A. This Section includes control equipment for HVAC systems and components, including control components for terminal heating and cooling units not supplied with factory-wired controls.

B. Related Sections include the following:
1. Division 15 Section "Common Work Results for Mechanical" for measuring equipment that relates to this Section.

1.4 DEFINITIONS

A. DDC: Direct digital control.

B. I/O: Input/output.

C. MS/TP: Master slave/token passing.

D. PC: Personal computer.

1.5 SYSTEM PERFORMANCE

A. Comply with the following performance requirements:
1. Graphic Display: Display graphic with minimum 20 dynamic points with current data within 10 seconds.
2. Graphic Refresh: Update graphic with minimum 20 dynamic points with current data within 8 seconds.

3. Object Command: Reaction time of less than two seconds between operator command of a binary object and device reaction.
4. Object Scan: Transmit change of state and change of analog values to control units or workstation within six seconds.
5. Alarm Response Time: Annunciate alarm at workstation within 45 seconds. Multiple workstations must receive alarms within five seconds of each other.
6. Program Execution Frequency: Run capability of applications as often as five seconds, but selected consistent with mechanical process under control.
7. Performance: Programmable controllers shall execute DDC PID control loops, and scan and update process values and outputs at least once per second.
8. Reporting Accuracy and Stability of Control: Report values and maintain measured variables within tolerances as follows:
   a. Water Temperature: Plus or minus 1 deg F.
   b. Water Flow: Plus or minus 5 percent of full scale.
   c. Water Pressure: Plus or minus 2 percent of full scale.
   d. Space Temperature: Plus or minus 1 deg F.
   e. Ducted Air Temperature: Plus or minus 1 deg F.
   f. Outside Air Temperature: Plus or minus 2 deg F.
   g. Dew Point Temperature: Plus or minus 3 deg F.
   h. Temperature Differential: Plus or minus 0.25 deg F.
   i. Relative Humidity: Plus or minus 5 percent.
   j. Airflow (Pressurized Spaces): Plus or minus 3 percent of full scale.
   k. Airflow (Measuring Stations): Plus or minus 5 percent of full scale.
   l. Airflow (Terminal): Plus or minus 10 percent of full scale.
   m. Air Pressure (Space): Plus or minus 0.01-inch wg.
   n. Air Pressure (Ducts): Plus or minus 0.1-inch wg.
   o. Carbon Dioxide: Plus or minus 50 ppm.
   p. Electrical: Plus or minus 5 percent of reading.

1.6 SEQUENCE OF OPERATION

A. Refer to project drawings for sequence of operation, controls diagrams, and points list.

1.7 SUBMITTALS

A. Product Data: Include manufacturer's technical literature for each control device. Indicate dimensions, capacities, performance characteristics, electrical characteristics, finishes for materials, and installation and startup instructions for each type of product indicated.
   1. DDC System Hardware: Bill of materials of equipment indicating quantity, manufacturer, and model number. Include technical data for operator workstation equipment, interface equipment, control units, transducers/transmitters, sensors, actuators, valves, relays/switches, control panels, and operator interface equipment.
   2. Control System Software: Include technical data for operating system software, operator interface, color graphics, and other third-party applications.
   3. Controlled Systems: Instrumentation list with element name, type of device, manufacturer, model number, and product data. Include written description of sequence of operation including schematic diagram.

B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
   1. Bill of materials of equipment indicating quantity, manufacturer, and model number.

2. Schematic flow diagrams showing fans, pumps, coils, dampers, valves, and control devices.
3. Wiring Diagrams: Power, signal, and control wiring.
4. Details of control panel faces, including controls, instruments, and labeling.
5. Written description of sequence of operation.
6. Schedule of dampers including size, leakage, and flow characteristics.
7. Schedule of valves including flow characteristics.
8. DDC System Hardware:
   a. Wiring diagrams for control units with termination numbers.
   b. Schematic diagrams and floor plans for field sensors and control hardware.
   c. Schematic diagrams for control, communication, and power wiring, showing trunk data conductors and wiring between operator workstation and control unit locations.
9. Control System Software: List of color graphics indicating monitored systems, data (connected and calculated) point addresses, output schedule, and operator notations.
10. Controlled Systems:
    a. Schematic diagrams of each controlled system with control points labeled and control elements graphically shown, with wiring.
    b. Scaled drawings showing mounting, routing, and wiring of elements including bases and special construction.
    c. Written description of sequence of operation including schematic diagram.
    d. Points list.

C. Data Communications Protocol Certificates: Certify that each proposed DDC system component complies with ASHRAE 135.

D. Software and Firmware Operational Documentation: Include the following:
1. Software operating and upgrade manuals.
2. Program Software Backup: On a magnetic media or compact disc, complete with data files.
3. Device address list.
4. Printout of software application and graphic screens.
5. Software license required by and installed for DDC workstations and control systems.

E. Operation and Maintenance Data: For HVAC instrumentation and control system to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:
1. Maintenance instructions and lists of spare parts for each type of control device and compressed-air station.
2. Interconnection wiring diagrams with identified and numbered system components and devices.
3. Keyboard illustrations and step-by-step procedures indexed for each operator function.
4. Inspection period, cleaning methods, cleaning materials recommended, and calibration tolerances.
5. Calibration records and list of set points.

1.8 QUALITY ASSURANCE

A. Installer Qualifications: Automatic control system manufacturer's authorized representative who is trained and approved for installation of system components required for this Project.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Comply with ASHRAE 135 for DDC system components.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Factory-Mounted Components: Where control devices specified in this Section are indicated to be factory mounted on equipment, arrange for shipping of control devices to equipment manufacturer.

B. System Software: Update to latest version of software at Project completion.

1.10 COORDINATION

A. Coordinate location of thermostats, humidistats, and other exposed control sensors with plans and room details before installation.

B. Coordinate equipment with Division 16 Section "Intrusion Detection" to achieve compatibility with equipment that interfaces with that system and with building master clock.

C. Coordinate equipment with Division 16 Section "Access Control" to achieve compatibility with equipment that interfaces with that system.

D. Coordinate equipment with Division 16 Section "Clock Systems" to achieve compatibility with equipment that interfaces with that system.

E. Coordinate equipment with Division 16 Section "PLC Electronic Detention Monitoring and Control Systems" to achieve compatibility with equipment that interfaces with that system.

F. Coordinate equipment with Division 16 Section "Network Lighting Controls" to achieve compatibility with equipment that interfaces with that system.

G. Coordinate equipment with Division 16 Section "Fire Detection and Alarm" to achieve compatibility with equipment that interfaces with that system.

H. Coordinate supply of conditioned electrical branch circuits for control units and operator workstation.

I. Coordinate equipment with Division 16 Section "Electrical Power Monitoring and Control" to achieve compatibility of communication interfaces.

J. Coordinate equipment with Division 16 Section "Panelboards" to achieve compatibility with starter coils and annunciation devices.

K. Coordinate equipment with Division 26 Section "Motor-Control Centers" to achieve compatibility with motor starters and annunciation devices.

L. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03 Section "Cast-in-Place Concrete."

PART 2 - PRODUCTS

2.1 CONTROL SYSTEM

A. Control system shall consist of sensors, indicators, actuators, final control elements, interface equipment, other apparatus, and accessories to control mechanical systems.

B. Control system shall consist of sensors, indicators, actuators, final control elements, interface equipment, other apparatus, accessories, and software connected to distributed controllers operating in multiuser, multitasking environment on token-passing network and programmed to control mechanical systems. An operator workstation permits interface with the network via dynamic color graphics with each mechanical system, building floor plan, and control device depicted by point-and-click graphics.

C. Control system shall include the following:
   1. Building intrusion detection system specified in Division 28 Section "Intrusion Detection."
   2. Building clock control system specified in Division 27 Section "Clock Systems."
   3. Building lighting control system specified in Division 26 Section "Network Lighting Controls."
   4. Fire alarm system specified in Division 28 Section "Fire Detection and Alarm."

2.2 DDC EQUIPMENT

A. Operator Workstation: One PC-based microcomputer(s) with minimum configuration as follows:
   1. Motherboard: With 8 integrated USB 2.0 ports, integrated Intel Pro 10/100 (Ethernet), integrated audio, bios, and hardware monitoring.
   2. Processor: Intel Quad Core, 2.0 GHz.
   3. Random-Access Memory: 6 GB.
   4. Graphics: Video adapter, minimum 1600 x 1200 pixels, 256 MB video memory, with TV out.
   5. Monitor: 19 inches LCD color.
   6. Keyboard: QWERTY, 105 keys in ergonomic shape.
   7. Hard-Disk Drive: 500 GB.
   8. DVD-ROM Read/Write Drive: 48x24x8.
   9. Mouse: Three button, optical.
   10. Uninterruptible Power Supply: 500 kVa.
   11. Operating System: Microsoft Windows 7 Professional with high-speed Internet access.
      a. ASHRAE 135 Compliance: Workstation shall use ASHRAE 135 protocol and communicate using ISO 8802-3 (Ethernet) datalink/physical layer protocol.
   12. Application Software:
      a. I/O capability from operator station.
      b. System security for each operator via software password and access levels.
      c. Automatic system diagnostics; monitor system and report failures.
      d. Database creation and support.
      e. Automatic and manual database save and restore.
      f. Dynamic color graphic displays with up to 10 screen displays at once.
      g. Custom graphics generation and graphics library of HVAC equipment and symbols.
      h. Alarm processing, messages, and reactions.
      i. Trend logs retrievable in spreadsheets and database programs.
      j. Alarm and event processing.
      k. Object and property status and control.
      l. Automatic restart of field equipment on restoration of power.

m. Data collection, reports, and logs. Include standard reports for the following:
   1) Current values of all objects.
   2) Current alarm summary.
   3) Disabled objects.
   4) Alarm lockout objects.
   5) Logs.
n. Custom report development.
o. Utility and weather reports.
p. Workstation application editors for controllers and schedules.
q. Maintenance management.

13. Custom Application Software:
   a. English language oriented.
   b. Full-screen character editor/programming environment.
   c. Allow development of independently executing program modules with debugging/simulation capability.
   d. Support conditional statements.
   e. Support floating-point arithmetic with mathematic functions.
   f. Contains predefined time variables.

B. Diagnostic Terminal Unit: Portable notebook-style, PC-based microcomputer terminal capable of accessing system data by connecting to system network. Computer provided by owner software for control system provided and installed by contractor.

C. Control Units: Modular, comprising processor board with programmable, nonvolatile, random-access memory; local operator access and display panel; integral interface equipment; and backup power source.
   1. Units monitor or control each I/O point; process information; execute commands from other control units, devices, and operator stations; and download from or upload to operator workstation or diagnostic terminal unit.
   2. Stand-alone mode control functions operate regardless of network status. Functions include the following:
      a. Global communications.
      b. Discrete/digital, analog, and pulse I/O.
      c. Monitoring, controlling, or addressing data points.
      d. Software applications, scheduling, and alarm processing.
      e. Testing and developing control algorithms without disrupting field hardware and controlled environment.
   3. Standard Application Programs:
      a. Electric Control Programs: Demand limiting, duty cycling, automatic time scheduling, start/stop time optimization, night setback/setup, on-off control with differential sequencing, staggered start, antishort cycling, PID control, DDC with fine tuning, and trend logging.
      b. HVAC Control Programs: Optimal run time, supply-air reset, and enthalpy switchover.
      c. Chiller Control Programs: Control function of condenser-water reset, chilled-water reset, and equipment sequencing.
      d. Programming Application Features: Include trend point; alarm processing and messaging; weekly, monthly, and annual scheduling; energy calculations; run-time totalization; and security access.
      e. Remote communications.
      f. Maintenance management.
      g. Units of Measure: Inch-pound and SI (metric).

4. Local operator interface provides for download from or upload to operator workstation or diagnostic terminal unit.
5. ASHRAE 135 Compliance: Control units shall use ASHRAE 135 protocol and communicate using ISO 8802-3 (Ethernet) datalink/physical layer protocol.

D. Local Control Units: Modular, comprising processor board with electronically programmable, nonvolatile, read-only memory; and backup power source.
1. Units monitor or control each I/O point, process information, and download from or upload to operator workstation or diagnostic terminal unit.
2. Stand-alone mode control functions operate regardless of network status. Functions include the following:
   a. Global communications.
   b. Discrete/digital, analog, and pulse I/O.
   c. Monitoring, controlling, or addressing data points.
3. Local operator interface provides for download from or upload to operator workstation or diagnostic terminal unit.
4. ASHRAE 135 Compliance: Control units shall use ASHRAE 135 protocol and communicate using ISO 8802-3 (Ethernet) datalink/physical layer protocol.

E. I/O Interface: Hardwired inputs and outputs may tie into system through controllers. Protect points so that shorting will cause no damage to controllers.
1. Binary Inputs: Allow monitoring of on-off signals without external power.
2. Pulse Accumulation Inputs: Accept up to 10 pulses per second.
3. Analog Inputs: Allow monitoring of low-voltage (0- to 10-V dc), current (4 to 20 mA), or resistance signals.
4. Binary Outputs: Provide on-off or pulsed low-voltage signal, selectable for normally open or normally closed operation with three-position (on-off-auto) override switches and status lights.
5. Analog Outputs: Provide modulating signal, either low voltage (0- to 10-V dc) or current (4 to 20 mA) with status lights, two-position (auto-manual) switch, and manually adjustable potentiometer.
6. Tri-State Outputs: Provide two coordinated binary outputs for control of three-point, floating-type electronic actuators.
7. Universal I/Os: Provide software selectable binary or analog outputs.

F. Power Supplies: Transformers with Class 2 current-limiting type or overcurrent protection; limit connected loads to 80 percent of rated capacity. DC power supply shall match output current and voltage requirements and be full-wave rectifier type with the following:
1. Output ripple of 5.0 mV maximum peak to peak.
2. Combined 1 percent line and load regulation with 100-mic.sec. response time for 50 percent load changes.
3. Built-in overvoltage and overcurrent protection and be able to withstand 150 percent overload for at least 3 seconds without failure.

G. Power Line Filtering: Internal or external transient voltage and surge suppression for workstations or controllers with the following:
1. Minimum dielectric strength of 1000 V.
2. Maximum response time of 10 nanoseconds.
3. Minimum transverse-mode noise attenuation of 65 dB.
4. Minimum common-mode noise attenuation of 150 dB at 40 to 100 Hz.

2.3 ALARM PANELS

A. Unitized cabinet with suitable brackets for wall or floor mounting. Fabricate of 0.06-inch-hick, furniture-quality steel or extruded-aluminum alloy, totally enclosed, with hinged doors and keyed lock and with manufacturer's standard shop-painted finish. Provide common keying for all panels.

B. Indicating light for each alarm point, single horn, acknowledge switch, and test switch, mounted on hinged cover.
   1. Alarm Condition: Indicating light flashes and horn sounds.
   2. Acknowledge Switch: Horn is silent and indicating light is steady.
   3. Second Alarm: Horn sounds and indicating light is steady.
   4. Alarm Condition Cleared: System is reset and indicating light is extinguished.
   5. Contacts in alarm panel allow remote monitoring by independent alarm company.

2.4 ELECTRONIC SENSORS

A. Description: Vibration and corrosion resistant; for wall, immersion, or duct mounting as required.

B. Pressure Transmitters/Transducers:
   1. Static-Pressure Transmitter: Nondirectional sensor with suitable range for expected input, and temperature compensated.
      a. Accuracy: 2 percent of full scale with repeatability of 0.5 percent.
      b. Output: 4 to 20 mA.
      c. Building Static-Pressure Range: 0- to 0.25-inch wg.
      d. Duct Static-Pressure Range: 0- to 5-inch wg.
   2. Water Pressure Transducers: Stainless-steel diaphragm construction, suitable for service; minimum 150-psigoperating pressure; linear output 4 to 20 mA.
   3. Water Differential-Pressure Transducers: Stainless-steel diaphragm construction, suitable for service; minimum 150-psigoperating pressure and tested to 300-psig; linear output 4 to 20 mA.
   4. Differential-Pressure Switch (Air or Water): Snap acting, with pilot-duty rating and with suitable scale range and differential.
   5. Pressure Transmitters: Direct acting for gas, liquid, or steam service; range suitable for system; linear output 4 to 20 mA.

C. Room Sensor Cover Construction: Manufacturer's standard locking covers.
   1. Set-Point Adjustment: Exposed.
   2. Set-Point Indication: Exposed.
   3. Thermometer: Concealed.
   4. Color: White
   5. Orientation: Vertical.

2.5 STATUS SENSORS

A. Status Inputs for Fans: Differential-pressure switch with pilot-duty rating and with adjustable range of 0- to 5-inch wg.

B. Status Inputs for Pumps: Differential-pressure switch with pilot-duty rating and with adjustable pressure-differential range of 8 to 60 psig, piped across pump.

C. Electronic Valve/Damper Position Indicator: Visual scale indicating percent of travel and 2- to 10-V dc, feedback signal.

D. Water-Flow Switches: Bellows-actuated mercury or snap-acting type with pilot-duty rating, stainless-steel or bronze paddle, with appropriate range and differential adjustment, in NEMA 250, Type 1 enclosure.

2.6 GAS DETECTION EQUIPMENT

A. Carbon Dioxide Sensor and Transmitter: Single detectors using solid-state infrared sensors; suitable over a temperature range of 23 to 130 deg Fand calibrated for 0 to 2 percent, with continuous or averaged reading, 4- to 20-mA output;, for wall mounting.

2.7 FLOW MEASURING STATIONS

A. Duct Airflow Station: Combination of air straightener and multiport, self-averaging pitot tube station.
   1. Casing: Galvanized-steel frame.
   2. Flow Straightener: Aluminum honeycomb, 3/4-inchparallel cell, 3 inchesdeep.
   3. Sensing Manifold: Copper manifold with bullet-nosed static pressure sensors positioned on equal area basis.

2.8 THERMOSTATS

A. Electric, solid-state, microcomputer-based room thermostat with remote sensor.
   1. Automatic switching from heating to cooling.
   2. Preferential rate control to minimize overshoot and deviation from set point.
   3. Set up for four separate temperatures per day.
   4. Instant override of set point for continuous or timed period from 1 hour to 31 days.
   5. Short-cycle protection.
   6. Programming based on every day of week.
   7. Selection features include degree F or degree C display, 12- or 24-hour clock, keyboard disable, remote sensor, and fan on-auto.
   8. Battery replacement without program loss.
   9. Thermostat display features include the following:
      a. Time of day.
      b. Actual room temperature.
      c. Programmed temperature.
      d. Programmed time.
      e. Duration of timed override.
      f. Day of week.
      g. System mode indications include "heating," "off," "fan auto," and "fan on."

2.9 ACTUATORS

A. Electric Motors: Size to operate with sufficient reserve power to provide smooth modulating action or two-position action.
   1. Comply with requirements in Division 23 Section "Common Motor Requirements for HVAC Equipment."
   2. Permanent Split-Capacitor or Shaded-Pole Type: Gear trains completely oil immersed and sealed. Equip spring-return motors with integral spiral-spring mechanism in housings designed for easy removal for service or adjustment of limit switches, auxiliary switches, or feedback potentiometer.
   3. Nonspring-Return Motors for Valves Larger Than NPS 2-1/2: Size for running torque of 150 in. x lbfand breakaway torque of 300 in. x lbf.

4. Spring-Return Motors for Valves Larger Than NPS 2-1/2: Size for running and breakaway torque of 150 in. x lbf.
5. Nonspring-Return Motors for Dampers Larger Than 25 Sq. Ft.: Size for running torque of 150 in. x lbfand breakaway torque of 300 in. x lbf.
6. Spring-Return Motors for Dampers Larger Than 25 Sq. Ft.: Size for running and breakaway torque of 150 in. x lbf.

B. Electronic Actuators: Direct-coupled type designed for minimum 60,000 full-stroke cycles at rated torque.
1. Valves: Size for torque required for valve close off at maximum pump differential pressure.
2. Dampers: Size for running torque calculated as follows:
   a. Parallel-Blade Damper with Edge Seals: 7 inch-lb/sq. ft.of damper.
   b. Opposed-Blade Damper with Edge Seals: 5 inch-lb/sq. ft.of damper.
   c. Parallel-Blade Damper without Edge Seals: 4 inch-lb/sq. ftof damper.
   d. Opposed-Blade Damper without Edge Seals: 3 inch-lb/sq. ft.of damper.
   e. Dampers with 2- to 3-Inch wgof Pressure Drop or Face Velocities of 1000 to 2500 fpm: Increase running torque by 1.5.
   f. Dampers with 3- to 4-Inch wgof Pressure Drop or Face Velocities of 2500 to 3000 fpm: Increase running torque by 2.0.
3. Coupling: V-bolt and V-shaped, toothed cradle.
4. Overload Protection: Electronic overload or digital rotation-sensing circuitry.
5. Fail-Safe Operation: Mechanical, spring-return mechanism. Provide external, manual gear release on nonspring-return actuators.
6. Power Requirements (Two-Position Spring Return): 24-V ac.
7. Power Requirements (Modulating): Maximum 10 VA at 24-V ac or 8 W at 24-V dc.
8. Proportional Signal: 2- to 10-V dc or 4 to 20 mA, and 2- to 10-V dc position feedback signal.
9. Temperature Rating: Minus 22 to plus 122 deg F
10. Temperature Rating (Smoke Dampers): Minus 22 to plus 250 deg F.
11. Run Time: 12 seconds open, 5 seconds closed.

2.10 CONTROL VALVES

A. Control Valves: Factory fabricated, of type, body material, and pressure class based on maximum pressure and temperature rating of piping system, unless otherwise indicated.

B. Hydronic system globe valves shall have the following characteristics:
1. NPS 2and Smaller: Class 125 bronze body, bronze trim, rising stem, renewable composition disc, and screwed ends with backseating capacity repackable under pressure.
2. NPS 2-1/2and Larger: Class 125 iron body, bronze trim, rising stem, plug-type disc, flanged ends, and renewable seat and disc.
3. Internal Construction: Replaceable plugs and stainless-steel or brass seats.
   a. Single-Seated Valves: Cage trim provides seating and guiding surfaces for plug on top and bottom.
   b. Double-Seated Valves: Balanced plug; cage trim provides seating and guiding surfaces for plugs on top and bottom.
4. Sizing: 3-psigmaximum pressure drop at design flow rate or the following:
   a. Two Position: Line size.
   b. Two-Way Modulating: Either the value specified above or twice the load pressure drop, whichever is more.

c. Three-Way Modulating: Twice the load pressure drop, but not more than value specified above.

5. Flow Characteristics: Two-way valves shall have equal percentage characteristics; three-way valves shall have linear characteristics.
6. Close-Off (Differential) Pressure Rating: Combination of actuator and trim shall provide minimum close-off pressure rating of 150 percent of total system (pump) head for two-way valves and 100 percent of pressure differential across valve or 100 percent of total system (pump) head.

C. Butterfly Valves: 200-psig, 150-psigmaximum pressure differential, ASTM A 126 cast-iron or ASTM A 536 ductile-iron body and bonnet, extended neck, stainless-steel stem, field-replaceable EPDM or Buna N sleeve and stem seals.
1. Body Style: Lug.
2. Disc Type: Nickel-plated ductile iron.
3. Sizing: 1-psigmaximum pressure drop at design flow rate.

D. Terminal Unit Control Valves: Bronze body, bronze trim, two or three ports as indicated, replaceable plugs and seats, and union and threaded ends.
1. Rating: Class 125 for service at 125 psigand 250 deg Foperating conditions.
2. Sizing: 3-psigmaximum pressure drop at design flow rate, to close against pump shutoff head.
3. Flow Characteristics: Two-way valves shall have equal percentage characteristics; three-way valves shall have linear characteristics.

2.11 DAMPERS

A. Dampers: AMCA-rated, opposed-blade design; 0.108-inch-inimum thick, galvanized-steel or 0.125-inch-inimum thick, extruded-aluminum frames with holes for duct mounting; damper blades shall not be less than 0.064-inch-hick galvanized steel with maximum blade width of 8 inchesand length of 48 inches.
1. Secure blades to 1/2-inch-iameter, zinc-plated axles using zinc-plated hardware, with nylon blade bearings, blade-linkage hardware of zinc-plated steel and brass, ends sealed against spring-stainless-steel blade bearings, and thrust bearings at each end of every blade.
2. Operating Temperature Range: From minus 40 to plus 200 deg F.
3. Edge Seals, Standard Pressure Applications: Closed-cell neoprene.
4. Edge Seals, Low-Leakage Applications: Use inflatable blade edging or replaceable rubber blade seals and spring-loaded stainless-steel side seals, rated for leakage at less than 10 cfm per sq. ft.of damper area, at differential pressure of 4-inch wgwhen damper is held by torque of 50 in. x lbf; when tested according to AMCA 500D.

2.12 CONTROL CABLE

A. Electronic and fiber-optic cables for control wiring are specified in Division 27 Section "Communications Horizontal Cabling."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that power supply is available to control units and operator workstation.

3.2 INSTALLATION

A. Install software in control units and operator workstation(s). Implement all features of programs to specified requirements and as appropriate to sequence of operation.

B. Connect and configure equipment and software to achieve sequence of operation specified.

C. Verify location of thermostats, humidistats, and other exposed control sensors with Drawings and room details before installation. Install devices 48 inchesabove the floor.
   1. Install averaging elements in ducts and plenums in crossing or zigzag pattern.

D. Install automatic dampers according to Division 23 Section "Air Duct Accessories."

E. Install damper motors on outside of duct in warm areas, not in locations exposed to outdoor temperatures.

F. Install labels and nameplates to identify control components according to Division 23 Section "Identification for HVAC Piping and Equipment."

G. Install hydronic instrument wells, valves, and other accessories according to Division 23 Section "Hydronic Piping."

H. Install steam and condensate instrument wells, valves, and other accessories according to Division 23 Section "Steam and Condensate Heating Piping."

I. Install refrigerant instrument wells, valves, and other accessories according to Division 23 Section "Refrigerant Piping."

J. Install duct volume-control dampers according to Division 23 Sections specifying air ducts.

K. Install electronic and fiber-optic cables according to Division 27 Section "Communications Horizontal Cabling."

3.3 ELECTRICAL WIRING AND CONNECTION INSTALLATION

A. Install raceways, boxes, and cabinets according to Division 26 Section "Raceway and Boxes for Electrical Systems."

B. Install building wire and cable according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

C. Install signal and communication cable according to Division 27 Section "Communications Horizontal Cabling."
   1. Conceal cable, except in mechanical rooms and areas where other conduit and piping are exposed.
   2. Install exposed cable in raceway.
   3. Install concealed cable in raceway.
   4. Bundle and harness multiconductor instrument cable in place of single cables where several cables follow a common path.
   5. Fasten flexible conductors, bridging cabinets and doors, along hinge side; protect against abrasion. Tie and support conductors.
   6. Number-code or color-code conductors for future identification and service of control system, except local individual room control cables.

7. Install wire and cable with sufficient slack and flexible connections to allow for vibration of piping and equipment.

D. Connect manual-reset limit controls independent of manual-control switch positions. Automatic duct heater resets may be connected in interlock circuit of power controllers.

E. Connect hand-off-auto selector switches to override automatic interlock controls when switch is in hand position.

3.4 ADJUSTING

A. Calibrating and Adjusting:
1. Calibrate instruments.
2. Make three-point calibration test for both linearity and accuracy for each analog instrument.
3. Calibrate equipment and procedures using manufacturer's written recommendations and instruction manuals. Use test equipment with accuracy at least double that of instrument being calibrated.
4. Control System Inputs and Outputs:
   a. Check analog inputs at 0, 50, and 100 percent of span.
   b. Check analog outputs using milliampere meter at 0, 50, and 100 percent output.
   c. Check digital inputs using jumper wire.
   d. Check digital outputs using ohmmeter to test for contact making or breaking.
   e. Check resistance temperature inputs at 0, 50, and 100 percent of span using a precision-resistant source.
5. Flow:
   a. Set differential pressure flow transmitters for 0 and 100 percent values with 3-point calibration accomplished at 50, 90, and 100 percent of span.
   b. Manually operate flow switches to verify that they make or break contact.
6. Pressure:
   a. Calibrate pressure transmitters at 0, 50, and 100 percent of span.
   b. Calibrate pressure switches to make or break contacts, with adjustable differential set at minimum.
7. Temperature:
   a. Calibrate resistance temperature transmitters at 0, 50, and 100 percent of span using a precision-resistance source.
   b. Calibrate temperature switches to make or break contacts.
8. Stroke and adjust control valves and dampers without positioners, following the manufacturer's recommended procedure, so that valve or damper is 100 percent open and closed.
9. Stroke and adjust control valves and dampers with positioners, following manufacturer's recommended procedure, so that valve and damper is 0, 50, and 100 percent closed.
10. Provide diagnostic and test instruments for calibration and adjustment of system.
11. Provide written description of procedures and equipment for calibrating each type of instrument. Submit procedures review and approval before initiating startup procedures.

B. Adjust initial temperature and humidity set points.

C. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to three visits to Project during other than normal occupancy hours for this purpose.

3.5 TRAINING

A. Contractor shall provide training to owners personnel for operation of controls system.

END OF SECTION 230900

SECTION 23 11 23

FACILITY NATURAL-GAS PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
1. Pipes, tubes, and fittings.
2. Piping specialties.
3. Piping and tubing joining materials.
4. Valves.
5. Pressure regulators.
6. Concrete bases.

1.3 DEFINITIONS

A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.

B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

1.4 PERFORMANCE REQUIREMENTS

A. Minimum Operating-Pressure Ratings:
1. Piping and Valves: 100 psig minimum unless otherwise indicated.
2. Service Regulators: 65 psig minimum unless otherwise indicated.
3. Minimum Operating Pressure of Service Meter: 65 psig.

B. Natural-Gas System Pressure within Buildings: More than 0.5 psig but not more than 2 psig .

C. Delegated Design: Design restraints and anchors for natural-gas piping and equipment, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of the following:
1. Piping specialties.

2. Valves. Include pressure rating, capacity, settings, and electrical connection data of selected models.
3. Pressure regulators. Indicate pressure ratings and capacities.
4. Service meters. Indicate pressure ratings and capacities. Include supports.
5. Dielectric fittings.

B. Shop Drawings: For facility natural-gas piping layout. Include plans, piping layout and elevations, sections, and details for fabrication of pipe anchors, hangers, supports for multiple pipes, alignment guides, expansion joints and loops, and attachments of the same to building structure. Detail location of anchors, alignment guides, and expansion joints and loops.

1. Shop Drawing Scale: 1/4 inch per foot.
2. Detail mounting, supports, and valve arrangements for service meter assembly and pressure regulator assembly.

1.6 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For pressure regulators to include in emergency, operation, and maintenance manuals.

1.8 QUALITY ASSURANCE

A. Contractor will provide support for weld inspection and testing by third party contracted directly by the owner.

B. Steel Support Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

C. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Handling Flammable Liquids: Remove and dispose of liquids from existing natural-gas piping according to requirements of authorities having jurisdiction.

B. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

C. Store and handle pipes and tubes having factory-applied protective coatings to avoid damaging coating, and protect from direct sunlight.

D. Protect stored PE pipes and valves from direct sunlight.

1.10 PROJECT CONDITIONS

A. Perform site survey, research public utility records, and verify existing utility locations. Contact utility-locating service for area where Project is located.

B. Interruption of Existing Natural-Gas Service: Do not interrupt natural-gas service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide purging and startup of natural-gas supply according to requirements indicated:
   1. Notify Architect and Owner no fewer than two days in advance of proposed interruption of natural-gas service.
   2. Do not proceed with interruption of natural-gas service without Architect's written permission.

1.11 COORDINATION

A. Coordinate sizes and locations of concrete bases with actual equipment provided.

B. Coordinate requirements for access panels and doors for valves installed concealed behind finished surfaces. Comply with requirements in Division 08 Section "Access Doors and Frames."

PART 2 - PRODUCTS

2.1 PIPES, TUBES, AND FITTINGS

A. Steel Pipe: ASTM A 53/A 53M, black steel, Schedule 40, Type E or S, Grade B.
   1. Malleable-Iron Threaded Fittings: ASME B16.3, Class 150, standard pattern.
   2. Wrought-Steel Welding Fittings: ASTM A 234/A 234M for butt welding and socket welding.
   3. Unions: ASME B16.39, Class 150, malleable iron with brass-to-iron seat, ground joint, and threaded ends.
   4. Forged-Steel Flanges and Flanged Fittings: ASME B16.5, minimum Class 150, including bolts, nuts, and gaskets of the following material group, end connections, and facings:
      a. Material Group: 1.1.
      b. End Connections: Threaded or butt welding to match pipe.
      c. Lapped Face: Not permitted underground.
      d. Gasket Materials: ASME B16.20, metallic, flat, asbestos free, aluminum o-rings, and spiral-wound metal gaskets.
      e. Bolts and Nuts: ASME B18.2.1, carbon steel aboveground and stainless steel underground.
   5. Protective Coating for Underground Piping: Factory-applied, three-layer coating of epoxy, adhesive, and PE.
      a. Joint Cover Kits: Epoxy paint, adhesive, and heat-shrink PE sleeves.

B. PE Pipe: ASTM D 2513, SDR 11.
   1. PE Fittings: ASTM D 2683, socket-fusion type or ASTM D 3261, butt-fusion type with dimensions matching PE pipe.
   2. PE Transition Fittings: Factory-fabricated fittings with PE pipe complying with ASTM D 2513, SDR 11; and steel pipe complying with ASTM A 53/A 53M, black steel, Schedule 40, Type E or S, Grade B.
   3. Anodeless Service-Line Risers: Factory fabricated and leak tested.
      a. Underground Portion: PE pipe complying with ASTM D 2513, SDR 11 inlet.

b. Casing: Steel pipe complying with ASTM A 53/A 53M, Schedule 40, black steel, Type E or S, Grade B, with corrosion-protective coating covering. Vent casing aboveground.
c. Aboveground Portion: PE transition fitting.
d. Outlet shall be threaded or flanged or suitable for welded connection.
e. Tracer wire connection.
f. Ultraviolet shield.
g. Stake supports with factory finish to match steel pipe casing or carrier pipe.

4. Transition Service-Line Risers: Factory fabricated and leak tested.
   a. Underground Portion: PE pipe complying with ASTM D 2513, SDR 11 inlet connected to steel pipe complying with ASTM A 53/A 53M, Schedule 40, Type E or S, Grade B, with corrosion-protective coating for aboveground outlet.
   b. Outlet shall be threaded or flanged or suitable for welded connection.
   c. Bridging sleeve over mechanical coupling.
   d. Factory-connected anode.
   e. Tracer wire connection.
   f. Ultraviolet shield.
   g. Stake supports with factory finish to match steel pipe casing or carrier pipe.
5. Plastic Mechanical Couplings,NPS 1-1/2 and Smaller: Capable of joining PE pipe to PE pipe.
   a. PE body with molded-in, stainless-steel support ring.
   b. Buna-nitrile seals.
   c. Acetal collets.
   d. Electro-zinc-plated steel stiffener.
6. Plastic Mechanical Couplings,NPS 2 and Larger: Capable of joining PE pipe to PE pipe, steel pipe to PE pipe, or steel pipe to steel pipe.
   a. Fiber-reinforced plastic body.
   b. PE body tube.
   c. Buna-nitrile seals.
   d. Acetal collets.
   e. Stainless-steel bolts, nuts, and washers.
7. Steel Mechanical Couplings: Capable of joining plain-end PE pipe to PE pipe, steel pipe to PE pipe, or steel pipe to steel pipe.
   a. Stainless-steel flanges and tube with epoxy finish.
   b. Buna-nitrile seals.
   c. Stainless-steel bolts, washers, and nuts.
   d. Factory-installed anode for steel-body couplings installed underground.

2.2 PIPING SPECIALTIES

A. Y-Pattern Strainers:
   1. Body: ASTM A 126, Class B, cast iron with bolted cover and bottom drain connection.
   2. End Connections: Threaded ends for NPS 2 and smaller; flanged ends for NPS 2-1/2 and larger.
   3. Strainer Screen: 40-mesh startup strainer, and perforated stainless-steel basket with 50 percent free area.
   4. CWP Rating: 125 psig .

2.3 JOINING MATERIALS

A. Joint Compound and Tape: Suitable for natural gas.

B. Welding Filler Metals: Comply with AWS D10.12/D10.12M for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

2.4 MANUAL GAS SHUTOFF VALVES

A. See "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles for where each valve type is applied in various services.

B. General Requirements for Metallic Valves, NPS 2 and Smaller: Comply with ASME B16.33.
1. CWP Rating: 125 psig.
2. Threaded Ends: Comply with ASME B1.20.1.
3. Dryseal Threads on Flare Ends: Comply with ASME B1.20.3.
4. Tamperproof Feature: Locking feature for valves indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
5. Listing: Listed and labeled by an NRTL acceptable to authorities having jurisdiction for valves 1 inch and smaller.
6. Service Mark: Valves 1-1/4 inches to NPS 2 shall have initials "WOG" permanently marked on valve body.

C. General Requirements for Metallic Valves, NPS 2-1/2 and Larger: Comply with ASME B16.38.
1. CWP Rating: 125 psig.
2. Flanged Ends: Comply with ASME B16.5 for steel flanges.
3. Tamperproof Feature: Locking feature for valves indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
4. Service Mark: Initials "WOG" shall be permanently marked on valve body.

D. Bronze Plug Valves: MSS SP-78.
1. Body: Bronze, complying with ASTM B 584.
2. Plug: Bronze.
3. Ends: Threaded, socket, or flanged as indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
4. Operator: Square head or lug type with tamperproof feature where indicated.
5. Pressure Class: 125 psig .
6. Listing: Valves NPS 1 and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
7. Service: Suitable for natural-gas service with "WOG" indicated on valve body.

E. Cast-Iron, Nonlubricated Plug Valves: MSS SP-78.
1. Body: Cast iron, complying with ASTM A 126, Class B.
2. Plug: Bronze or nickel-plated cast iron.
3. Seat: Coated with thermoplastic.
4. Stem Seal: Compatible with natural gas.
5. Ends: Threaded or flanged as indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
6. Operator: Square head or lug type with tamperproof feature where indicated.
7. Pressure Class: 125 psig .
8. Listing: Valves NPS 1 and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
9. Service: Suitable for natural-gas service with "WOG" indicated on valve body.

F. Cast-Iron, Lubricated Plug Valves: MSS SP-78.

1. Body: Cast iron, complying with ASTM A 126, Class B.
2. Plug: Bronze or nickel-plated cast iron.
3. Seat: Coated with thermoplastic.
4. Stem Seal: Compatible with natural gas.
5. Ends: Threaded or flanged as indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
6. Operator: Square head or lug type with tamperproof feature where indicated.
7. Pressure Class: 125 psig .
8. Listing: Valves NPS 1 and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
9. Service: Suitable for natural-gas service with "WOG" indicated on valve body.

G. Valve Boxes:
1. Cast-iron, two-section box.
2. Top section with cover with "GAS" lettering.
3. Bottom section with base to fit over valve and barrel a minimum of 5 inches in diameter.
4. Adjustable cast-iron extensions of length required for depth of bury.
5. Include tee-handle, steel operating wrench with socket end fitting valve nut or flat head, and with stem of length required to operate valve.

2.5 PRESSURE REGULATORS

A. General Requirements:
1. Single stage and suitable for natural gas.
2. Steel jacket and corrosion-resistant components.
3. Elevation compensator.
4. End Connections: Threaded for regulators NPS 2 and smaller; flanged for regulators NPS 2-1/2 and larger.

B. Service Pressure Regulators: Comply with ANSI Z21.80.
1. Body and Diaphragm Case: Cast iron or die-cast aluminum.
2. Springs: Zinc-plated steel; interchangeable.
3. Diaphragm Plate: Zinc-plated steel.
4. Seat Disc: Nitrile rubber resistant to gas impurities, abrasion, and deformation at the valve port.
5. Orifice: Aluminum; interchangeable.
6. Seal Plug: Ultraviolet-stabilized, mineral-filled nylon.
7. Single-port, self-contained regulator with orifice no larger than required at maximum pressure inlet, and no pressure sensing piping external to the regulator.
8. Pressure regulator shall maintain discharge pressure setting downstream, and not exceed 150 percent of design discharge pressure at shutoff.
9. Overpressure Protection Device: Factory mounted on pressure regulator.
10. Atmospheric Vent: Factory- or field-installed, stainless-steel screen in opening if not connected to vent piping.
11. Maximum Inlet Pressure: 100 psig.

2.6 DIELECTRIC FITTINGS

A. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.

B. Dielectric Unions:
1. Description:

a. Standard: ASSE 1079.
b. Pressure Rating: 125 psig minimum at 180 deg F.
c. End Connections: Solder-joint copper alloy and threaded ferrous.

C. Dielectric Flanges:
1. Description:
a. Standard: ASSE 1079.
b. Factory-fabricated, bolted, companion-flange assembly.
c. Pressure Rating: 125 psig minimum at 180 deg F.
d. End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.

2.7 LABELING AND IDENTIFYING

A. Detectable Warning Tape: Acid- and alkali-resistant, PE film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description of utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored yellow.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in for natural-gas piping system to verify actual locations of piping connections before equipment installation.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Close equipment shutoff valves before turning off natural gas to premises or piping section.

B. Inspect natural-gas piping according to NFPA 54 and the International Fuel Gas Code to determine that natural-gas utilization devices are turned off in piping section affected.

C. Comply with NFPA 54 and the International Fuel Gas Code requirements for prevention of accidental ignition.

3.3 OUTDOOR PIPING INSTALLATION

A. Comply with NFPA 54 and the International Fuel Gas Code for installation and purging of natural-gas piping.

B. Install underground, natural-gas piping buried at least 36 inches below finished grade. Comply with requirements in Division 31 Section "Earth Moving" for excavating, trenching, and backfilling.
1. If natural-gas piping is installed less than 36 inches below finished grade, install it in containment conduit.

C. Install underground, PE, natural-gas piping according to ASTM D 2774.

D. Steel Piping with Protective Coating:
   1. Apply joint cover kits to pipe after joining to cover, seal, and protect joints.
   2. Repair damage to PE coating on pipe as recommended in writing by protective coating manufacturer.
   3. Replace pipe having damaged PE coating with new pipe.

E. Copper Tubing with Protective Coating:
   1. Apply joint cover kits over tubing to cover, seal, and protect joints.
   2. Repair damage to PE coating on pipe as recommended in writing by protective coating manufacturer.

F. Install fittings for changes in direction and branch connections.

G. Install pressure gage upstream and downstream from each service regulator. Pressure gages are specified in Division 23 Section "Meters and Gages for HVAC Piping."

3.4 INDOOR PIPING INSTALLATION

A. Comply with NFPA 54 and the International Fuel Gas Code for installation and purging of natural-gas piping.

B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

C. Arrange for pipe spaces, chases, slots, sleeves, and openings in building structure during progress of construction, to allow for mechanical installations.

D. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

E. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

F. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

G. Locate valves for easy access.

H. Install natural-gas piping at uniform grade of 2 percent down toward drip and sediment traps.

I. Install piping free of sags and bends.

J. Install fittings for changes in direction and branch connections.

K. Verify final equipment locations for roughing-in.

L. Comply with requirements in Sections specifying gas-fired appliances and equipment for roughing-in requirements.

M. Drips and Sediment Traps: Install drips at points where condensate may collect, including service-meter outlets. Locate where accessible to permit cleaning and emptying. Do not install where condensate is subject to freezing.
   1. Construct drips and sediment traps using tee fitting with bottom outlet plugged or capped. Use nipple a minimum length of 3 pipe diameters, but not less than 3 inches long and same size as connected pipe. Install with space below bottom of drip to remove plug or cap.

N. Conceal pipe installations in walls, pipe spaces, utility spaces, above ceilings, below grade or floors, and in floor channels unless indicated to be exposed to view.

O. Use eccentric reducer fittings to make reductions in pipe sizes. Install fittings with level side down.

P. Connect branch piping from top or side of horizontal piping.

Q. Install unions in pipes NPS 2 and smaller, adjacent to each valve, at final connection to each piece of equipment. Unions are not required at flanged connections.

R. Do not use natural-gas piping as grounding electrode.

S. Install strainer on inlet of each line-pressure regulator and automatic or electrically operated valve.

T. Install pressure gage upstream and downstream from each line regulator. Pressure gages are specified in Division 23 Section "Meters and Gages for HVAC Piping."

U. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Division 23 Section "Sleeves and Sleeve Seals for HVAC Piping."

V. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Division 23 Section "Sleeves and Sleeve Seals for HVAC Piping."

W. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Division 23 Section "Escutcheons for HVAC Piping."

3.5 VALVE INSTALLATION

A. Install manual gas shutoff valve for each gas appliance ahead of corrugated stainless-steel tubing, aluminum, or copper connector.

B. Install regulators and overpressure protection devices with maintenance access space adequate for servicing and testing.

C. Install anode for metallic valves in underground PE piping.

3.6 PIPING JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs.

B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

C. Threaded Joints:
1. Thread pipe with tapered pipe threads complying with ASME B1.20.1.
2. Cut threads full and clean using sharp dies.
3. Ream threaded pipe ends to remove burrs and restore full inside diameter of pipe.
4. Apply appropriate tape or thread compound to external pipe threads unless dryseal threading is specified.
5. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

D. Welded Joints:
1. Construct joints according to AWS D10.12/D10.12M, using qualified processes and welding operators.
2. Bevel plain ends of steel pipe.
3. Patch factory-applied protective coating as recommended by manufacturer at field welds and where damage to coating occurs during construction.

E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter.

F. Flanged Joints: Install gasket material, size, type, and thickness appropriate for natural-gas service. Install gasket concentrically positioned.

G. Flared Joints: Cut tubing with roll cutting tool. Flare tube end with tool to result in flare dimensions complying with SAE J513. Tighten finger tight, then use wrench. Do not overtighten.

H. PE Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657.
1. Plain-End Pipe and Fittings: Use butt fusion.
2. Plain-End Pipe and Socket Fittings: Use socket fusion.

3.7 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements for pipe hangers and supports specified in Division 23 Section "Hangers and Supports for HVAC Piping and Equipment."

B. Install hangers for horizontal steel piping with the following maximum spacing and minimum rod sizes:
1. NPS 1 and Smaller: Maximum span, 96 inches ; minimum rod size, 3/8 inch .
2. NPS 1-1/4 : Maximum span, 108 inches ; minimum rod size, 3/8 inch .
3. NPS 1-1/2 and NPS 2 : Maximum span, 108 inches ; minimum rod size, 3/8 inch .
4. NPS 2-1/2 to NPS 3-1/2 : Maximum span, 10 feet ; minimum rod size, 1/2 inch .
5. NPS 4 and Larger: Maximum span, 10 feet ; minimum rod size, 5/8 inch .

3.8 CONNECTIONS

A. Connect to utility's gas main according to utility's procedures and requirements.

B. Install natural-gas piping electrically continuous, and bonded to gas appliance equipment grounding conductor of the circuit powering the appliance according to NFPA 70.

C. Install piping adjacent to appliances to allow service and maintenance of appliances.

D. Connect piping to appliances using manual gas shutoff valves and unions. Install valve within 72 inches of each gas-fired appliance and equipment. Install union between valve and appliances or equipment.

E. Sediment Traps: Install tee fitting with capped nipple in bottom to form drip, as close as practical to inlet of each appliance.

3.9 LABELING AND IDENTIFYING

A. Comply with requirements in Division 23 Section "Identification for HVAC Piping and Equipment" for piping and valve identification.

B. Install detectable warning tape directly above gas piping, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.10 PAINTING

A. Comply with requirements in Division 09 painting Sections for painting interior and exterior natural-gas piping.

B. Paint exposed, exterior metal piping, valves, service regulators, service meters and meter bars, earthquake valves, and piping specialties, except components, with factory-applied paint or protective coating.
   1. Alkyd System: MPI EXT 5.1D.
      a. Prime Coat: Alkyd anticorrosive metal primer.
      b. Intermediate Coat: Exterior alkyd enamel matching topcoat.
      c. Topcoat: Exterior alkyd enamel (semigloss).
      d. Color: Gray.

C. Paint exposed, interior metal piping, valves, service regulators, service meters and meter bars, earthquake valves, and piping specialties, except components, with factory-applied paint or protective coating.
   1. Latex Over Alkyd Primer System: MPI INT 5.1Q.
      a. Prime Coat: Alkyd anticorrosive metal primer.
      b. Intermediate Coat: Interior latex matching topcoat.
      c. Topcoat: Interior latex (low sheen).
      d. Color: Gray.

D. Damage and Touchup: Repair marred and damaged factory-applied finishes with materials and by procedures to match original factory finish.

3.11 CONCRETE BASES

A. Concrete Bases: Anchor equipment to concrete base.
   1. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in both directions than supported unit.

2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of the base.
3. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
5. Install anchor bolts to elevations required for proper attachment to supported equipment.
6. Use 3000-psig, 28-day, compressive-strength concrete and reinforcement as specified in Division 03 Section "Miscellaneous Cast-in-Place Concrete."

3.12 OUTDOOR PIPING SCHEDULE

A. Underground natural-gas pipingshall be the following:
1. PE pipe and fittings joined by heat fusion, or mechanical couplings; service-line risers with tracer wire terminated in an accessible location.

B. Aboveground natural-gas pipingshall be the following:
1. Steel pipe with wrought-steel fittings and welded joints.

3.13 INDOOR PIPING SCHEDULE FOR SYSTEM PRESSURES MORE THAN 0.5 PSIG AND LESS THAN 5 PSIG

A. Aboveground, piping NPS 1 and smaller shall be the following:
1. Steel pipe with malleable-iron fittings and threaded joints.

B. Aboveground, piping NPS 1-1/4 and larger shall be the following:
1. Steel pipe with steel welding fittings and welded joints.

3.14 ABOVEGROUND MANUAL GAS SHUTOFF VALVE SCHEDULE

A. Valves for pipe sizes NPS 2-1/2 and larger shall be the following:
1. Cast-iron, lubricated plug valve.

B. Valves for pipe sizes NPS 2 and smaller shall be the following:
1. Bronze plug valve.

END OF SECTION 23 11 23

SECTION 232113

HYDRONIC PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes pipe and fitting materials, joining methods, special-duty valves, and specialties for the following:
   1. Hot-water heating piping.
   2. Chilled-water piping.
   3. Makeup-water piping.
   4. Condensate-drain piping.
   5. Air-vent piping.
   6. Safety-valve-inlet and -outlet piping.

B. Related Sections include the following:
   1. Division 23 Section "Hydronic Pumps" for pumps, motors, and accessories for hydronic piping.

1.3 PERFORMANCE REQUIREMENTS

A. Hydronic piping components and installation shall be capable of withstanding the following minimum working pressure and temperature:
   1. Hot-Water Heating Piping: 125 psig at 200 deg F.
   2. Chilled-Water Piping: 125 psig at 200 deg F.
   3. Makeup-Water Piping: 80 psig at 150 deg F.
   4. Condensate-Drain Piping: 150 deg F.
   5. Air-Vent Piping: 200 deg F.
   6. Safety-Valve-Inlet and -Outlet Piping: Equal to the pressure of the piping system to which it is attached.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of the following:
   1. Plastic pipe and fittings with solvent cement.
   2. Valves. Include flow and pressure drop curves based on manufacturer's testing for calibrated-orifice balancing valves and automatic flow-control valves.
   3. Air control devices.
   4. Hydronic specialties.

B. Shop Drawings: Detail, at 1/4 scale, the piping layout, fabrication of pipe anchors, hangers, supports for multiple pipes, alignment guides, expansion joints and loops, and attachments of the same to the building structure. Detail location of anchors, alignment guides, and expansion joints and loops.

1.5 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For air control devices, hydronic specialties, and special-duty valves to include in emergency, operation, and maintenance manuals.

1.7 QUALITY ASSURANCE

A. Contractor will provide support for weld inspection and testing by third party contracted directly by the owner.

B. Steel Support Welding: Qualify processes and operators according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

C. Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX.
   1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
   2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

D. ASME Compliance: Comply with ASME B31.9, "Building Services Piping," for materials, products, and installation. Safety valves and pressure vessels shall bear the appropriate ASME label. Fabricate and stamp air separators and expansion tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 01.

PART 2 - PRODUCTS

2.1 COPPER TUBE AND FITTINGS

A. Drawn-Temper Copper Tubing: ASTM B 88, Type L.

B. Annealed-Temper Copper Tubing: ASTM B 88, Type K.

C. DWV Copper Tubing: ASTM B 306, Type DWV.

D. Wrought-Copper Fittings: ASME B16.22.
   1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. Anvil International, Inc.
      b. S. P. Fittings; a division of Star Pipe Products.
      c. Victaulic Company.

E. Copper, Mechanically Formed Tee Option: For forming T-branch on copper water tube.
   1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. T-DRILL Industries Inc.

F. Wrought-Copper Unions: ASME B16.22.

2.2 STEEL PIPE AND FITTINGS

A. Steel Pipe: ASTM A 53/A 53M, black steel with plain ends; type, grade, and wall thickness as indicated in Part 3 "Piping Applications" Article.

B. Wrought-Steel Fittings: ASTM A 234/A 234M, wall thickness to match adjoining pipe.

C. Wrought Cast- and Forged-Steel Flanges and Flanged Fittings: ASME B16.5, including bolts, nuts, and gaskets of the following material group, end connections, and facings:
1. Material Group: 1.1.
2. End Connections: Butt welding.
3. Facings: Raised face.

D. Steel Pipe Nipples: ASTM A 733, made of same materials and wall thicknesses as pipe in which they are installed.

2.3 JOINING MATERIALS

A. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.
1. ASME B16.21, nonmetallic, flat, asbestos free, 1/8-inch maximum thickness unless thickness or specific material is indicated.

B. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

C. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

D. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for joining copper with copper; or BAg-1, silver alloy for joining copper with bronze or steel.

E. Welding Filler Metals: Comply with AWS D10.12/D10.12M for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

F. Gasket Material: Thickness, material, and type suitable for fluid to be handled and working temperatures and pressures.

2.4 DIELECTRIC FITTINGS

A. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.

B. Dielectric Unions:
1. Description:
   a. Standard: ASSE 1079.
   b. Pressure Rating: 125 psig minimum at 180 deg F.
   c. End Connections: Solder-joint copper alloy and threaded ferrous.

C. Dielectric Flanges:
1. Description:

a. Standard: ASSE 1079.
b. Factory-fabricated, bolted, companion-flange assembly.
c. Pressure Rating: 125 psig minimum at 180 deg F.
d. End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.

2.5 VALVES

A. Automatic Temperature-Control Valves, Actuators, and Sensors: Comply with requirements specified in Division 23 Section "Instrumentation and Control for HVAC."

B. Automatic Flow-Control Valves:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Flow Design Inc.
   b. Griswold Controls.
2. Body: Brass or ferrous metal.
3. Piston and Spring Assembly: Stainless steel, tamper proof, self cleaning, and removable.
4. Combination Assemblies: Include bonze or brass-alloy ball valve.
5. Identification Tag: Marked with zone identification, valve number, and flow rate.
6. Size: Same as pipe in which installed.
7. Performance: Maintain constant flow, plus or minus 5 percent over system pressure fluctuations.
8. Minimum CWP Rating: 175 psig.
9. Maximum Operating Temperature: 200 deg F.

2.6 AIR CONTROL DEVICES

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Armstrong Pumps, Inc.
2. Bell & Gossett Domestic Pump; a division of ITT Industries.
3. PACO, a division of Grundfos CBS Inc.
4. Patterson Pump Co, a subsidiary of Gorman-Rupp Co.

C. Manual Air Vents:
1. Body: Bronze.
2. Internal Parts: Nonferrous.
3. Operator: Screwdriver or thumbscrew.
4. Inlet Connection: NPS 1/2.
5. Discharge Connection: **NPS 1/8**.
6. CWP Rating: 150 psig.
7. Maximum Operating Temperature: 225 deg F.

D. Automatic Air Vents:
1. Body: Bronze or cast iron.
2. Internal Parts: Nonferrous.
3. Operator: Noncorrosive metal float.
4. Inlet Connection: NPS 1/2.
5. Discharge Connection: NPS 1/4.

6. CWP Rating: 150 psig.
7. Maximum Operating Temperature: 240 deg F.

E. Bladder-Type Expansion Tanks:
1. Tank: Welded steel, rated for 125-psig working pressure and 375 deg F maximum operating temperature. Factory test with taps fabricated and supports installed and labeled according to ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
2. Bladder: Securely sealed into tank to separate air charge from system water to maintain required expansion capacity.
3. Air-Charge Fittings: Schrader valve, stainless steel with EPDM seats.

2.7 AIR AND PARTICLE SEPARATOR DEVICES

A. In-Line Air and Dirt Separators:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. SPIROTHERM.
b. Thrush Co Inc..
2. Body: Steel shell with internal coalescing medium to facilitate maximum air and dirt separation and suppress turbulence. Units shall be capable of removing 100% of entrained air, 100% of free air and 99.6% of the dissolve air in the system fluid. Unit shall have removable lower head to facilitate removal of coalescing medium.
3. Maximum Working Pressure: Up to 150 psig.
4. Maximum Operating Temperature: Up to 300 deg F.
5. Maximum Pressure Drop: Less than 1 psig.

2.8 HYDRONIC PIPING SPECIALTIES

A. Y-Pattern Strainers:
1. Body: ASTM A 126, Class B, cast iron with bolted cover and bottom drain connection.
2. End Connections: Threaded ends for NPS 2 and smaller; flanged ends for NPS 2-1/2 and larger.
3. Strainer Screen: 40-mesh startup strainer, and perforated stainless-steel basket with 50 percent free area.
4. CWP Rating: 125 psig.

B. Stainless-Steel Bellow, Flexible Connectors:
1. Body: Stainless-steel bellows with woven, flexible, bronze, wire-reinforcing protective jacket.
2. End Connections: Threaded or flanged to match equipment connected.
3. Performance: Capable of 3/4-inch misalignment.
4. CWP Rating: 150 psig.
5. Maximum Operating Temperature: 250 deg F.

C. Expansion fittings are specified in Division 23 Section "Expansion Fittings and Loops for HVAC Piping."

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS

A. Hot-water heating piping, aboveground, NPS 2 and smaller, shall be the following:
1. Type L, drawn-temper copper tubing, wrought-copper fittings, and soldered joints.

B. Hot-water heating piping, aboveground, NPS 2-1/2 and larger, shall be the following:
   1. Schedule 40 steel pipe, wrought-steel fittings and wrought-cast or forged-steel flanges and flange fittings, and welded and flanged joints.

C. Chilled-water piping, aboveground, NPS 2 and smaller, shall be the following:
   1. Type L, drawn-temper copper tubing, wrought-copper fittings, and soldered joints.

D. Chilled-water piping, aboveground, NPS 2-1/2 and larger, shall be the following:
   1. Schedule 40 steel pipe, wrought-steel fittings and wrought-cast or forged-steel flanges and flange fittings, and welded and flanged joints.

E. Makeup-water piping installed aboveground shall be the following:
   1. Type L, drawn-temper copper tubing, wrought-copper fittings, and soldered joints.

F. Condensate-Drain Piping: Type DWV, drawn-temper copper tubing, wrought-copper fittings, and soldered joints.

G. Air-Vent Piping:
   1. Inlet: Same as service where installed with metal-to-plastic transition fittings for plastic piping systems according to the piping manufacturer's written instructions.
   2. Outlet: Type K, annealed-temper copper tubing with soldered or flared joints.

H. Safety-Valve-Inlet and -Outlet Piping for Hot-Water Piping: Same materials and joining methods as for piping specified for the service in which safety valve is installed with metal-to-plastic transition fittings for plastic piping systems according to the piping manufacturer's written instructions.

3.2 VALVE APPLICATIONS

A. Install shutoff-duty valves at each branch connection to supply mains, and at supply connection to each piece of equipment.

B. Install throttling-duty valves at each branch connection to return main.

C. Install pressure-reducing valves at makeup-water connection to regulate system fill pressure.

3.3 PIPING INSTALLATIONS

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicate piping locations and arrangements if such were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

B. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.

C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

E. Install piping to permit valve servicing.

F. Install piping at indicated slopes.

G. Install piping free of sags and bends.

H. Install fittings for changes in direction and branch connections.

I. Install piping to allow application of insulation.

J. Select system components with pressure rating equal to or greater than system operating pressure.

K. Install groups of pipes parallel to each other, spaced to permit applying insulation and servicing of valves.

L. Install drains, consisting of a tee fitting, **NPS 3/4** ball valve, and short NPS 3/4 threaded nipple with cap, at low points in piping system mains and elsewhere as required for system drainage.

M. Install piping at a uniform grade of 0.2 percent upward in direction of flow.

N. Reduce pipe sizes using eccentric reducer fitting installed with level side up.

O. Install branch connections to mains using mechanically formed tee fittings in main pipe, with the branch connected to the bottom of the main pipe. For up-feed risers, connect the branch to the top of the main pipe.

P. Install valves according to Division 23 Section "General-Duty Valves for HVAC Piping."

Q. Install unions in piping**,** NPS 2 and smaller, adjacent to valves, at final connections of equipment, and elsewhere as indicated.

R. Install flanges in piping, NPS 2-1/2 and larger, at final connections of equipment and elsewhere as indicated.

S. Install strainers on inlet side of each control valve, pressure-reducing valve, solenoid valve, in-line pump, and elsewhere as indicated. Install NPS 3/4 nipple and ball valve in blowdown connection of strainers NPS 2 and larger. Match size of strainer blowoff connection for strainers smaller than NPS 2.

T. Install expansion loops, expansion joints, anchors, and pipe alignment guides as specified in Division 23Section "Expansion Fittings and Loops for HVAC Piping."

U. Identify piping as specified in Division 23 Section "Identification for HVAC Piping and Equipment."

V. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Division 23 Section "Sleeves and Sleeve Seals for HVAC Piping."

W. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Division 23 Section "Sleeves and Sleeve Seals for HVAC Piping."

X. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Division 23 Section "Escutcheons for HVAC Piping."

3.4 HANGERS AND SUPPORTS

A. Hanger, support, and anchor devices are specified in Division 23 Section "Hangers and Supports for HVAC Piping and Equipment." Comply with the following requirements for maximum spacing of supports.

B. Install the following pipe attachments:
1. Adjustable steel clevis hangers for individual horizontal piping less than 20 feet long.
2. Adjustable roller hangers and spring hangers for individual horizontal piping 20 feet or longer.
3. Pipe Roller: MSS SP-58, Type 44 for multiple horizontal piping 20 feet or longer, supported on a trapeze.
4. Spring hangers to support vertical runs.
5. Provide copper-clad hangers and supports for hangers and supports in direct contact with copper pipe.

C. Install hangers for steel piping with the following maximum spacing and minimum rod sizes:
1. NPS 3/4: Maximum span, 7 feet; minimum rod size, 1/4 inch.
2. NPS 1: Maximum span, 7 feet; minimum rod size, 1/4 inch.
3. NPS 1-1/2: Maximum span, 9 feet; minimum rod size, 3/8 inch.
4. NPS 2: Maximum span, 10 feet; minimum rod size, 3/8 inch.
5. NPS 2-1/2: Maximum span, 11 feet; minimum rod size, 3/8 inch.
6. NPS 3: Maximum span, 12 feet; minimum rod size, 3/8 inch.
7. NPS 4: Maximum span, 14 feet; minimum rod size, 1/2 inch.
8. NPS 6: Maximum span, 17 feet; minimum rod size, 1/2 inch.
9. NPS 8: Maximum span, 19 feet; minimum rod size, 5/8 inch.
10. NPS 10: Maximum span, 20 feet; minimum rod size, 3/4 inch.
11. NPS 12: Maximum span, 23 feet; minimum rod size, 7/8 inch.
12. NPS 14: Maximum span, 25 feet; minimum rod size, 1 inch.
13. NPS 16: Maximum span, 27 feet; minimum rod size, 1 inch.
14. NPS 18: Maximum span, 28 feet; minimum rod size, 1-1/4 inches.
15. NPS 20: Maximum span, 30 feet; minimum rod size, 1-1/4 inches.

D. Install hangers for drawn-temper copper piping with the following maximum spacing and minimum rod sizes:
1. NPS 3/4: Maximum span, 5 feet; minimum rod size, 1/4 inch.
2. NPS 1: Maximum span, 6 feet; minimum rod size, 1/4 inch.
3. NPS 1-1/2: Maximum span, 8 feet; minimum rod size, 3/8 inch.
4. NPS 2: Maximum span, 8 feet; minimum rod size, 3/8 inch.
5. NPS 2-1/2: Maximum span, 9 feet; minimum rod size, 3/8 inch.
6. NPS 3: Maximum span, 10 feet; minimum rod size, 3/8 inch.

E. Plastic Piping Hanger Spacing: Space hangers according to pipe manufacturer's written instructions for service conditions. Avoid point loading. Space and install hangers with the fewest practical rigid anchor points.

F. Support vertical runs at roof, at each floor, and at 10-foot intervals between floors.

3.5 PIPE JOINT CONSTRUCTION

A. Join pipe and fittings according to the following requirements and Division 23 Sections specifying piping systems.

B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.

E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.

F. Welded Joints: Construct joints according to AWS D10.12/D10.12M, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.

G. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

H. Mechanically Formed, Copper-Tube-Outlet Joints: Use manufacturer-recommended tool and procedure, and brazed joints.

3.6 HYDRONIC SPECIALTIES INSTALLATION

A. Install manual air vents at high points in piping, at heat-transfer coils, and elsewhere as required for system air venting.

B. Install automatic air vents at high points of system piping in mechanical equipment rooms only. Manual vents at heat-transfer coils and elsewhere as required for air venting.

C. Install piping from boiler air outlet, air separator, or air purger to expansion tank with a 2 percent upward slope toward tank.

D. Install air and dirt separator in pump suction. Install blowdown piping with full-port ball valve; extend full size to nearest floor drain.

E. Install expansion tanks above the air separator. Install tank fitting in tank bottom and charge tank. Use manual vent for initial fill to establish proper water level in tank.
   1. Install tank fittings that are shipped loose.
   2. Support tank from floor or structure above with sufficient strength to carry weight of tank, piping connections, fittings, plus tank full of water. Do not overload building components and structural members.

3.7 TERMINAL EQUIPMENT CONNECTIONS

A. Sizes for supply and return piping connections shall be the same as or larger than equipment connections.

B. Install control valves in accessible locations close to connected equipment.

C. Install bypass piping with globe valve around control valve. If parallel control valves are installed, only one bypass is required.

D. Install ports for pressure gages and thermometers at coil inlet and outlet connections according to Division 23 Section "Meters and Gages for HVAC Piping."

3.8 FIELD QUALITY CONTROL

A. Prepare hydronic piping according to ASME B31.9 and as follows:
1. Leave joints, including welds, uninsulated and exposed for examination during test.
2. Provide temporary restraints for expansion joints that cannot sustain reactions due to test pressure. If temporary restraints are impractical, isolate expansion joints from testing.
3. Flush hydronic piping systems with clean water; then remove and clean or replace strainer screens.
4. Isolate equipment from piping. If a valve is used to isolate equipment, its closure shall be capable of sealing against test pressure without damage to valve. Install blinds in flanged joints to isolate equipment.
5. Install safety valve, set at a pressure no more than one-third higher than test pressure, to protect against damage by expanding liquid or other source of overpressure during test.

B. Perform the following tests on hydronic piping:
1. Use ambient temperature water as a testing medium unless there is risk of damage due to freezing. Another liquid that is safe for workers and compatible with piping may be used.
2. While filling system, use vents installed at high points of system to release air. Use drains installed at low points for complete draining of test liquid.
3. Isolate expansion tanks and determine that hydronic system is full of water.
4. Subject piping system to hydrostatic test pressure that is not less than 1.5 times the system's working pressure. Test pressure shall not exceed maximum pressure for any vessel, pump, valve, or other component in system under test. Verify that stress due to pressure at bottom of vertical runs does not exceed 90 percent of specified minimum yield strength or 1.7 times "SE" value in Appendix A in ASME B31.9, "Building Services Piping."
5. After hydrostatic test pressure has been applied for at least 10 minutes, examine piping, joints, and connections for leakage. Eliminate leaks by tightening, repairing, or replacing components, and repeat hydrostatic test until there are no leaks.
6. Prepare written report of testing.

C. Perform the following before operating the system:
1. Open manual valves fully.
2. Inspect pumps for proper rotation.
3. Set makeup pressure-reducing valves for required system pressure.
4. Inspect air vents at high points of system and determine if all are installed and operating freely (automatic type), or bleed air completely (manual type).
5. Set temperature controls so all coils are calling for full flow.
6. Inspect and set operating temperatures of hydronic equipment, such as boilers, chillers, cooling towers, to specified values.
7. Verify lubrication of motors and bearings.

END OF SECTION 23 2113

SECTION 23 21 23

HYDRONIC PUMPS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Separately coupled, base-mounted, end-suction centrifugal pumps.

1.3 DEFINITIONS

A. Buna-N: Nitrile rubber.

B. EPT: Ethylene propylene terpolymer.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of pump. Include certified performance curves and rated capacities, operating characteristics, furnished specialties, final impeller dimensions, and accessories for each type of product indicated. Indicate pump's operating point on curves.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For pumps to include in emergency, operation, and maintenance manuals.

PART 2 - PRODUCTS

2.1 SEPARATELY COUPLED, BASE-MOUNTED, END-SUCTION CENTRIFUGAL PUMPS

A. Description: Factory-assembled and -tested, centrifugal, overhung-impeller, separately coupled, end-suction pump as defined in HI 1.1-1.2 and HI 1.3; designed for base mounting, with pump and motor shafts horizontal.

B. Pump Construction:

   1. Casing: Radially split, cast iron, with replaceable bronze wear rings, threaded gage tappings at inlet and outlet, drain plug at bottom and air vent at top of volute, and flanged connections. Provide integral mount on volute to support the casing, and provide attached piping to allow removal and replacement of impeller without disconnecting piping or requiring the realignment of pump and motor shaft.
   2. Impeller: ASTM B 584, cast bronze; statically and dynamically balanced, keyed to shaft, and secured with a locking cap screw. For pumps not frequency-drive controlled, trim impeller to match specified performance.

3. Pump Shaft: Stainless steel.
4. Seal: Mechanical seal consisting of carbon rotating ring against a ceramic seat held by a stainless-steel spring, and Buna-N bellows and gasket.
5. Pump Bearings: Grease-lubricated ball bearings in cast-iron housing with grease fittings.

C. Shaft Coupling: Molded-rubber insert and interlocking spider capable of absorbing vibration. Couplings shall be drop-out type to allow disassembly and removal without removing pump shaft or motor. EPDM coupling sleeve for variable-speed applications.

D. Coupling Guard: Dual rated; ANSI B15.1, Section 8; OSHA 1910.219 approved; steel; removable; attached to mounting frame.

E. Mounting Frame: Welded-steel frame and cross members, factory fabricated from ASTM A 36/A 36M channels and angles. Fabricate to mount pump casing, coupling guard, and motor.

F. Motor: Single speed, secured to mounting frame, with adjustable alignment.

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Comply with NEMA designation, temperature rating, service factor, and efficiency requirements for motors specified in Division 23 Section "Common Motor Requirements for HVAC Equipment."

a. Enclosure: Open, dripproof Open, externally ventilated.
b. Enclosure Materials: Cast iron.
c. Motor Bearings: Permanently lubricated ball bearings.
d. Unusual Service Conditions:

1) Ambient Temperature: 200 deg F.
2) Altitude: 1280 feet above sea level.
3) High humidity.

e. Efficiency: Premium efficient.
f. Service Factor: 1.15.

2.2 PUMP SPECIALTY FITTINGS

A. Suction Diffuser:

1. Angle pattern.
2. 175-psig pressure rating, cast-iron body and end cap, pump-inlet fitting.
3. Bronze startup and bronze or stainless-steel permanent strainers.
4. Bronze or stainless-steel straightening vanes.
5. Drain plug.
6. Factory-fabricated support.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine equipment foundations and anchor-bolt locations for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for piping systems to verify actual locations of piping connections before pump installation.

C. Examine foundations and inertia bases for suitable conditions where pumps are to be installed.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PUMP INSTALLATION

A. Install pumps to provide access for periodic maintenance including removing motors, impellers, couplings, and accessories.

B. Independently support pumps and piping so weight of piping is not supported by pumps and weight of pumps is not supported by piping.

C. Equipment Mounting: Install base-mounted pumps on cast-in-place concrete equipment base(s) using restrained spring isolators. Comply with requirements for equipment bases specified in Division 03 Section "Cast-in-Place Concrete."

1. Minimum Deflection: 1 inch.
2. Coordinate sizes and locations of concrete bases with actual equipment provided. Cast anchor-bolt inserts into bases.
3. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around full perimeter of concrete base.
4. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
5. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
6. Install anchor bolts to elevations required for proper attachment to supported equipment.
7. Install on 6-inch- high concrete base.

D. Equipment Mounting: Install in-line pumps with continuous-thread hanger rods and spring hangers with vertical-limit stop of size required to support weight of in-line pumps.

1. Comply with requirements for hangers and supports specified in Division 23 Section "Hangers and Supports for HVAC Piping and Equipment."

3.3 ALIGNMENT

A. Engage a factory-authorized service representative to perform alignment service.

B. Comply with requirements in Hydronics Institute standards for alignment of pump and motor shaft. Add shims to the motor feet and bolt motor to base frame. Do not use grout between motor feet and base frame.

C. Comply with pump and coupling manufacturers' written instructions.

D. After alignment is correct, tighten foundation bolts evenly but not too firmly. Completely fill baseplate with nonshrink, nonmetallic grout while metal blocks and shims or wedges are in place. After grout has cured, fully tighten foundation bolts.

3.4 CONNECTIONS

A. Comply with requirements for piping specified in Division 23 Section "Steam and Condensate Heating Piping." Drawings indicate general arrangement of piping, fittings, and specialties.

B. Where installing piping adjacent to pump, allow space for service and maintenance.

C. Connect piping to pumps. Install valves that are same size as piping connected to pumps.

D. Install suction and discharge pipe sizes equal to or greater than diameter of pump nozzles.

E. Install check, shutoff, and manual flow measuring valves on discharge side of pumps.

F. Install Y-type strainer or suction diffuser and shutoff valve on suction side of pumps.

G. Install flexible connectors on suction and discharge sides of base-mounted pumps between pump casing and valves.

H. Install pressure gages on pump suction and discharge or at integral pressure-gage tapping, or install single gage with multiple-input selector valve.

I. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

3.5 STARTUP SERVICE

A. Perform startup service.

1. Complete installation and startup checks according to manufacturer's written instructions.
2. Check piping connections for tightness.
3. Clean strainers on suction piping.
4. Perform the following startup checks for each pump before starting:

    a. Verify bearing lubrication.
    b. Verify that pump is free to rotate by hand and that pump for handling hot liquid is free to rotate with pump hot and cold. If pump is bound or drags, do not operate until cause of trouble is determined and corrected.
    c. Verify that pump is rotating in the correct direction.

5. Prime pump by opening suction valves and closing drains, and prepare pump for operation.
6. Start motor.
7. Open discharge valve slowly.

END OF SECTION

SECTION 23 25 00

HVAC WATER TREATMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following HVAC water-treatment systems:
1. Bypass chemical-feed equipment and controls.
2. HVAC water-treatment chemicals.
3. Glycol Makeup System
4. Propylene Glycol.

1.3 DEFINITIONS

A. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control, signaling power-limited circuits.

B. TDS: Total dissolved solids.

1.4 PERFORMANCE REQUIREMENTS

A. Water quality for HVAC systems shall minimize corrosion, scale buildup, and biological growth for optimum efficiency of HVAC equipment without creating a hazard to operating personnel or the environment.

B. Base HVAC water treatment on quality of water available at Project site, HVAC system equipment material characteristics and functional performance characteristics, operating personnel capabilities, and requirements and guidelines of authorities having jurisdiction.

C. Closed hydronic systems, including hot-water heating and chilled water, shall have the following water qualities:

1. pH: Maintain a value within 9.0 to 10.5.
2. "P" Alkalinity: Maintain a value within 100 to 500 ppm.
3. Boron: Maintain a value within 100 to 200 ppm.
4. Chemical Oxygen Demand: Maintain a maximum value of 100 ppm.
5. Soluble Copper: Maintain a maximum value of 0.20 ppm.
6. TDS: Maintain a maximum value of 10 ppm.
7. Ammonia: Maintain a maximum value of 20 ppm.
8. Free Caustic Alkalinity: Maintain a maximum value of 20 ppm.
9. Microbiological Limits:

    a. Total Aerobic Plate Count: Maintain a maximum value of 1000 organisms/ml.
    b. Total Anaerobic Plate Count: Maintain a maximum value of 100 organisms/ml.

c. Nitrate Reducers: Maintain a maximum value of 100 organisms/ml.
d. Sulfate Reducers: Maintain a maximum value of 0 organisms/ml.
e. Iron Bacteria: Maintain a maximum value of 0 organisms/ml.

1.5 SUBMITTALS

A. Product Data: Include rated capacities, operating characteristics, furnished specialties, and accessories for the following products:
1. Bypass feeders.
2. Water meters.
3. Chemical material safety data sheets.

B. Operation and Maintenance Data: For equipment, sensors, and controllers to include in emergency, operation, and maintenance manuals.

C. Other Informational Submittals:

1. Water-Treatment Program: Written sequence of operation on an annual basis for the application equipment required to achieve water quality defined in the "Performance Requirements" Article above.
2. Water Analysis: Illustrate water quality available at Project site. Provide the following information:

a. Calcium Hardness (as ppm CaCO3)
b. Total Hardness (as ppm CaCO3)
c. Total Alkalinity or m-Alkalinity (as ppm CaCO3)
d. pH
e. Silica (as SiO2)
f. Specific Conductivity (μS/cm)
g. Sulfate (as SO4)
h. Chloride (as Cl-)
i. Phosphate (as PO4)

1.6 QUALITY ASSURANCE

A. HVAC Water-Treatment Service Provider Qualifications: An experienced HVAC water-treatment service provider capable of analyzing water qualities, installing water-treatment equipment, and applying water treatment as specified in this Section.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.7 MAINTENANCE SERVICE

A. Scope of Maintenance Service: Provide chemicals and service program to maintain water conditions required above to inhibit corrosion, scale formation, and biological growth for cooling, chilled-water piping and heating, hot-water piping and equipment. Services and chemicals shall be provided for a period of one year from date of Substantial Completion, and shall include the following:

1. Initial water analysis and HVAC water-treatment recommendations.
2. Startup assistance for Contractor to flush the systems, clean with detergents, and initially fill systems with required chemical treatment prior to operation.
3. Periodic field service and consultation.
4. Customer report charts and log sheets.
5. Laboratory technical analysis.
6. Analyses and reports of all chemical items concerning safety and compliance with government regulations.

PART 2 - PRODUCTS

2.1 MANUAL CHEMICAL-FEED EQUIPMENT

A. Bypass Feeders: Steel, with corrosion-resistant exterior coating, minimum 3-1/2-inch fill opening in the top, and NPS 3/4 bottom inlet and top side outlet. Quarter turn or threaded fill cap with gasket seal and diaphragm to lock the top on the feeder when exposed to system pressure in the vessel.

1. Capacity: 5 gal.
2. Minimum Working Pressure: 125 psig.

2.2 CHEMICALS

A. Chemicals shall be as recommended by water-treatment system manufacturer that are compatible with base wide existing treatment, piping system components and connected equipment, and that can attain water quality specified in Part 1 "Performance Requirements" Article.

2.3 GLYCOL MAKEUP SYSTEM

A. Description: The glyclol makeup system shall provide a consistent operating pressure in closed loop systems so that a controlled percentage of glycol solution can be fed to the system. The controller shall employ solid state electronics and a 0-100 psi pressure gauge to monitor closed loop operating pressure. A NEMA Type 1 steel enclosure shall be prewired for ease of installation. A prepiped flow assembly shall include a pressure switch and pressure relief valve to prevent excessive pressure buildup. A low liquid switch shall prevent the positive displacement pump from operating when solution is low. The glycol feeder shall be mounted on a primed and painted steel frame with a polyethylene tank. B&G, Model 50 RJX 50-115 or approved equal.
1. Manufacturer: Morr Control, Model GF-1 or approved equal.
2. Pump: Positive displacement rated at 115 VAC. Pump capacity output of 2.1 gpm at 2 psi through 1.5 gpm at 100 psi.
3. Tank: 50 gallon capacity, polyethelene construction.
4. Operating pressure: 150 psi maximum.
5. Power: 115 VAC, 60 Hz, Single phase, 15 amp SPDT, 1/2 HP.
6. Environment: Ambient temperature -40 to 140oF.
7. Enclosure: NEMA Type 1 steel with gasketed, hinged door, Lexan window, padlocking hasp and 8' three-wire power cord.

2.4 PROPYLENE GLYCOL

A. Provide HVAC grade Propylene Glycol in a 30% by volume for the total system. Provide DOWFROST HD heat transfer fluid which is a formulation of propylene glycol and a specially

designed package of industrial corrosion inhibitors. The fluid shall be dyed fluorescent yellow to aid in leak detection. The fluid shall be Suitable for this application which includes: single fluid process heating and cooling, closed-loop, water-based HVAC applications where propylene glycol solutions are required. Other manufacturers shall provide material data sheet for engineers approval.

2.5 MISCELLANEOUS WATER TREATMENT EQUIPMENT

A. Water Meter:

1. AWWA C701, turbine-type, totalization meter.
2. Body: Bronze.
3. Minimum Working-Pressure Rating: 100 psig .
4. Maximum Pressure Loss at Design Flow: 3 psig .
5. Registration: Gallons or cubic feet .
6. End Connections: Threaded.
7. Control: Low-voltage signal capable of transmitting 1000 feet .

2.6 CHEMICALS

A. Chemicals shall be as recommended by water-treatment system manufacturer that are compatible with piping system components and connected equipment, and that can attain water quality specified in Part 1 "Performance Requirements" Article.

PART 3 - EXECUTION

3.1 WATER ANALYSIS

A. Perform an analysis of supply water to determine quality of water available at Project site.

3.2 INSTALLATION

A. Install chemical application equipment on concrete bases, level and plumb. Maintain manufacturer's recommended clearances. Arrange units so controls and devices that require servicing are accessible. Anchor chemical tanks and floor-mounting accessories to substrate.

B. Install interconnecting control wiring for chemical treatment controls and sensors.

C. Mount sensors and injectors in piping circuits.

D. Bypass Feeders: Install in closed hydronic systems, including hot-water heating and chilled water, and equipped with the following:

1. Install bypass feeder in a bypass circuit around circulating pumps, unless otherwise indicated on Drawings.
2. Install water meter in makeup water supply.
3. Install test-coupon assembly in bypass circuit around circulating pumps, unless otherwise indicated on Drawings.
4. Install a full-port ball isolation valves on inlet, outlet, and drain below feeder inlet.
5. Install a swing check on inlet after the isolation valve.

3.3 CONNECTIONS

A. Piping installation requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to equipment to allow service and maintenance.

C. Make piping connections between HVAC water-treatment equipment and dissimilar-metal piping with dielectric fittings. Dielectric fittings are specified in Division 23 Section "Common Work Results for HVAC."

D. Install shutoff valves on HVAC water-treatment equipment inlet and outlet. Metal general-duty valves are specified in Division 23 Section "General-Duty Valves for HVAC Piping."

E. Refer to Division 22 Section "Domestic Water Piping Specialties" for backflow preventers required in makeup water connections to potable-water systems.

F. Confirm applicable electrical requirements in Division 26 Sections for connecting electrical equipment.

G. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."

H. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

END OF SECTION 23 25 00

SECTION 23 29 23

VARIABLE-FREQUENCY MOTOR CONTROLLERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes separately enclosed, pre-assembled, combination VFCs, rated 600 V and less, for speed control of three-phase, squirrel-cage induction motors.

B. Related Sections:
1. Division 26 Section "Motor-Control Centers" for VFCs installed in motor-control centers.

1.3 DEFINITIONS

A. BAS: Building automation system.

B. CE: Conformite Europeene (European Compliance).

C. CPT: Control power transformer.

D. IGBT: Insulated-gate bipolar transistor.

E. LAN: Local area network.

F. LED: Light-emitting diode.

G. MCP: Motor-circuit protector.

H. NC: Normally closed.

I. NO: Normally open.

J. OCPD: Overcurrent protective device.

K. PCC: Point of common coupling.

L. PID: Control action, proportional plus integral plus derivative.

M. PWM: Pulse-width modulated.

N. TDD: Total demand (harmonic current) distortion.

O. THD(V): Total harmonic voltage demand.

P. VFC: Variable-frequency motor controller.

1.4 ACTION SUBMITTALS

A. Product Data: For each type and rating of VFC indicated. Include features, performance, electrical ratings, operating characteristics, shipping and operating weights, and furnished specialties and accessories.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For VFCs to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:
   1. Manufacturer's written instructions for testing and adjusting thermal-magnetic circuit breaker and MCP trip settings.
   2. Manufacturer's written instructions for setting field-adjustable overload relays.
   3. Manufacturer's written instructions for testing, adjusting, and reprogramming microprocessor control modules.
   4. Manufacturer's written instructions for setting field-adjustable timers, controls, and status and alarm points.

1.6 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NFPA 70.

1.7 DELIVERY, STORAGE, AND HANDLING

A. If stored in space that is not permanently enclosed and air conditioned, remove loose packing and flammable materials from inside controllers and connect factory-installed space heaters to temporary electrical service.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Rate equipment for continuous operation, capable of driving full load without derating, under the following conditions unless otherwise indicated:
   1. Ambient Temperature: Not less than 14 deg F and not exceeding 104 deg F .
   2. Ambient Storage Temperature: Not less than minus 4 deg F and not exceeding 140 deg F
   3. Humidity: Less than 95 percent (noncondensing).
   4. Altitude: Not exceeding 3300 feet .

B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for VFCs, including clearances between VFCs, and adjacent surfaces and other items.

1.9 COORDINATION

A. Coordinate features of motors, load characteristics, installed units, and accessory devices to be compatible with the following:
   1. Torque, speed, and horsepower requirements of the load.
   2. Ratings and characteristics of supply circuit and required control sequence.
   3. Ambient and environmental conditions of installation location.

B. Coordinate sizes and locations of concrete bases with actual equipment provided. Cast anchor-bolt inserts into bases.

C. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.

1.10 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace VFCs that fail in materials or workmanship within specified warranty period.
1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

A. General Requirements for VFCs: Comply with NEMA ICS 7, NEMA ICS 61800-2, and UL 508C.

B. Application: variable torque.

C. VFC Description: Variable-frequency power converter (rectifier, dc bus, and IGBT, PWM inverter) factory packaged in an enclosure, with integral disconnecting means and overcurrent and overload protection; listed and labeled by an NRTL as a complete unit; arranged to provide self-protection, protection, and variable-speed control of one or more three-phase induction motors by adjusting output voltage and frequency.
1. Units suitable for operation of inverter-duty motors as defined by NEMA MG 1, Section IV, Part 31, "Definite-Purpose Inverter-Fed Polyphase Motors."
2. Listed and labeled for integrated short-circuit current (withstand) rating by an NRTL acceptable to authorities having jurisdiction.

D. Design and Rating: Match load type, such as fans, blowers, and pumps; and type of connection used between motor and load such as direct or through a power-transmission connection.

E. Output Rating: Three-phase; 10 to 60 Hz, with voltage proportional to frequency throughout voltage range; maximum voltage equals input voltage.

F. Unit Operating Requirements:
1. Input AC Voltage Tolerance: Plus 10 and minus 15 percent of VFC input voltage rating.
2. Input AC Voltage Unbalance: Not exceeding 3 percent.
3. Input Frequency Tolerance: Plus or minus 3 percent of VFC frequency rating.
4. Minimum Efficiency: 96 percent at 60 Hz, full load.
5. Minimum Displacement Primary-Side Power Factor: 96 percent under any load or speed condition.
6. Minimum Short-Circuit Current (Withstand) Rating: 10 kA.
7. Ambient Temperature Rating: Not less than 14 deg F and not exceeding 104 deg F .
8. Ambient Storage Temperature Rating: Not less than minus 4 deg F and not exceeding 140 deg F
9. Humidity Rating: Less than 95 percent (noncondensing).
10. Altitude Rating: Not exceeding 3300 feet .
11. Vibration Withstand: Comply with IEC 60068-2-6.
12. Overload Capability: 1.1 times the base load current for 60 seconds; minimum of 1.8 times the base load current for three seconds.

13. Starting Torque: Minimum 100 percent of rated torque from 3 to 60 Hz.
14. Speed Regulation: Plus or minus 5 percent.
15. Output Carrier Frequency: Selectable; 0.5 to 15 kHz.
16. Stop Modes: Programmable; includes fast, free-wheel, and dc injection braking.

G. Inverter Logic: Microprocessor based, 16 bit, isolated from all power circuits.

H. Isolated Control Interface: Allows VFCs to follow remote-control signal over a minimum 40:1 speed range.
1. Signal: Electrical.
2. Signal: Pneumatic.

I. Internal Adjustability Capabilities:
1. Minimum Speed: 5 to 25 percent of maximum rpm.
2. Maximum Speed: 80 to 100 percent of maximum rpm.
3. Acceleration: 0.1 to 999.9 seconds.
4. Deceleration: 0.1 to 999.9 seconds.
5. Current Limit: 30 to minimum of 150 percent of maximum rating.

J. Self-Protection and Reliability Features:
1. Input transient protection by means of surge suppressors to provide three-phase protection against damage from supply voltage surges 10 percent or more above nominal line voltage.
2. Loss of Input Signal Protection: Selectable response strategy, including speed default to a percent of the most recent speed, a preset speed, or stop; with alarm.
3. Under- and overvoltage trips.
4. Inverter overcurrent trips.
5. VFC and Motor Overload/Overtemperature Protection: Microprocessor-based thermal protection system for monitoring VFCs and motor thermal characteristics, and for providing VFC overtemperature and motor overload alarm and trip; settings selectable via the keypad; NRTL approved.
6. Critical frequency rejection, with three selectable, adjustable deadbands.
7. Instantaneous line-to-line and line-to-ground overcurrent trips.
8. Loss-of-phase protection.
9. Reverse-phase protection.
10. Short-circuit protection.
11. Motor overtemperature fault.

K. Automatic Reset/Restart: Attempt three restarts after drive fault or on return of power after an interruption and before shutting down for manual reset or fault correction; adjustable delay time between restart attempts.

L. Power-Interruption Protection: To prevent motor from re-energizing after a power interruption until motor has stopped, unless "Bidirectional Autospeed Search" feature is available and engaged.

M. Bidirectional Autospeed Search: Capable of starting VFC into rotating loads spinning in either direction and returning motor to set speed in proper direction, without causing damage to drive, motor, or load.

N. Torque Boost: Automatically varies starting and continuous torque to at least 1.5 times the minimum torque to ensure high-starting torque and increased torque at slow speeds.

O. Motor Temperature Compensation at Slow Speeds: Adjustable current fall-back based on output frequency for temperature protection of self-cooled, fan-ventilated motors at slow speeds.

P. Integral Input Disconnecting Means and OCPD: NEMA KS 1, fusible switch with pad-lockable, door-mounted handle mechanism.
1. Disconnect Rating: Not less than 115 percent of VFC input current rating.
2. Disconnect Rating: Not less than 115 percent of NFPA 70 motor full-load current rating or VFC input current rating, whichever is larger.
3. Auxiliary Contacts: NO/NC, arranged to activate before switch blades open.
4. Auxiliary contacts "a" and "b" arranged to activate with circuit-breaker handle.
5. Aalarm contact that operates only when circuit breaker has tripped.

2.2 CONTROLS AND INDICATION

A. Status Lights: Door-mounted LED indicators displaying the following conditions:
1. Power on.
2. Run.
3. Overvoltage.
4. Line fault.
5. Overcurrent.
6. External fault.

B. Panel-Mounted Operator Station: Manufacturer's standard front-accessible, sealed keypad and plain-English language digital display; allows complete programming, program copying, operating, monitoring, and diagnostic capability.
1. Keypad: In addition to required programming and control keys, include keys for HAND, OFF, and AUTO modes.
2. Security Access: Provide electronic security access to controls through identification and password with at least three levels of access: View only; view and operate; and view, operate, and service.
a. Control Authority: Supports at least four conditions: Off, local manual control at VFC, local automatic control at VFC, and automatic control through a remote source.

C. Historical Logging Information and Displays:
1. Real-time clock with current time and date.
2. Running log of total power versus time.
3. Total run time.
4. Fault log, maintaining last 10 faults with time and date stamp for each.

D. Indicating Devices: Digital displayand additional readout devices as required, mounted flush in VFC door and connected to display VFC parameters including, but not limited to:
1. Output frequency (Hz).
2. Motor speed (rpm).
3. Motor status (running, stop, fault).
4. Motor current (amperes).
5. Motor torque (percent).
6. Fault or alarming status (code).
7. PID feedback signal (percent).
8. DC-link voltage (V dc).
9. Set point frequency (Hz).
10. Motor output voltage (V ac).

E. Control Signal Interfaces:
   1. Electric Input Signal Interface:
      a. A minimum of two programmable analog inputs: Operator-selectable "x"- to "y"-mA dc.
      b. A minimum of six multifunction programmable digital inputs.
   2. Pneumatic Input Signal Interface: 3 to 15 psig .
   3. Remote Signal Inputs: Capability to accept any of the following speed-setting input signals from the BAS or other control systems:
      a. 0- to 10-V dc.
      b. 4- to 20-mA dc.
      c. Potentiometer using up/down digital inputs.
      d. Fixed frequencies using digital inputs.

   4. Output Signal Interface: A minimum of one programmable analog output signal(s) (operator-selectable "x"- to "y"-mA dc), which can be configured for any of the following:
      a. Output frequency (Hz).
      b. Output current (load).
      c. DC-link voltage (V dc).
      d. Motor torque (percent).
      e. Motor speed (rpm).
      f. Set point frequency (Hz).

   5. Remote Indication Interface: A minimum of two programmable dry-circuit relay outputs (120-V ac, 1 A) for remote indication of the following:
      a. Motor running.
      b. Set point speed reached.
      c. Fault and warning indication (overtemperature or overcurrent).
      d. PID high- or low-speed limits reached.

F. PID Control Interface: Provides closed-loop set point, differential feedback control in response to dual feedback signals. Allows for closed-loop control of fans and pumps for pressure, flow, or temperature regulation.
   1. Number of Loops: Two.

G. BAS Interface: Factory-installed hardware and software to enable the BAS to monitor, control, and display VFC status and alarms. Allows VFC to be used with an external system within a multidrop LAN configuration; settings retained within VFC's nonvolatile memory.
   1. Network Communications Ports: Ethernet and RS-422/485.
   2. Embedded BAS Protocols for Network Communications: ASHRAE 135 BACnet; protocols accessible via the communications ports.

2.3 LINE CONDITIONING AND FILTERING

A. Input Line Conditioning: Based on the harmonic analysis study and report, provide input filtering, as required, to limit TDD and THD(V) at the defined PCC per IEEE 519.

2.4 BYPASS SYSTEMS

A. Bypass Operation: Safely transfers motor between power converter output and bypass circuit, manually, automatically, or both. Selector switches set modes and indicator lights indicate mode selected. Unit is capable of stable operation (starting, stopping, and running) with motor completely disconnected from power converter.

B. Bypass Mode: Manual operation only; requires local operator selection at VFC. Transfer between power converter and bypass contactor and retransfer shall only be allowed with the motor at zero speed.

C. Bypass Contactor Configuration: Full-voltage (across-the-line) type.
1. NORMAL/BYPASS selector switch.
2. HAND/OFF/AUTO selector switch.
3. NORMAL/TEST Selector Switch: Allows testing and adjusting of VFC while the motor is running in the bypass mode.
4. Contactor Coils: Pressure-encapsulated type with coil transient suppressors.
   a. Operating Voltage: Depending on contactor NEMA size and line-voltage rating, manufacturer's standard matching control power or line voltage.
   b. Power Contacts: Totally enclosed, double break, and silver-cadmium oxide; assembled to allow inspection and replacement without disturbing line or load wiring.
5. Control Circuits: 120-V ac; obtained from integral CPT, with primary and secondary fuses, with control power source of sufficient capacity to operate all integral devices and remotely located pilot, indicating, and control devices.
   a. CPT Spare Capacity: 50 VA.
6. Overload Relays: NEMA ICS 2.
   a. Solid-State Overload Relays:
      1) Switch or dial selectable for motor-running overload protection.
      2) Sensors in each phase.
      3) Class 10/20 selectable tripping characteristic selected to protect motor against voltage and current unbalance and single phasing.
      4) Class II ground-fault protection, with start and run delays to prevent nuisance trip on starting.
      5) Analog communication module.
   b. Isolated overload alarm contact.
   c. External overload reset push button.

2.5 ENCLOSURES

A. VFC Enclosures: NEMA 250, to comply with environmental conditions at installed location.
1. Dry and Clean Indoor Locations: Type 1.

B. Plenum Rating: UL 1995; NRTL certification label on enclosure, clearly identifying VFC as "Plenum Rated."

2.6 ACCESSORIES

A. General Requirements for Control-Circuit and Pilot Devices: NEMA ICS 5; factory installed in VFC enclosure cover unless otherwise indicated.
1. Push Buttons, Pilot Lights, and Selector Switches: Heavy-duty, type.
   a. Push Buttons: Covered types; maintained.
   b. Pilot Lights: LED types; push to test.
   c. Selector Switches: Rotary type.
   d. Stop and Lockout Push-Button Station: Momentary-break, push-button station with a factory-applied hasp arranged so padlock can be used to lock push button in depressed position with control circuit open.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, surfaces, and substrates to receive VFCs, with Installer present, for compliance with requirements for installation tolerances, and other conditions affecting performance.

B. Examine VFC before installation. Reject VFCs that are wet, moisture damaged, or mold damaged.

C. Examine roughing-in for conduit systems to verify actual locations of conduit connections before VFC installation.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Coordinate layout and installation of VFCs with other construction including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

B. Wall-Mounting Controllers: Install VFCs on walls with tops at uniform height and with disconnect operating handles not higher than 79 inches above finished floor unless otherwise indicated, and by bolting units to wall or mounting on lightweight structural-steel channels bolted to wall. For controllers not on walls, provide freestanding racks complying with Division 26 Section "Hangers and Supports for Electrical Systems."

C. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.

D. Install fuses in each fusible-switch VFC.

E. Install fuses in control circuits if not factory installed. Comply with requirements in Division 26 Section "Fuses."

F. Install heaters in thermal-overload relays. Select heaters based on actual nameplate full-load amperes after motors have been installed.

G. Install, connect, and fuse thermal-protector monitoring relays furnished with motor-driven equipment.

H. Comply with NECA 1.

3.3 IDENTIFICATION

A. Identify VFCs, components, and control wiring. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."
   1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
   2. Label each VFC with engraved nameplate.
   3. Label each enclosure-mounted control and pilot device.

B. Operating Instructions: Frame printed operating instructions for VFCs, including control sequences and emergency procedures. Fabricate frame of finished metal, and cover instructions with clear acrylic plastic. Mount on front of VFC units.

3.4 CONTROL WIRING INSTALLATION

A. Install wiring between VFCs and remote devices and facility's central-control system]. Comply with requirements in Division 26 Section "Control-Voltage Electrical Power Cables."

B. Bundle, train, and support wiring in enclosures.

C. Connect selector switches and other automatic control devices where applicable.
1. Connect selector switches to bypass only those manual- and automatic control devices that have no safety functions when switches are in manual-control position.
2. Connect selector switches with control circuit in both manual and automatic positions for safety-type control devices such as low- and high-pressure cutouts, high-temperature cutouts, and motor overload protectors.

3.5 ADJUSTING

A. Program microprocessors for required operational sequences, status indications, alarms, event recording, and display features. Clear events memory after final acceptance testing and prior to Substantial Completion.

B. Set field-adjustable switches, auxiliary relays, time-delay relays, timers, and overload-relay pickup and trip ranges.

C. Adjust the trip settings of MCPs and thermal-magnetic circuit breakers with adjustable, instantaneous trip elements. Initially adjust to six times the motor nameplate full-load amperes and attempt to start motors several times, allowing for motor cool-down between starts. If tripping occurs on motor inrush, adjust settings in increments until motors start without tripping. Do not exceed eight times the motor full-load amperes (or 11 times for NEMA Premium Efficient motors if required). Where these maximum settings do not allow starting of a motor, notify Architect before increasing settings.

D. Set the taps on reduced-voltage autotransformer controllers.

E. Set field-adjustable circuit-breaker trip ranges

F. Set field-adjustable pressure switches.

3.6 PROTECTION

A. Temporary Heating: Apply temporary heat to maintain temperature according to manufacturer's written instructions until controllers are ready to be energized and placed into service.

B. Replace VFCs whose interiors have been exposed to water or other liquids prior to Substantial Completion.

3.7 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, reprogram, and maintain VFCs.

END OF SECTION

SECTION 23 3113

METAL DUCTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
1. Single-wall rectangular ducts and fittings.
2. Double-wall rectangular ducts and fittings.
3. Single-wall round ducts and fittings.
4. Double-wall round ducts and fittings.
5. Sheet metal materials.
6. Duct liner.
7. Sealants and gaskets.
8. Hangers and supports.

B. Related Sections:
1. Section 23 0593 "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing requirements for metal ducts.
2. Section 23 3116 "Nonmetal Ducts" for fibrous-glass ducts, thermoset fiber-reinforced plastic ducts, thermoplastic ducts, PVC ducts, and concrete ducts.
3. Section 23 3119 "HVAC Casings" for factory- and field-fabricated casings for mechanical equipment.
4. Section 23 3300 "Air Duct Accessories" for dampers, sound-control devices, duct-mounting access doors and panels, turning vanes, and flexible ducts.

1.3 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.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of the following products:
1. Liners and adhesives.

2. Sealants and gaskets.

B. Shop Drawings:
1. Provide ¼" scale duct work drawings that have been coordinated with other all other work.
2. Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work.
3. Factory- and shop-fabricated ducts and fittings.
4. Duct layout indicating sizes, configuration, liner material, and static-pressure classes.
5. Elevation of top of ducts.
6. Dimensions of main duct runs from building grid lines.
7. Fittings.
8. Reinforcement and spacing.
9. Seam and joint construction.
10. Penetrations through fire-rated and other partitions.
11. Equipment installation based on equipment being used on Project.
12. Locations for duct accessories, including dampers, turning vanes, and access doors and panels.
13. Hangers and supports, including methods for duct and building attachment and vibration isolation.

1.5 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel," for hangers and supports. AWS D9.1M/D9.1, "Sheet Metal Welding Code," for duct joint and seam welding.

B. Welding Qualifications: Qualify procedures and personnel according to the following:
1. AWS D1.1/D1.1M, "Structural Welding Code - Steel," for hangers and supports.
2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum," for aluminum supports.
3. AWS D9.1M/D9.1, "Sheet Metal Welding Code," for duct joint and seam welding.

C. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and System Start-up."

D. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6.4.4 - "HVAC System Construction and Insulation."

PART 2 - PRODUCTS

2.1 SINGLE-WALL RECTANGULAR DUCTS AND FITTINGS

A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.

B. 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."

C. 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."

D. 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 DOUBLE-WALL RECTANGULAR DUCTS AND FITTINGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. McGill AirFlow LLC.

B. Rectangular Ducts: Fabricate ducts with indicated dimensions for the inner duct.

C. Outer Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.

D. 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."

E. 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."

F. Interstitial Insulation: Fibrous-glass liner complying with ASTM C 1071, NFPA 90A, or NFPA 90B; and with NAIMA AH124, "Fibrous Glass Duct Liner Standard."
1. Install spacers that position the inner duct at uniform distance from outer duct without compressing insulation.
2. Coat insulation with antimicrobial coating.
3. Cover insulation with polyester film complying with UL 181, Class 1.

G. Inner Duct: Minimum 0.028-inch solid sheet steel.

H. Formed-on Transverse Joints (Flanges): Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-1, "Rectangular Duct/Traverse 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."

I. 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."

2.3 SINGLE-WALL ROUNDDUCTS AND FITTINGS

A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 3, "Round, Oval, and Flexible Duct," based on indicated static-pressure class unless otherwise indicated.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Lindab Inc.
      b. McGill AirFlow LLC.

B. Flat-Oval Ducts: Indicated dimensions are the duct width (major dimension) and diameter of the round sides connecting the flat portions of the duct (minor dimension).

C. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-1, "Round 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 3-2, "Round 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."
   1. Fabricate flat-oval ducts larger than 72 inches in width (major dimension) with butt-welded longitudinal seams.

E. Tees and Laterals: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees," 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."

2.4 DOUBLE-WALL ROUNDDUCTS AND FITTINGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Lindab Inc.
   2. McGill AirFlow LLC.

B. Flat-Oval Ducts: Indicated dimensions are the duct width (major dimension) and diameter of the round sides connecting the flat portions of the duct (minor dimension) of the inner duct.

C. Outer Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 3, "Round, Oval, and Flexible Duct," based on static-pressure class unless otherwise indicated.
   1. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-1, "Round 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."

2. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-2, "Round 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."
3. Tees and Laterals: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees," 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. Inner Duct: Minimum 0.028-inch solid sheet steel.

E. Interstitial Insulation: Fibrous-glass liner complying with ASTM C 1071, NFPA 90A, or NFPA 90B; and with NAIMA AH124, "Fibrous Glass Duct Liner Standard."
1. Install spacers that position the inner duct at uniform distance from outer duct without compressing insulation.
2. Coat insulation with antimicrobial coating.
3. Cover insulation with polyester film complying with UL 181, Class 1.

2.5 SHEET METAL MATERIALS

A. 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.

B. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.
1. Galvanized Coating Designation: G90.
2. Finishes for Surfaces Exposed to View: Mill phosphatized.

C. 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.

D. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.6 DUCT LINER

A. Fibrous-Glass Duct Liner: Comply with ASTM C 1071, NFPA 90A, or NFPA 90B; and with NAIMA AH124, "Fibrous Glass Duct Liner Standard."
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. CertainTeed Corporation; Insulation Group.
   b. Johns Manville.
   c. Knauf Insulation.
   d. Owens Corning.
2. Maximum Thermal Conductivity:
   a. Type I, Flexible: 0.27 Btu x in./h x sq. ft. x deg F at 75 deg F mean temperature.

3. Water-Based Liner Adhesive: Comply with NFPA 90A or NFPA 90B and with ASTM C 916.
   a. For indoor applications, adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Insulation Pins and Washers:
1. Cupped-Head, Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.106-inch- diameter shank, length to suit depth of insulation indicated with integral 1-1/2-inch galvanized carbon-steel washer.
2. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- thick aluminum; with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.

C. Shop Application of Duct Liner: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 7-11, "Flexible Duct Liner Installation."
1. Adhere a single layer of indicated thickness of duct liner with at least 90 percent adhesive coverage at liner contact surface area. Attaining indicated thickness with multiple layers of duct liner is prohibited.
2. Apply adhesive to transverse edges of liner facing upstream that do not receive metal nosing.
3. Butt transverse joints without gaps, and coat joint with adhesive.
4. Fold and compress liner in corners of rectangular ducts or cut and fit to ensure butted-edge overlapping.
5. Do not apply liner in rectangular ducts with longitudinal joints, except at corners of ducts, unless duct size and dimensions of standard liner make longitudinal joints necessary.
6. Apply adhesive coating on longitudinal seams in ducts with air velocity of 2500 fpm.
7. Secure transversely oriented liner edges facing the airstream with metal nosings that have either channel or "Z" profiles or are integrally formed from duct wall. Fabricate edge facings at the following locations:
   a. Fan discharges.
   b. Intervals of lined duct preceding unlined duct.
   c. Upstream edges of transverse joints in ducts where air velocities are higher than 2500 fpm or where indicated.
8. Terminate inner ducts with buildouts attached to fire-damper sleeves, dampers, turning vane assemblies, or other devices. Fabricated buildouts (metal hat sections) or other buildout means are optional; when used, secure buildouts to duct walls with bolts, screws, rivets, or welds.

2.7 SEALANT 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. 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.

C. 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).

D. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.

2.8 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.

PART 3 - EXECUTION

3.1 DUCT INSTALLATION

A. 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.

B. Install ducts according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.

C. Install ducts with fewest possible joints.

D. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.

E. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.

F. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.

G. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.

H. Route ducts to avoid passing through transformer vaults and electrical equipment rooms and enclosures.

I. 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.

J. Where ducts pass through fire-rated interior partitions and exterior walls, install fire dampers. Comply with requirements in Section 23 3300 "Air Duct Accessories" for fire and smoke dampers.

K. 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."

3.2 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.

3.3 ADDITIONAL INSTALLATION REQUIREMENTS FOR COMMERCIAL KITCHEN HOOD EXHAUST DUCT

A. Install commercial kitchen hood exhaust ducts without dips and traps that may hold grease, and sloped a minimum of 2 percent to drain grease back to the hood.

B. Install fire-rated access panel assemblies at each change in direction and at maximum intervals of 20 feet in horizontal ducts, and at every floor for vertical ducts, or as indicated on Drawings. Locate access panel on top or sides of duct a minimum of 1-1/2 inches from bottom of duct.

C. Do not penetrate fire-rated assemblies except as allowed by applicable building codes and authorities having jurisdiction.

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."

3.5 HANGER AND SUPPORT INSTALLATION

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

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.

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 inches of each elbow and within 48 inches of 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.

3.6 CONNECTIONS

A. Make connections to equipment with flexible connectors complying with Section 23 3300 "Air Duct Accessories."

B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

3.7 PAINTING

A. Paint interior of metal ducts that are visible through registers and grilles and that do not have duct liner. Apply one coat of flat, black, latex paint over a compatible galvanized-steel primer. Paint materials and application requirements are specified in Section 09 9113 "Exterior Painting" and Section 09 9123 "Interior Painting."

3.8 START UP

A. Air Balance: Comply with requirements in Section 23 0593 "Testing, Adjusting, and Balancing for HVAC."

3.9 DUCT SCHEDULE

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.
   2. Ducts Connected to Variable-Air-Volume Air-Handling Units:
      a. Pressure Class: Positive 3-inch wg.
      b. Minimum SMACNA Seal Class: B.
   3. Ducts Connected to Equipment Not Listed Above:
      a. Pressure Class: Positive 2-inch wg.
      b. Minimum SMACNA Seal Class: B.

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: C.
   2. Ducts Connected to Air-Handling Units:
      a. Pressure Class: Positive or negative 2-inch wg.
      b. Minimum SMACNA Seal Class: B.
   3. Ducts Connected to Equipment Not Listed Above:
      a. Pressure Class: Positive or negative 2-inch wg.
      b. Minimum SMACNA Seal Class: B.

C. Exhaust Ducts:
   1. Ducts Connected to Fans Exhausting (ASHRAE 62.1, Class 1 and 2) Air:
      a. Pressure Class: Negative 1-inch wg.
      b. Minimum SMACNA Seal Class: C if negative pressure, and A if positive pressure.
   2. Ducts Connected to Air-Handling Units:
      a. Pressure Class: Positive or negative 2-inch wg.
      b. Minimum SMACNA Seal Class: B if negative pressure, and A if positive pressure.
   3. Ducts Connected to Commercial Kitchen Hoods: Comply with NFPA 96.
      a. Exposed to View: Type 304, stainless-steel sheet, No. 4 finish.
      b. Concealed: Type 304, stainless-steel sheet, No. 2D finish.
      c. Welded seams and joints.
      d. Pressure Class: Positive or negative 3-inch wg.
      e. Minimum SMACNA Seal Class: Welded seams, joints, and penetrations.
      f. SMACNA Leakage Class: 3.
   4. Ducts Connected to Dishwasher Hoods:
      a. Type 304, stainless-steel sheet.
      b. Exposed to View: No. 4 finish.
      c. Concealed: No. 2D finish.
      d. Welded seams and flanged joints with watertight EPDM gaskets.

e. Pressure Class: Positive or negative 2-inch wg.
f. Minimum SMACNA Seal Class: Welded seams, joints, and penetrations.
g. SMACNA Leakage Class: 3.

5. Ducts Connected to Equipment Not Listed Above:
   a. Pressure Class: Positive or negative 2-inch wg.
   b. Minimum SMACNA Seal Class: B if negative pressure, and A if positive pressure.

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.
2. Ducts Connected to Air-Handling Units:
   a. Pressure Class: Positive or negative 2-inch wg.
   b. Minimum SMACNA Seal Class: B.
3. Ducts Connected to Equipment Not Listed Above:
   a. Pressure Class: Positive or negative 2-inch wg.
   b. Minimum SMACNA Seal Class: B.

E. Intermediate Reinforcement:
1. Galvanized-Steel Ducts: Galvanized steel.
2. PVC-Coated Ducts:
   a. Exposed to Airstream: Match duct material.
   b. Not Exposed to Airstream: Match duct material.
3. Stainless-Steel Ducts:
   a. Exposed to Airstream: Match duct material.
   b. Not Exposed to Airstream: Galvanized.
4. Aluminum Ducts: Aluminumor galvanized sheet steel coated with zinc chromate.

F. Liner:
1. All exposed ducts to have duct liner unless indicated otherwise.
2. **1.5 inch duct liner is indicated to comply with the 2006 and 2009 International Energy Conservation Code requirement for a minimum R-Valve of 5 when located in unconditioned spaces. A minimum R-Value of 8 is required when ducts are located outside or in an unconditioned attic. The 2015 Energy Conservation Code requires a minimum R-Value of 6 when located in unconditioned spaces.**
3. Supply and return ducts located within 20 feet of air handler connection to be lined unless indicated otherwise.
4. Ducts in acoustic areas to be lined. Refer to drawings.
5. All return duct to be lined.
6. All transfer ducts to be lined.
7. Variable air volume boxes and fan coil unit supply plenums to be lined.
8. Supply Air Ducts: Fibrous glass, Type I, 1.5 inch thick.
9. Return Air Ducts: Fibrous glass, Type I, 1.5 inch thick.
10. Exhaust Air Ducts: Fibrous glass, Type I, 1.5 inch thick.
11. Transfer Ducts: Fibrous glass, Type I, 1.5 inch thick.

G. Double-Wall Duct Interstitial Insulation:
1. Supply Air Ducts: 1.5 inch thick.
2. Return Air Ducts: 1.5 inch thick.
3. Exhaust Air Ducts: 1.5 inch thick.

H. Elbow Configuration:

1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-2, "Rectangular Elbows."
   a. Velocity 1000 fpm or Lower (except supply ducts):
      1) Radius Type RE 1 with minimum 1.0 radius-to-diameter ratio. **Square throat not allowed.**
      2) Mitered Type RE 4 without vanes.
   b. Velocity 1000 to 1500 fpm and supply ducts less than 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." **Single thickness vanes only.**
   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.
      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." **Single thickness vanes only.**
2. 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 fpm or Lower: 1.0 radius-to-diameter ratio and five segments for 90-degree elbow.
      2) Velocity 1000 to 1500 fpm: 1.5 radius-to-diameter ratio and five segments for 90-degree elbow.
      3) Velocity 1500 fpm or Higher: 1.5 radius-to-diameter ratio and die stamped for 90-degree elbow.
      4) Radius-to Diameter Ratio: 1.5.

I. 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.
   2. 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.
      a. Velocity 1000 fpm or Lower: 90-degree tap.
      b. Velocity 1000 to 1500 fpm: Conical tap.
      c. Velocity 1500 fpm or Higher: 45-degree lateral.

END OF SECTION 23 3113

SECTION 23 3300

AIR DUCT ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
1. Manual volume dampers.
2. Control dampers.
3. Fire dampers.
4. Smoke Dampers
5. Flange connectors.
6. Duct silencers.
7. Turning vanes.
8. Remote damper operators.
9. Duct-mounted access doors.
10. Flexible connectors.
11. Flexible ducts.
12. Duct accessory hardware.

B. Related Sections:
1. Division 23 Section "HVAC Gravity Ventilators" for roof-mounted ventilator caps.
2. Division 26 Section "Fire Detection and Alarm" for duct-mounted fire and smoke detectors.

1.3 QUALITY ASSURANCE

A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

B. Comply with AMCA 500-D testing for damper rating.

PART 2 - PRODUCTS

2.1 MATERIALS

A. 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.

B. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.
1. Galvanized Coating Designation: G90 .
2. Exposed-Surface Finish: Mill phosphatized.

C. Stainless-Steel Sheets: Comply with ASTM A 480/A 480M, Type 304, and having a No. 2 finish for concealed ducts and No. 1 finish for exposed ducts.

D. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.

E. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches .

2.2 MANUAL VOLUME DAMPERS

A. Standard, Steel, Manual Volume Dampers:
1. Standard leakage rating, with linkage outside airstream.
2. Suitable for horizontal or vertical applications.
3. Frames:
   a. Hat-shaped, stainless-steel channels, 0.064-inch minimum thickness.
   b. Mitered and welded corners.
   c. Flanges for attaching to walls and flangeless frames for installing in ducts.
4. Blades:
   a. Multiple or single blade.
   b. Parallel- or opposed-blade design.
   c. Stiffen damper blades for stability.
   d. Galvanized-steel, 0.064 inch thick.
5. Blade Axles: Stainless steel.
6. Bearings:
   a. Oil-impregnated bronze.
   b. Dampers in ducts with pressure classes of 3-inch wg or less shall have axles full length of damper blades and bearings at both ends of operating shaft.
7. Tie Bars and Brackets: Galvanized steel.

B. Jackshaft:
1. Size: 1-inch diameter.
2. Material: Galvanized-steel pipe rotating within pipe-bearing assembly mounted on supports at each mullion and at each end of multiple-damper assemblies.
3. Length and Number of Mountings: As required to connect linkage of each damper in multiple-damper assembly.

C. Damper Hardware:
1. Zinc-plated, die-cast core with dial and handle made of 3/32-inch- thick zinc-plated steel, and a 3/4-inch hexagon locking nut.
2. Include center hole to suit damper operating-rod size.
3. Include elevated platform for insulated duct mounting.

2.3 CONTROL DAMPERS

A. Low-leakage rating, with linkage outside airstream, and bearing AMCA's Certified Ratings Seal for both air performance and air leakage.

B. Frames:
1. U shaped.
2. Stainless-steel channels, 0.064 inch thick.
3. Mitered and welded corners.

C. Blades:
1. Multiple blade with maximum blade width of 8 inches .
2. Opposed-blade design.
3. Stainless steel.
4. 0.064 inch thick.
5. Blade Edging: Closed-cell neoprene edging.

D. Blade Axles: 1/2-inch- diameter; stainless steel; blade-linkage hardware of zinc-plated steel and brass; ends sealed against blade bearings.
1. Operating Temperature Range: From minus 40 to plus 200 deg F .

E. Bearings:
1. Oil-impregnated bronze.
2. Dampers in ducts with pressure classes of 3-inch wg or less shall have axles full length of damper blades and bearings at both ends of operating shaft.
3. Thrust bearings at each end of every blade.

2.4 FIRE DAMPERS

A. Type: Static and dynamic; rated and labeled according to UL 555 by an NRTL.

B. Closing rating in ducts up to 4-inch wg static pressure class and minimum 4000-fpm velocity.

C. Fire Rating: 1-1/2 and 3 hours.

D. Frame: Curtain type with blades outside airstream except when located behind grille where blades may be inside airstream; fabricated with roll-formed, 0.034-inch- thick galvanized steel; with mitered and interlocking corners.

E. Mounting Sleeve: Factory- or field-installed, galvanized sheet steel.
1. Minimum Thickness: 0.052 or 0.138 inch thick, as indicated, and of length to suit application.
2. Exception: Omit sleeve where damper-frame width permits direct attachment of perimeter mounting angles on each side of wall or floor; thickness of damper frame must comply with sleeve requirements.

F. Mounting Orientation: Vertical or horizontal as indicated.

G. Blades: Roll-formed, interlocking, 0.034-inch- thick, galvanized sheet steel. In place of interlocking blades, use full-length, 0.034-inch- thick, galvanized-steel blade connectors.

H. Horizontal Dampers: Include blade lock and stainless-steel closure spring.

I. Heat-Responsive Device: Replaceable, 165 deg F rated, fusible links.

2.5 SMOKE DAMPERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Greenheck Fan Corporation.

2. Nailor Industries Inc.
3. Ruskin Company.

B. General Requirements: Label according to UL 555S by an NRTL.

C. Smoke Detector: Integral, factory wired for single-point connection.

D. Frame: Hat-shaped, 0.094-inch-thick, galvanized sheet steel, with welded corners and mounting flange.

E. Blades: Roll-formed, horizontal, interlocking, 0.034-inch-thick, galvanized sheet steel.

F. Leakage: Class I.

G. Rated pressure and velocity to exceed design airflow conditions.

H. Mounting Sleeve: Factory-installed, 0.039-inch-thick, galvanized sheet steel; length to suit wall or floor application.

I. Damper Motors: two-position action.

J. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Section 230513 "Common Motor Requirements for HVAC Equipment."

1. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
2. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in Section 230900 "Instrumentation and Control for HVAC." Section ."
3. Permanent-Split-Capacitor or Shaded-Pole Motors: With oil-immersed and sealed gear trains.
4. Spring-Return Motors: Equip with an integral spiral-spring mechanism where indicated. Enclose entire spring mechanism in a removable housing designed for service or adjustments. Size for running torque rating of 150 in. x lbf and breakaway torque rating of 150 in. x lbf.
5. Outdoor Motors and Motors in Outdoor-Air Intakes: Equip with O-ring gaskets designed to make motors weatherproof. Equip motors with internal heaters to permit normal operation at minus 40 deg F.
6. Nonspring-Return Motors: For dampers larger than 25 sq. ft., size motor for running torque rating of 150 in. x lbf and breakaway torque rating of 300 in. x lbf.
7. Electrical Connection: 115 V, single phase, 60 Hz.

K. Accessories:

1. Auxiliary switches for signaling or position indication.
2. Test and reset switches, remote mounted.

2.6 FLANGE CONNECTORS

A. Description: Add-on or roll-formed, factory-fabricated, slide-on transverse flange connectors, gaskets, and components.

B. Material: Galvanized steel.

C. Gage and Shape: Match connecting ductwork.

2.7 DUCT SILENCERS

A. General Requirements:
1. Factory fabricated.
2. Fire-Performance Characteristics: Adhesives, sealants, packing materials, and accessory materials shall have flame-spread index not exceeding 25 and smoke-developed index not exceeding 50 when tested according to ASTM E 84.

B. Shape:
1. Rectangular straight with splitters or baffles.
2. Rectangular transitional with splitters or baffles.

C. Rectangular Silencer Outer Casing: Aluminum.

D. Inner Casing and Baffles: Aluminum.

E. Special Construction:
1. Suitable for outdoor use.
2. High transmission loss to achieve STC 45.

F. Connection Sizes: Match connecting ductwork unless otherwise indicated.

G. Principal Sound-Absorbing Mechanism:
1. Controlled impedance membranes and broadly tuned resonators without absorptive media.

H. Fabricate silencers to form rigid units that will not pulsate, vibrate, rattle, or otherwise react to system pressure variations. Do not use mechanical fasteners for unit assemblies.
1. Flange connections.
2. Suspended Units: Factory-installed suspension hooks or lugs attached to frame in quantities and spaced to prevent deflection or distortion.
3. Reinforcement: Cross or trapeze angles for rigid suspension.

2.8 TURNING VANES

A. Manufactured Turning Vanes for Metal Ducts: Curved blades of galvanized sheet steel; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.

B. General Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 4-3, "Vanes and Vane Runners," and 4-4, "Vane Support in Elbows."

C. Vane Construction: Single wall.

2.9 REMOTE DAMPER OPERATORS

A. Description: Cable system designed for remote manual damper adjustment.

B. Tubing: Brass.

C. Cable: Stainless steel.

D. Wall-Box Mounting: Recessed, 3/4 inches deep.

E. Wall-Box Cover-Plate Material: Stainless steel.

2.10 DUCT-MOUNTED ACCESS DOORS

A. Duct-Mounted Access Doors: Fabricate access panels according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 7-2 , "Duct Access Doors and Panels," and 7-3, "Access Doors - Round Duct."
   1. Door:
      a. Double wall, rectangular.
      b. Galvanized sheet metal with insulation fill and thickness as indicated for duct pressure class.
      c. Vision panel.
      d. Hinges and Latches: 1-by-1-inch butt or piano hinge and cam latches.
      e. Fabricate doors airtight and suitable for duct pressure class.
   2. Frame: Galvanized sheet steel, with bend-over tabs and foam gaskets.
   3. Number of Hinges and Locks:
      a. Access Doors Less Than 12 Inches Square: No hinges and two sash locks.
      b. Access Doors up to 18 Inches Square: Two hinges and two sash locks.
      c. Access Doors up to 24 by 48 Inches : Three hinges and two compression latches with outside and inside handles.
      d. Access Doors Larger Than 24 by 48 Inches : Four hinges and two compression latches with outside and inside handles.

2.11 FLEXIBLE CONNECTORS

A. Materials: Flame-retardant or noncombustible fabrics.

B. Coatings and Adhesives: Comply with UL 181, Class 1.

C. Indoor System, Flexible Connector Fabric: Glass fabric double coated with neoprene.
   1. Minimum Weight: 26 oz./sq. yd. .
   2. Tensile Strength: 480 lbf/inch in the warp and 360 lbf/inch in the filling.
   3. Service Temperature: Minus 40 to plus 200 deg F .

D. Thrust Limits: Combination coil spring and elastomeric insert with spring and insert in compression, and with a load stop. Include rod and angle-iron brackets for attaching to fan discharge and duct.
   1. Frame: Steel, fabricated for connection to threaded rods and to allow for a maximum of 30 degrees of angular rod misalignment without binding or reducing isolation efficiency.
   2. Outdoor Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
   3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
   4. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
   5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
   6. Elastomeric Element: Molded, oil-resistant rubber or neoprene.
   7. Coil Spring: Factory set and field adjustable for a maximum of 1/4-inch movement at start and stop.

2.12 FLEXIBLE DUCTS

A. Insulated, Flexible Duct: UL 181, Class 1, 2-ply vinyl film supported by helically wound, spring-steel wire; fibrous-glass insulation; polyethylene vapor-barrier film.
   1. Pressure Rating: 10-inch wg positive and 1.0-inch wg negative.
   2. Maximum Air Velocity: 4000 fpm .
   3. Temperature Range: Minus 10 to plus 160 deg F .

B. Flexible Duct Connectors:
   1. Non-Clamp Connectors: Adhesive plus sheet metal screws.

2.13 DUCT ACCESSORY HARDWARE

A. Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments and of length to suit duct-insulation thickness.

B. Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for metal ducts and in NAIMA AH116, "Fibrous Glass Duct Construction Standards," for fibrous-glass ducts.

B. Install duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel and fibrous-glass ducts, stainless-steel accessories in stainless-steel ducts, and aluminum accessories in aluminum ducts.

C. Install volume dampers at points on supply, return, and exhaust systems where branches extend from larger ducts. Where dampers are installed in ducts having duct liner, install dampers with hat channels of same depth as liner, and terminate liner with nosing at hat channel.
   1. Install steel volume dampers in steel ducts.

D. Set dampers to fully open position before testing, adjusting, and balancing.

E. Install test holes at fan inlets and outlets and elsewhere as indicated.

F. Install firedampers according to UL listing.

G. Connect ducts to duct silencers rigidly.

H. Install duct access doors on sides of ducts to allow for inspecting, adjusting, and maintaining accessories and equipment at the following locations:
   1. On both sides of duct coils.
   2. Upstream from duct filters.
   3. At outdoor-air intakes and mixed-air plenums.
   4. At drain pans and seals.

5. Downstream from manual volume dampers, control dampers, backdraft dampers, and equipment.
6. Adjacent to and close enough to fire or smoke dampers, to reset or reinstall fusible links. Access doors for access to fire or smoke dampers having fusible links shall be pressure relief access doors and shall be outward operation for access doors installed upstream from dampers and inward operation for access doors installed downstream from dampers.
7. At each change in direction and at maximum 50-foot spacing.
8. Upstreamand downstream from turning vanes.
9. Upstream or downstream from duct silencers.
10. Control devices requiring inspection.
11. Elsewhere as indicated.

I. Install access doors with swing against duct static pressure.

J. Label access doors according to Division 23 Section "Identification for HVAC Piping and Equipment" to indicate the purpose of access door.

K. Install flexible connectors to connect ducts to equipment.

L. Connect terminal units to supply ducts directly .

M. Connect flexible ducts to metal ducts with adhesive plus sheet metal screws.

N. Install duct test holes where required for testing and balancing purposes.

O. Install thrust limits at centerline of thrust, symmetrical on both sides of equipment. Attach thrust limits at centerline of thrust and adjust to a maximum of 1/4-inch movement during start and stop of fans.

END OF SECTION 23 33 00

SECTION 23 37 13
DIFFUSERS, REGISTERS, AND GRILLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Rectangular and square ceiling diffusers.
   2. Adjustable bar registers and grilles.

B. Related Sections:
   1. Division 23 Section "Air Duct Accessories" for fire dampers and volume-control dampers not integral to diffusers, registers, and grilles.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated, include the following:

   1. Data Sheet: Indicate materials of construction, finish, and mounting details; and performance data including throw and drop, static-pressure drop, and noise ratings.
   2. Diffuser, Register, and Grille Schedule: Indicate drawing designation, room location, quantity, model number, size, and accessories furnished.

PART 2 - PRODUCTS

2.1 CEILING DIFFUSERS

A. Rectangular and Square Ceiling Diffusers:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Anemostat Products; a Mestek company.
      b. Krueger.
      c. Price Industries.
      d. Titus.
   2. Material: Steel.
   3. Finish: Baked enamel, white.
   4. Face Size: 24 by 24 inches and 12 by 12 inches.
   5. Face Style: Plaque.
   6. Mounting: Surface and T-bar.
   7. Pattern: Fixed.
   8. Dampers: Radial opposed blade.

2.2 REGISTERS AND GRILLES

A. Adjustable Bar Register:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Anemostat Products; a Mestek company.
   b. Krueger.
   c. Price Industries.
   d. Titus.
2. Material: Steel.
3. Finish: Baked enamel, white.
4. Face Blade Arrangement: Horizontal spaced 3/4 inch apart.
5. Core Construction: Integral.
6. Frame: 1 inch wide.
7. Mounting: As indicated on drawings.
8. Damper Type: Adjustable opposed blade.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas where diffusers, registers, and grilles are to be installed for compliance with requirements for installation tolerances and other conditions affecting performance of equipment.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install diffusers, registers, and grilles level and plumb.

B. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practical. For units installed in lay-in ceiling panels, locate units in the center of panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.

C. Install diffusers, registers, and grilles with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

3.3 ADJUSTING

A. After installation, adjust diffusers, registers, and grilles to air patterns indicated, or as directed, before starting air balancing.

END OF SECTION

SECTION 23 73 13
INDOOR CENTRAL-STATION AIR-HANDLING UNITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Single-zone air-handling units.

1.3 PERFORMANCE REQUIREMENTS

A. Structural Performance: Casing panels shall be self-supporting and capable of withstanding 133 percent of internal static pressures indicated, without panel joints exceeding a deflection of L/200 where "L" is the unsupported span length within completed casings.

1.4 SUBMITTALS

A. Product Data: For each air-handling unit indicated.

1. Unit dimensions and weight.
2. Cabinet material, metal thickness, finishes, insulation, and accessories.
3. Fans:

    a. Certified fan-performance curves with system operating conditions indicated.
    b. Certified fan-sound power ratings.
    c. Fan construction and accessories.
    d. Motor ratings, electrical characteristics, and motor accessories.

4. Certified coil-performance ratings with system operating conditions indicated.
5. Dampers, including housings, linkages, and operators.
6. Filters with performance characteristics.

B. Operation and Maintenance Data: For air-handling units to include in emergency, operation, and maintenance manuals.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. NFPA Compliance: Comply with NFPA 90A for design, fabrication, and installation of air-handling units and components.

C. ARI Certification: Air-handling units and their components shall be factory tested according to ARI 430, "Central-Station Air-Handling Units," and shall be listed and labeled by ARI.

D. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and Startup."

E. ASHRAE/IESNA 90.1 Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6 - "Heating, Ventilating, and Air-Conditioning."

F. Comply with NFPA 70.

1.6 COORDINATION

A. Coordinate sizes and locations of concrete bases with actual equipment provided.

B. Coordinate sizes and locations of structural-steel support members, if any, with actual equipment provided.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Trane
2. JCI Johnson Controls
3. York

2.2 UNIT CASINGS

A. Provide a full perimeter welded base frame manufactured with structural steel tubing and C-Channel cross support members on close centers. Unit frame shall be from 14-gauge carbon tubular steel, mig welded to form a unitized assembly for support of all internal components. Base and unit frame shall be painted with a lacquer resisting gray phenolic corrosion inhibitive primer. Base rails shall be fitted with lifting lugs at the corner of the unit or section (if de-mounted). The base shall include a 4-inch thick insulated “double bottom” floor with minimum 20 gauge G-90 galvanized outer and 16 gauge G-90 galvanized inner walk-on surface. All floor seams shall be gasketed, caulked and sealed for an airtight / thermal break floor. Where access is provided to the unit interior, floor openings shall be covered with walk on steel safety grating. Single wall floors with glued and pined insulation are not acceptable. Base frame shall be attached to the unit at the factory.

B. The exterior panel shall be fabricated from formed 16 gauge G-90 galvanized steel with exterior coating as specified below. Flat panel design is not acceptable. The air handling unit casing shall be of the “no-through-metal” design. The casing structure shall incorporate insulating thermal breaks as required so that, when fully assembled, there is no path of continuous unbroken metal to metal conduction from inner to outer surfaces. Provide necessary support to limit casing deflection to 1/200 of the narrowest panel dimension. If panels cannot meet this deflection, add additional internal reinforcing. Panels shall be gasketed and secured to the tubular steel frame with 1/4" hex head, zinc plated fasteners and neoprene washers. Outer panels must be removable without affecting the structural integrity of the unit. All panel seams shall be caulked and sealed for an airtight unit. Leakage rates shall be less than 1% at design

static pressure or 8" whichever is greater. The exterior panel finish shall be unpainted bright spangled galvanized.

C. Each unit shall have double wall construction with 16 / 20 (outer / inner) gauge solid galvanized steel liner in all sections. AHU-1 and AHU-2 shall have 22 gauge perforated galvanized steel liner in the fan inlet, fan, and supply air discharge sections. All other sections shall be 20 gauge solid galvanized steel liner. The entire double wall panel shall be removable from the outside if the unit without affecting the structural integrity of the unit.

D. Entire unit to be insulated with a full 2" thick non-compressed fiberglass insulation The insulation shall have an effective thermal conductivity (C) of .24 (BTU in./sq.ft.Fdegrees) and a noise reduction coefficient (NRC) of 0.70 / per inch thick (based on a type "A" mounting). The coefficients shall meet or exceed a 3.0 P.C.F. density material rating. Insulation shall meet the erosion requirements of UL 181 facing the air stream and fire hazard classification of 25/50 (per ASTM-84 and UL 723 and CAN/ULC S102-M88). All insulation edges shall be encapsulated within the panel. **AHU-1 and AHU-2 only:** Kinetics KNM loaded vinyl limp mass barrier shall be used in all sections with perforated liner. Vinyl barrier shall be sandwiched between two layers of insulation.

E. The unit shall be equipped with a solid double wall insulated, hinged access doors as shown on the plans. The doorframe shall be extruded aluminum with a built in thermal break barrier and full perimeter gasket. The door hinge assembly shall be die cast zinc with stainless steel pivot mechanism, completely adjustable. There shall be a minimum of two heavy duty cast; UV rated; nylon handles per door. Provide ETL, UL 1995, and CAL-OSHA approved tool operated safety latch on all fan section access doors.

F. Access doors in all accessible sections shall be provided with a 10 x 10 dual thermal pane safety glass window, and Ventlok model 699 test port.

2.3 FAN, DRIVE, AND MOTOR SECTION

A. Plug Fan (PF) SWSI fans: Fan shall be single width single inlet arrangement 3 plenum fan as indicated on the schedule. Fan blades shall be hollow airfoil in shape, welded to the center and wheel side plates. Fan bearings shall be heavy duty, self-aligning, Dodge concentric "Grip Tight" type with full contact on shaft. Bearings shall be selected for a minimum L-10 life (200,000) hours at maximum horsepower and operating speed for the classification. Rigid support for the inlet bearing must be removable for access to the wheel. Inlet cone shall be precision spun. Fan shaft shall be turned, ground and polished solid steel rated at maximum RPM below critical speed. Fan wheel and sheaves shall be keyed to the shaft. Fan shall be IRD balanced (per ANSI / AMCA 204-96 fan application category BV-3) at design RPM with belts and drives in place to a vibration velocity less than or equal to .157 inches per second measured horizontal and vertical at each bearing pad. Vibration amplitudes are in inches/second-Peak. All values are filter-in at the fan speed. Fan shall be rated in accordance with AMCA 210 for performance and AMCA 300 for sound.

B. The following fan options shall be provided:

1. Internally spring isolated fan, motor and drive on a structural steel base complete with flex connection. Formed metal isolation bases will not be acceptable. Provide Amber Booth (Zone 4) seismically restrained isolator type SWSR with 2 inch deflection.

2. **AHU-1 to be provided with fully welded fan inertia base.** The base shall be constructed from structural steel and a minimum 14 gauge bottom pan. Formed members

are not acceptable. Provide ½" re-bar welded in place on 12" centers in both directions. Concrete fill (4" deep) is furnished by contractor. The unit must be in a permanent location before pouring concrete. All other AHUs to be provided with welded steel structural fan bases.

C. Motors shall be NEMA Design B; T-FRAME mounted on an adjustable steel base. All motors shall be tested to IEEE standard 112 test method B and rated per NEMA MG1, Part 31 "Inverter Fed Motors". All motors shall be specifically designed to meet or exceed all (EPAct) requirements for energy efficiency and include Class 'F' insulation. Motors shall be as manufactured by WEG, Reliance or equal. Motors shall meet the electrical characteristics as specified for voltage, rpm, and efficiencies in Division 24.

D. Variable Pitch drives sheaves shall be furnished on motors up to 10 HP and fixed pitch on 15 HP and above. Fixed pitch sheaves shall be provided on all fans in excess of 2,000 rpm. V-Belt drives shall be selected at 175% motor nameplate horsepower.

2.4 COIL SECTION

A. All coil assemblies shall be leak tested under water at 315 PSIG and PERFORMANCE is to be CERTIFIED under ARI Standard 410. Coils exceeding the range of ARI standard rating conditions shall be noted.

B. Cooling coils shall be mounted on stainless steel support rack to permit coils to slide out individually from the unit. Provide intermediate drain pans on all stacked cooling coils. The intermediate pan shall drain to the main drain pan through a copper downspout. Water coils shall be constructed of seamless copper tubing mechanically expanded into fin collars. All fins shall be continuous within the coil casing to eliminate carryover inherent with a split fin design. Fins are die formed Plate type.

C. Headers are to be seamless copper with die formed tube holes.

D. Connections shall be male pipe thread (MPT) Schedule 40 Red Brass with 1/8" vent and drain provided for complete coil drainage. All coil connections shall be extended to the exterior of the unit casing by the manufacturer. Coils shall be suitable for 250 PSIG working pressure. Intermediate tube supports shall be supplied on coils over 44" fin length with an additional support every 42" multiple thereafter.

1. Water coils shall have the following construction:

2. Standard 5/8":

3. 5/8" o.d. x .025" wall copper tube with .035 return bends

4. .008" aluminum fins

5. 16 gauge 304 stainless steel casing (cooling coils)

6. 16 gauge G-90 galvanized steel casing (heating coils)

E. IAQ style drain pans shall be provided under all cooling coils as shown on the drawings. The drain pan shall be fabricated from 16 gauge 304 stainless steel. All pans are to be triple pitched for complete drainage with no standing water in the unit. They shall be insulated minimum 3-

inch "Double Bottom" construction with welded corners. Provide stainless steel, 1-1/4" MPT drain connection extended to the exterior of the unit base rail. Units in excess of 159 inches shall have drain connections on both sides. All drain connections shall be piped and trapped separately for proper drainage.

2.5 AIR FILTRATION SECTION

A. Provide filters as manufactured by CamfilFarr, to be Merv 7 4" in angle rack. Filters section to be sized for filter face velocities not to exceed 350 feet per minute. Filters shall be in compliance with ANSI/UL 900 – Test Performance of Air Filters. 2 sets shall be provided.

B. Filter Gage: Each Filter bank shall be furnished with: Magnehelic filter gage (Dwyer Series 2000) Air filter gage.

2.6 DAMPERS

A. Provide low leak dampers as indicated on the unit drawings. Low leakage dampers shall have airfoil blades. Flat or formed metal blades are not acceptable. The damper blade shall incorporate santoprene rubber edge seals and zinc plated tubular steel shaft for a non-slip operation. Shaft bearings holes shall be N.C. machine punched and fitted with one inch O.D. heavy duty nylon bearings to eliminate friction and any metal to metal contact. Damper jamb seals shall be stainless steel spring arcs designed for a minimum air leakage and smooth operation. Damper linkage shall be concealed within a 16 gauge G-90 galvanized steel frame. (Operator furnished and installed by temperature controls contractor.

2.7 ELECTRICAL

A. All electrical and automatic control devices not previously called out or listed below are to be furnished and installed in the field by OTHERS.

B. Provide factory installation and wiring of external electrical junction box on exterior of each fan section to include terminal lugs with wire and conduit extending and terminating on fan motors.

C. The unit shall be equipped with 20 watt compact florescent vapor proof light fixture(s) (with guard) in all accessible sections, with exterior switches mounted adjacent to each access door. Light fixture to be factory wired to switch.

D. Back-to-back juctions boxes to be factory installed in each section to include conduit with caulk seal, to allow for temperature control wiring installation without field panel penetration.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine casing insulation materials and filter media before air-handling unit installation. Reject insulation materials and filter media that are wet, moisture damaged, or mold damaged.

C. Examine roughing-in for steam, hydronic, and condensate drainage piping systems and electrical services to verify actual locations of connections before installation.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Equipment Mounting: Install air-handling units on concrete bases without vibration isolation devices. Secure units to anchor bolts installed in concrete bases. Comply with requirements for concrete bases specified in Division 03 Section "Cast-in-Place Concrete." Comply with requirements for vibration isolation devices specified in Division 23 Section "Vibration and Seismic Controls for HVAC Piping and Equipment."

B. Arrange installation of units to provide access space around air-handling units for service and maintenance.

C. Do not operate fan system until filters (temporary or permanent) are in place. Replace temporary filters used during construction and testing, with new, clean filters.

D. Install filter-gage, static-pressure taps upstream and downstream of filters. Mount filter gages on outside of filter housing or filter plenum in accessible position. Provide filter gages on filter banks, installed with separate static-pressure taps upstream and downstream of filters.

3.3 CONNECTIONS

A. Comply with requirements for piping specified in other Division 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to air-handling unit to allow service and maintenance.

C. Connect piping to air-handling units mounted on vibration isolators with flexible connectors.

D. Connect condensate drain pans using ASTM B 88, Type M copper tubing. Extend to nearest equipment or floor drain. Construct deep trap at connection to drain pan and install cleanouts at changes in direction.

E. Hot- and Chilled-Water Piping: Comply with applicable requirements in Division 23 Section "Hydronic Piping." Install shutoff valve and union or flange at each coil supply connection. Install balancing valve and union or flange at each coil return connection.

F. Connect duct to air-handling units with flexible connections. Comply with requirements in Division 23 Section "Air Duct Accessories."

3.4 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

1. Complete installation and startup checks according to manufacturer's written instructions.
2. Verify that shipping, blocking, and bracing are removed.
3. Verify that unit is secure on mountings and supporting devices and that connections to piping, ducts, and electrical systems are complete. Verify that proper thermal-overload protection is installed in motors, controllers, and switches.
4. Verify proper motor rotation direction, free fan wheel rotation, and smooth bearing operations. Reconnect fan drive system, align belts, and install belt guards.

5. Verify that bearings, pulleys, belts, and other moving parts are lubricated with factory-recommended lubricants.
6. Comb coil fins for parallel orientation.
7. Verify that proper thermal-overload protection is installed for electric coils.
8. Install new, clean filters.
9. Verify that manual and automatic volume control and fire and smoke dampers in connected duct systems are in fully open position.

B. Starting procedures for air-handling units include the following:

1. Energize motor; verify proper operation of motor, drive system, and fan wheel. Adjust fan to indicated rpm. Replace fan and motor pulleys as required to achieve design conditions.
2. Measure and record motor electrical values for voltage and amperage.
3. Manually operate dampers from fully closed to fully open position and record fan performance.

3.5 ADJUSTING

A. Adjust damper linkages for proper damper operation.

B. Comply with requirements in Division 23 Section "Testing, Adjusting, and Balancing for HVAC" for air-handling system testing, adjusting, and balancing.

END OF SECTION

SECTION 237433
DEDICATED OUTDOOR-AIR UNITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes factory-packaged units capable of supplying up to 100 percent outdoor air and providing cooling and heating.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product. Include rated capacities, operating characteristics, and furnished specialties and accessories.

1.4 INFORMATIONAL SUBMITTALS

A. Startup service reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For units to include in emergency, operation, and maintenance manuals.

1.6 WARRANTY

A. Special Warranty: Manufacturer agrees to replace components of units that fail in materials or workmanship within specified warranty period.
   1. Warranty Period for Compressors: Five years from date of Substantial Completion.
   2. Warranty Period for Heat Exchangers: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Valent Model VPRE-110-5F
   2. Greenheck Fan Corporation
   3. Addision

2.2 PERFORMANCE REQUIREMENTS

A. Cabinet Thermal Performance:
   1. Maximum Overall U-Value: Comply with requirements in ASHRAE/IESNA 90.1.
   2. Include effects of metal-to-metal contact and thermal bridges in the calculations.

B. Cabinet Surface Condensation:
   1. Cabinet shall have additional insulation and vapor seals if required to prevent condensation on the interior and exterior of the cabinet.
   2. Portions of cabinet located downstream from the cooling coil shall have a thermal break at each thermal bridge between the exterior and interior casing to prevent condensation from occurring on the interior and exterior surfaces. The thermal break shall not compromise the structural integrity of the cabinet.

C. Maximum Cabinet Leakage: 1 percent of the total supply-air flow at a pressure rating equal to the fan shut-off pressure.

D. Cabinet Deflection Performance:
   1. Walls and roof deflection shall be within 1/200 of the span at the design working pressure equal to the fan shut-off pressure. Deflection limits shall be measured at any point on the surface.
   2. Floor deflections shall be within 1/240 of the span considering the worst-case condition caused by the following:
      a. Service personnel.
      b. Internal components.
      c. Design working pressure defined for the walls and roof.

E. Electrical components, devices, and accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

F. Construction: double wall.

G. Exterior Casing Material: Galvanized steel with paint finish.

H. Interior Casing Material: Galvanized steel.

I. Lifting and Handling Provisions: Factory-installed shipping skids and lifting lugs.

J. Base Rails: Galvanized-steel rails for mounting on roof curb or pad as indicated.

K. Roof: Standing seam or membrane; sloped to drain water.

L. Floor: Reinforced, metal surface; reinforced to limit deflection when walked on by service personnel. Insulation shall be below metal walking surface.

M. Cabinet Insulation:
   1. Type: Fibrous-glass duct lining complying with ASTM C 1071, Type II
   2. Thickness: 2 inches.
   3. Insulation Adhesive: Comply with ASTM C 916, Type I.
   4. Mechanical Fasteners: Suitable for adhesive, mechanical, or welding attachment to casing without damaging liner and without causing air leakage when applied as recommended by manufacturer.

N. Condensate Drain Pans:
   1. Shape: Rectangular, with 2 percent slope in at least two planes to direct water toward drain connection.
   2. Size: Large enough to collect condensate from cooling coils including coil piping connections, coil headers, and return bends.

a. Length: Extend drain pan downstream from leaving face Insert distance.
b. Depth: A minimum of 2 inches deep.
3. Configuration: Single wall.
4. Configuration: Double wall, with space between walls filled with foam insulation and moisture-tight seal.
5. Material: Galvanized-steel sheet with asphaltic waterproofing compound coating on pan top surface.
6. Material: Stainless-steel sheet.
7. Drain Connection:
a. Located on both ends of pan, at lowest point of pan.
b. Terminated with threaded nipple.
8. Units with stacked coils shall have an intermediate drain pan to collect condensate from top coil.

O. Roof Curb: Full-perimeter insulated curb of sheet metal, minimum18 inches high, with 2" insulation, wood nailer, neoprene sealing strip, and welded Z-bar flashing.
1. Comply with requirements in "The NRCA Roofing Manual."

2.3 SUPPLY and RELIEF FAN

A. Plenum Fan Type: Single width, non-overloading, with backward-inclined or airfoil blades.
1. Fan Wheel Material: Aluminum; attached directly to motor shaft.
2. Fan Wheel Drive and Arrangement: Direct drive, AMCA Arrangement 4.
3. Fan panel and frame Material: Powder-coated steel, stainless steel, or aluminum.
4. Fan Enclosure: Easily removable enclosure around rotating parts.
5. Fan Balance: Precision balance fan below 0.08 inch/sat design speed with filter in.

B. Service Factor for Belt Drive Applications: V-belt drive with matching fan pulley and adjustable motor sheaves and belt assembly with minimum1.5 service factor.

C. Motors:
1. Comply with NEMA designation, temperature rating, service factor, and efficiency requirements for motors specified in Section 230513 "Common Motor Requirements for HVAC Equipment."
2. Enclosure: Open dripproof.
3. Efficiency: Premium efficient.
4. Service Factor: 1.15.

D. Mounting: Fan wheel, motor, and drives shall be mounted to fan casing with restrained isolators.

2.4 COOLING COILS

A. Capacity Ratings: Comply with ASHRAE 33 and ARI 410 and coil bearing the ARI label.

B. Coil Casing Material: Stainless steel.

C. Tube Material: Copper.

D. Tube Header Material: Copper.

E. Fin Material: Aluminum.

F. Fin and Tube Joints: Mechanical bond.

G. Leak Test: Coils shall be leak tested with air underwater.

H. Refrigerant Coil Capacity Reduction: Circuit coils for interleaved control.

I. Refrigerant Coil Suction and Distributor Header Materials: Seamless copper tube with brazed joints.

2.5 REFRIGERATION SYSTEM

A. Comply with requirements in ASHRAE 15, "Safety Standard for Refrigeration Systems."

B. Refrigerant Charge: Factory charged with refrigerant and filled with oil.

C. Compressors: Scroll compressors with integral vibration isolators, internal overcurrent and overtemperature protection, internal pressure relief, and crankcase heater.

D. Refrigerant: R-410A.
1. Classified as Safety Group A1 according to ASHRAE 34.
2. Provide unit with operating charge of refrigerant.

E. Refrigeration System Specialties:
1. Expansion valve with replaceable thermostatic element.
2. High-pressure switch.
3. Low-pressure switch.
4. Brass service valves installed in discharge and liquid lines.

F. Capacity Control:
1. Digital scroll compressor.

G. Refrigerant condenser and reheat condenser coils:
1. Capacity Ratings: Complying with ASHRAE 33 and ARI 410 and coil bearing the ARI label.
2. Tube Material: Copper.
3. Fin Material: Aluminum.
4. Fin and Tube Joint: Mechanical bond.
5. Leak Test: Coils shall be leak tested with air underwater.

H. Condenser Fan Assembly:
1. Fans: Direct-drive propeller type with statically and dynamically balanced fan blades.
2. Fan Motors:
   a. Comply with NEMA designation, temperature rating, service factor, and efficiency requirements for motors specified in Section 230513 "Common Motor Requirements for HVAC Equipment."
   b. Motor Enclosure: Totally enclosed non-ventilating (TENV) or totally enclosed air over (TEAO) enclosure.
   c. Enclosure Materials: Cast aluminum.
   d. Motor Bearings: Permanently lubricated bearings.
   e. Built-in overcurrent and thermal-overload protection.
   f. Efficiency: Premium efficient.
3. Fan Safety Guards: Steel with corrosion-resistant coating.

I. Safety Controls:
1. Compressor motor and condenser coil fan motor low ambient lockout.
2. Overcurrent protection for compressor motor.

2.6 INDIRECT-FIRED GAS FURNACE HEATING

A. Furnace Assembly:
1. Factory assembled, piped, and wired.
2. Comply with requirements in NFPA 54, "National Fuel Gas Code," and ANSI Z21.47, "Gas-Fired Central Furnaces."
3. AGA Approval: Designed and certified by and bearing label of AGA.

B. Burners:
1. Heat-Exchanger Material: Stainless steel with a minimum thermal efficiency of 80 percent.
2. Fuel: Natural gas.
3. Ignition: Electronically controlled electric spark with flame sensor.

C. Heat-Exchanger Drain Pan Material: Stainless steel.

D. Venting: Gravity vented.

E. Safety Controls:
1. Gas Control Valve: 4 stage.
2. Gas Train: Single-body, regulated, redundant, 24-V ac gas valve assembly containing pilot solenoid valve, pilot filter, pressure regulator, pilot shutoff, and manual shutoff.

2.7 HEAT RECOVERY DEVICE: HEAT WHEEL

A. Casing:
a. Steel with standard factory-painted finish.
b. Integral purge section limiting carryover of exhaust air to between 0.05 percent at 1.6-inch wg and 0.20 percent at 4-inch wg differential pressure.
c. Casing seals on periphery of rotor and on duct divider and purge section.
d. Support vertical rotors on grease-lubricated ball bearings having extended grease fittings or permanently lubricated bearings. Support horizontal rotors on tapered roller bearing.

B. Rotor:
1. Polymer segmented wheel strengthened with radial spokes impregnated with non migrating, water-selective, molecular-sieve desiccant coating.
a. Maximum Solid Size for Media to Pass: 800 micrometer.

C. Drive:
1. Fractional horsepower motor and gear reducer and self-adjusting multilink belt around outside of rotor.
a. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Section 230513 "Common Motor Requirements for HVAC Equipment."
b. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.

2.8 OUTDOOR-AIR INTAKE HOOD

A. Type: Manufacturer's standard hood or louver.

B. Materials: Match cabinet.

C. Bird Screen: Comply with requirements in ASHRAE 62.1.

D. Configuration: Designed to inhibit wind-driven rain and snow from entering unit.

2.9 FILTERS

A. Extended-Surface, Disposable Panel Filters:
1. Comply with NFPA 90A.
2. Factory-fabricated, dry, extended-surface type.
3. Thickness: 2 inches.
4. Minimum Arrestance: 90, according to ASHRAE 52.1.
5. Minimum Merv: 13, according to ASHRAE 52.2.
6. Media: Fibrous material formed into deep-V-shaped pleats and held by self-supporting wire grid.

B. Mounting Frames:
1. Panel filters arranged for flat or angular orientation, with access doors on both sides of unit. Filters shall be removable from one side or from access plenum.
2. Extended surface filters arranged for flat orientation, removable from access plenum.
3. Galvanized or stainless steel with gaskets and fasteners, suitable for bolting together into built-up filter banks.

2.10 ELECTRICAL POWER CONNECTIONS

A. General Electrical Power Connection Requirements: Factory-installed and -wired switches, motor controllers, transformers, and other necessary electrical devices shall provide a single-point field power connection to unit.

B. Enclosure: NEMA 250, Type 4, mounted in unit with hinged access door in unit cabinet having a lock and key or padlock and key,

C. Wiring: Numbered and color-coded to match wiring diagram.

D. Wiring Location: Install factory wiring outside an enclosure in a raceway.

E. Power Interface: Field power interface shall be to [wire lugs][NEMA KS 1, heavy-duty, nonfused disconnect switch].

F. Factory Wiring: Branch power circuit to each motor and to controls with one of the following disconnecting means:
1. NEMA KS 1, heavy-duty, fusible switch with rejection-type fuse clips rated for fuses. Select and size fuses to provide Type 2 protection according to IEC 60947-4-1.
2. NEMA KS 1, heavy-duty, nonfusible switch.
3. UL 489, motor-circuit protector (circuit breaker) with field-adjustable, short-circuit trip coordinated with motor locked-rotor amperes.

G. Factory-Mounted, Overcurrent-Protection Service: For each motor.

H. Transformer: Factory mounted with primary and secondary fuses and sized with enough capacity to operate electrical load plus spare capacity.

I. Controls: Factory wire unit-mounted controls where indicated.

J. Lights: Factory wire unit-mounted lights.

K. Receptacle: Factory wire unit-mounted, ground fault interrupt (GFI) duplex receptacle.

L. Control Relays: Auxiliary and adjustable time-delay relays.

2.11 CONTROLS

A. Control Wiring: Factory wire connection for controls' power supply.

B. Control Devices: Sensors, transmitters, relays, switches, detectors, operators, actuators, and valves shall be manufacturer's standard items to accomplish indicated control functions.

C. Remote-Mounted Status Panel:
1. Cooling/Off/Heating Controls: Control operational mode.
2. Damper Position: Indicate position of outdoor-air dampers in terms of percentage of outdoor air.
3. Status Lights:
   a. Filter dirty.
   b. Fan operating.
   c. Cooling operating.
   d. Heating operating.
   e. Smoke alarm.
4. Digital Numeric Display:
   a. Outdoor airflow.
   b. Supply airflow.
   c. Outdoor dry-bulb temperature.
   d. Outdoor dew point temperature.
   e. Space temperature.
   f. Supply temperature.
   g. Space relative humidity.
   h. Space carbon dioxide level.

D. Control Dampers:
1. Damper Location: Factory installed inside unit for ease of blade axle and bushing service. Arrange dampers located in a mixing box to achieve convergent airflow to minimize stratification.
2. Damper Leakage: Comply with requirements in AMCA 500-D. Leakage shall not exceed 6.5 cfm per sq. ft.at a static-pressure differential of 4.0 inches water column when a torque of 5 inch pounds per sq. ft.is applied to the damper jackshaft.
3. Damper Rating: Rated for close-off pressure equal to the fan shutoff pressure.
4. Damper Label: Bear the AMCA seal for both air leakage and performance.
5. Blade Configuration: Unless otherwise indicated, use parallel blade configuration for two-position control and equipment isolation service and use modulating control when mixing two airstreams. For other applications, use an opposed-blade configuration.
6. Damper Frame Material: Extruded aluminum,, or stainless steel.

7. Blade Type: Single-thickness metal reinforced with multiple V-grooves.
8. Blade Material: Extruded aluminum.
9. Maximum Blade Width: 6 inches.
10. Maximum Blade Length: 48 inches.
11. Blade Seals: Replaceable, continuous perimeter vinyl seals and jambs with stainless-steel compression-type seals.
12. Bearings: Thrust bearings for vertical blade axles.

E. Damper Operators:
1. Factory-installed electric operator for each damper assembly with one operator for each damper assembly mounted to the damper frame.
2. Operator capable of shutoff against fan pressure and able to operate the damper with sufficient reserve power to achieve smooth modulating action and proper speed of response at the velocity and pressure conditions to which the damper is subjected.
3. Maximum Operating Time: Open or close damper 90 degrees in 90 seconds.
4. Adjustable Stops: For both maximum and minimum positions.
5. Position Indicator and Graduated Scale: Factory installed on each actuator with words "OPEN" and "CLOSED," or similar identification, at travel limits.
6. Spring-return operator to fail-safe; either closed or open as required by application.
7. Operator Type: Direct coupled, designed for minimum 60,000 full-stroke cycles at rated torque.
8. Position feedback Signal: For remote monitoring of damper position.
9. Coupling: V-bolt and V-shaped, toothed cradle.
10. Circuitry: Electronic overload or digital rotation-sensing circuitry.

F. Refrigeration System Controls:
1. Unit-mounted enthalpy controller shall lock out refrigerant system when outdoor-air enthalpy is less than 28 Btu/lb of dry air or outdoor-air temperature is less than 60 deg F Insert value.
2. Outdoor-air sensor de-energizes dehumidifier operation when outdoor-air temperature is less than 60 deg F Insert value.
3. Relative-humidity sensor energizes dehumidifier operation when relative humidity is more than 50 percent.

G. Furnace Controls:
1. Wall-mounted, space-temperature sensor with temperature adjustment to modulate gas furnace burner to maintain space temperature.
2. Remote Setback: Adjustable room thermostat selected by timer, set at 50 deg F; cycles supply fan and gas furnace burner to maintain space temperature.
3. Staged Burner Control: Four steps of control.

H. Damper Controls: Space pressure sensor modulates outdoor-dampers to maintain a positive pressure in space at a minimum of 0.05 inch wg with respect to outdoor reference.

2.12 ACCESSORIES

A. Hail guards of galvanized steel, painted to match casing.

B. Smoke detectors: For units with 2000 cfm or greater, unit shall be provided with a smoke detector sensing the return air of the unit, wired to shut off the unit’s control circuit. For units with 15,000 cfm or greater, unit shall be provided with a smoke detector also sensing the supply air of the unit, wired to shut off the unit’s control circuit.

C. Duplex Receptacle: Factory mounted in unit supply-fan section, with 20 amp 120 V GFI duplex receptacle and weatherproof cover.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for piping, ducts, and electrical systems to verify actual locations of connections before equipment installation.

C. Examine roof curbs and equipment supports for suitable conditions where units will be installed.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's rigging and installation instructions for unloading units and moving to final locations.

B. Curb Support: Install roof curb on roof structure according to "The NRCA Roofing Manual."
1. Install and secure units on curbs and coordinate roof penetrations and flashing with roof construction.
2. Coordinate size, installation, and structural capacity of roof curbs, equipment supports, and roof penetrations. These items are specified in Section 077200 "Roof Accessories."
3. Coordinate size, location, and installation of unit manufacturer's roof curbs and equipment supports with roof Installer.

C. Install wall- and duct-mounted sensors furnished by manufacturer for field installation. Install control wiring and make final connections to control devices and unit control panel.

D. Install 3000-psi, compressive-strength (28-day) concrete base inside roof curb, 4 inches thick. Concrete and reinforcement are specified with concrete.

E. Comply with requirements for gas-fired furnace installation in NFPA 54, "National Fuel Gas Code."

F. Install separate devices furnished by manufacturer and not factory installed.

G. Install new filters at completion of equipment installation and before testing, adjusting, and balancing.

H. Install drain pipes from unit drain pans to sanitary drain.
1. Drain Piping: Drawn-temper copper water tubing complying with ASTM B 88, Type L, with soldered joints.
2. Pipe Size: Same size as condensate drain pan connection.

3.3 CONNECTIONS

A. Where installing piping adjacent to units, allow space for service and maintenance.

B. Gas Piping Connections:
   1. Comply with requirements in Section 231123 "Facility Natural-Gas Piping."
   2. Connect gas piping to furnace, full size of gas train inlet, and connect with union, pressure regulator, and shutoff valve with sufficient clearance for burner removal and service.

C. Duct Connections:
   1. Comply with requirements in Section 233113 "Metal Ducts."
   2. Drawings indicate the general arrangement of ducts.
   3. Connect ducts to units with flexible duct connectors. Comply with requirements for flexible duct connectors in Section 233300 "Air Duct Accessories."

D. Electrical Connections: Comply with requirements for power wiring, switches, and motor controls in electrical Sections.
   1. Install electrical devices furnished by unit manufacturer but not factory mounted.

3.4 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.
   1. Complete installation and startup checks according to manufacturer's written instructions.
   2. Inspect units for visible damage to furnace combustion chamber.
   3. Perform the following operations for both minimum and maximum firing and adjust burner for peak efficiency:
      a. Measure gas pressure at manifold.
      b. Measure combustion-air temperature at inlet to combustion chamber.
      c. Measure flue-gas temperature at furnace discharge.
      d. Perform flue-gas analysis. Measure and record flue-gas carbon dioxide and oxygen concentration.
      e. Measure supply-air temperature and volume when burner is at maximum firing rate and when burner is off. Calculate useful heat to supply air.
   4. Verify operation of remote panel including pilot-light operation and failure modes. Inspect the following:
      a. High-limit heat exchanger.
      b. Alarms.
   5. Inspect units for visible damage to refrigerant compressor, condenser and evaporator coils, and fans.
   6. Start refrigeration system when outdoor-air temperature is within normal operating limits and measure and record the following:
      a. Cooling coil leaving-air, dry- and wet-bulb temperatures.
      b. Cooling coil entering-air, dry- and wet-bulb temperatures.
      c. Condenser coil entering-air dry-bulb temperature.
      d. Condenser coil leaving-air dry-bulb temperature.
   7. Simulate maximum cooling demand and inspect the following:
      a. Compressor refrigerant suction and hot-gas pressures.
      b. Short-circuiting of air through outside coil or from outside coil to outdoor-air intake.
   8. Inspect casing insulation for integrity, moisture content, and adhesion.
   9. Verify that clearances have been provided for servicing.
   10. Verify that controls are connected and operable.
   11. Verify that filters are installed.
   12. Clean coils and inspect for construction debris.
   13. Clean furnace flue and inspect for construction debris.
   14. Inspect operation of power vents.
   15. Purge gas line.

16. Verify bearing lubrication.
17. Clean fans and inspect fan-wheel rotation for movement in correct direction without vibration and binding.
18. Adjust fan belts to proper alignment and tension.
19. Start unit.
20. Inspect and record performance of interlocks and protective devices including response to smoke detectors by fan controls and fire alarm.
21. Operate unit for run-in period.
22. Calibrate controls.
23. Adjust and inspect high-temperature limits.
24. Inspect outdoor-air dampers for proper stroke.
25. Verify operational sequence of controls.
26. Measure and record the following airflows. Plot fan volumes on fan curve.
    a. Supply-air volume.
    b. Return-air flow.
    c. Outdoor-air flow.

B. After startup, change filters, verify bearing lubrication, and adjust belt tension.

C. Remove and replace components that do not properly operate and repeat startup procedures as specified above.

D. Prepare written report of the results of startup services.

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain units.

END OF SECTION

SECTION 23 82 19
FAN COIL UNITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes fan-coil units and accessories.

1.3 DEFINITIONS

A. BAS: Building automation system.

1.4 SUBMITTALS

A. Product Data: Include rated capacities, operating characteristics, furnished specialties, and accessories.

B. Operation and Maintenance Data: For fan-coil units to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:

1. Maintenance schedules and repair part lists for motors, coils, integral controls, and filters.

C. Warranty: Special warranty specified in this Section.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1-2004, Section 5 - "Systems and Equipment" and Section 7 - "Construction and Startup."

C. ASHRAE/IESNA 90.1-2004 Compliance: Applicable requirements in ASHRAE/IESNA 90.1-2004, Section 6 - "Heating, Ventilating, and Air-Conditioning."

1.6 COORDINATION

A. Coordinate layout and installation of fan-coil units and suspension system components with other construction that penetrates or is supported by ceilings, including light fixtures, HVAC equipment, fire-suppression-system components, and partition assemblies.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of condensing units that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Five 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:

B. In the Fan-Coil-Unit Schedule where titles below are column or row headings that introduce lists, the following requirements apply to product selection:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 DUCTED AND CONCEALED FAN-COIL UNITS

A. Manufacturers:

1. Trane
2. JCI
3. Envirotec
4. International IEC

B. Description: Factory-packaged and -tested units rated according to ARI 440, ASHRAE 33, and UL 1995.

C. Coil Section Insulation: 1/2-inch thick foil-faced glass fiber complying with ASTM C 1071 and attached with adhesive complying with ASTM C 916.

1. Fire-Hazard Classification: Insulation and adhesive shall have a combined maximum flame-spread index of 25 and smoke-developed index of 50 when tested according to ASTM E 84.
2. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2004.

D. Drain Pans: Stainless steel . Fabricate pans and drain connections to comply with ASHRAE 62.1-2004.

E. Chassis: Galvanized steel where exposed to moisture, with baked-enamel finish and removable access panels.

F. Cabinets: Steel with baked-enamel finish in manufacturer's standard paint color.

1. Supply-Air Plenum: Sheet metal plenum finished and insulated to match the chassis.
2. Return-Air Plenum: Sheet metal plenum finished to match the chassis.
3. Dampers: Galvanized steel with extruded-vinyl blade seals, flexible-metal jamb seals, and interlocking linkage.

G. Filters: Minimum arrestance according to ASHRAE 52.1, and a minimum efficiency reporting value (MERV) according to ASHRAE 52.2.

1. Pleated Cotton-Polyester Media: 90 percent arrestance and 7 MERV.

H. Hydronic Coils: Copper tube 0.025 inches thick, with mechanically bonded aluminum fins spaced no closer than 10 fins per inch , rated for a minimum working pressure of 200 psig and a maximum entering-water temperature of 220 deg F . Include manual air vent and drain.

I. Direct-Driven Fans: Double width, forward curved, centrifugal; with permanently lubricated, multispeed motor resiliently mounted in the fan inlet. Aluminum or painted-steel wheels, and painted-steel or galvanized-steel fan scrolls.

J. Belt-Driven Fans: Double width, forward curved, centrifugal; with permanently lubricated, single-speed motor installed on an adjustable fan base resiliently mounted in the cabinet. Aluminum or painted-steel wheels, and painted-steel or galvanized-steel fan scrolls.

1. Motors: Comply with requirements in Division 23 Section "Common Motor Requirements for HVAC Equipment."

K. Control devices and operational sequence are specified in Division 23 Sections "Instrumentation and Control for HVAC" and "Sequence of Operations for HVAC Controls."

L. DDC Terminal Controller: Provided and field installed by Controls Contractor.

M. Electrical Connection: Factory wire motors and controls for a single electrical connection.

2.3 VERTICAL FAN-COIL UNITS

A. Manufacturers:
1. Trane
2. JCI
3. Envirotec
4. International IEC

B. Basic Unit: Basic unit shall include chassis, coil, main drain pan, fan board, fan, fan housing, motor and thermal insulation.

C. Cabinet: Front panel to be 16-gauge steel. All other panels are 18-gauge steel. Panels shall be removable for easy access.

D. Cabinet Finish: All cabinet parts shall be cleaned, bonderized, phosphatized, and painted with baked-on powder primer. Final finish color shall be as selected by the Owners Representative.

E. Coils: 5/8-inch O.D. seamless copper tubes mechanically bonded to aluminum fins with continuous fin collars and sleeved coil end supports. Coils shall have a maximum working pressure of 300 psig, burst test of 450 psi (air), and leak test of 300 psi (air under water). Coils shall have female sweat connection to accept copper tubing.

F. Drain Pans: Drain pans shall be stainless steel and insulated underneath. Drain pans shall accept a copper sweat fitting.

G. Fans: Fan wheels shall be centrifugal forward-curved, double-width of molded, constructed of aluminum. Fan wheels and housing shall be corrosion resistant. Fan housings shall be of formed sheet metal.

H. Motors: All motors shall have integral thermal overload protection and shall start at 78 percent of rated voltage. Motors shall operate satisfactorily at a 10 percent variation of rated voltage on all speed settings without undue magnetic hum. All motors shall be factory run tested in assembled unit prior to shipping.

I. Filters: Filters shall be located in the return air registers. Filters shall be the 1" throw-away type equal to Farr 30/30.

J. Accessories:
   a. Provide extended motor oilers.
   b. Provide auxiliary drain pan and pipe drain to sight as approved by the Architect or as indicated on the drawings. Drain pipes through a finished ceiling shall be trimmed with an escutcheon.
   c. Provide unit mounted disconnect.

K. Control devices and operational sequence are specified in Division 23 Sections "Instrumentation and Control for HVAC" and "Sequence of Operations for HVAC Controls."

L. DDC Terminal Controller: Provided and field installed by Controls Contractor.

M. Electrical Connection: Factory wire motors and controls for a single electrical connection.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive fan-coil units for compliance with requirements for installation tolerances and other conditions affecting performance.

B. Examine roughing-in for piping and electrical connections to verify actual locations before fan-coil-unit installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install fan-coil units level and plumb.

B. Install fan-coil units to comply with NFPA 90A.

C. Suspend fan-coil units from structure with elastomeric hangers. Vibration isolators are specified in Division 23 Section "Vibration and Seismic Controls for HVAC Piping and Equipment."

D. Verify locations of thermostats, humidistats, and other exposed control sensors with Drawings and room details before installation. Install devices 48 inches above finished floor.

E. Install new filters in each fan-coil unit within two weeks after Substantial Completion.

3.3 CONNECTIONS

A. Piping installation requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties. Specific connection requirements are as follows:

1. Install piping adjacent to machine to allow service and maintenance.
2. Connect piping to fan-coil-unit factory hydronic piping package. Install piping package if shipped loose.

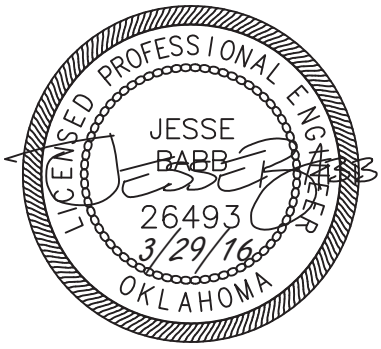
B. Connect supply and return ducts to fan-coil units with flexible duct connectors specified in Division 23 Section "Air Duct Accessories." Comply with safety requirements in UL 1995 for duct connections.

C. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."

D. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

END OF SECTION

ELECTRICAL SPECIFICATIONS
for
ROOF REPLACEMENT AND HVAC RENOVATION
FOR
CANADIAN COUNTY OFFICE BUILDING



END OF SECTION

SECTION 26 05 00

BASIC ELECTRICAL REQUIREMENTS

PART 1: GENERAL

1.01 RELATED DOCUMENTS

A. The General Conditions, Supplementary General Conditions with Amendment, General Requirements of the Specifications bound herewith as the first section of these specifications are included in and made a part of this Specification. References in the specifications to the "Architect" shall be equal to, and the same as the "Engineer."

B. The attention of this Contractor, Sub-contractors, and all others furnishing labor, materials, or work is particularly directed to the drawings, which show the extent of the work contemplated.

C. The Electrical Provisions contained in this section of the Specifications applies fully to all sub-contractors, etc., furnishing labor and/or materials under heading of Electrical Work.

1.02 SITE VISITATION

A. The Contractor shall visit the site of this project and thoroughly familiarize himself with existing conditions before submitting a proposal on this work. Failure on the contractor's part to inspect the existing conditions will not be sufficient cause for extras after the contract is signed, by reason of unforeseen conditions.

1.03 CODES AND STANDARDS

A. The Contractor shall keep fully informed of any and all existing and current ordinances, laws, and regulations of the city, county, state and national governments, and the local utilities, which are applicable to the materials, labor, and work under this contract. He shall at all times observe and comply with such regulations and shall protect and indemnify the Owner against any claims or liability arising from or based on any violations of same.

B. In case the specifications or drawings conflict with such ordinances, laws, or regulation, the conflicting portion of work affected shall be installed in strict accordance with the regulations above mentioned; the remainder of the drawings and specification, however, shall remain in full force. In no case will work or materials inferior to these specifications be accepted even if permitted by code.

C. In places where codes conflict, the local code shall have preference.

D. Permits: All necessary licenses, fees, or permits for the carrying out of this work must be secured and paid for by this Contractor. The Contractor shall be responsible for any damage sustained due to his failure to secure such licenses, fees, or permits. This Contractor shall pay all taxes applicable to his work or materials.

E. Cooperation: This Contractor is cautioned to examine all drawings and specifications relating to all other branches of the work, and he shall make proper provisions to receive all other work.

F. This Contractor shall provide all other contractors or sub-contractors whose work will be in contact with the work under this heading with approved shop drawings, and request approved copies of their drawings, so that proper cooperation between different trades shall result therefrom.

G. This Contractor shall cooperate fully with all other contractors on the work. If any part of this Contractor's work depends for proper execution or results upon the work of any other contractor, this Contractor shall inspect and promptly report to the Architect any defects in such work that render it unsuitable for such execution and results. Failure to so inspect and report shall constitute an acceptance of the other contractor's work as fit and proper for the reception of this work.

H. To ensure proper execution of his subsequent work, this Contractor shall measure work already in place, and shall at once report to the Architect any discrepancies between executed work and the drawings.

1.04 DRAWINGS AND SPECIFICATIONS

A. The drawings and specifications are to be considered as mutually explanatory, and any work required by one but not the other shall be performed as though required by both. The work shall be accomplished as called for in the specifications and/or shown on the drawings.

B. The drawings constitute an integral part of this contract and shall serve as the working drawings. They indicate the general layout of the complete electrical system. Data presented on these drawings are as accurate as preliminary surveys and planning can determine, but absolute accuracy is not guaranteed. Field verifications of scale dimensions on drawings are the responsibility of the Contractor since final locations, distances and heights will be governed by actual field conditions.

C. The Contractor shall check all Civil, Architectural, Structural, Plumbing, Air Conditioning, Heating and Ventilating, and Landscape drawings to avert possible installation conflicts. Discrepancies shown on different drawings or between drawings and actual field conditions or between drawings and specifications, or other necessary changes shall be brought to the attention of the Architect promptly for resolution. It shall be the responsibility of the Contractor to check all schedules with the drawings in order to verify all quantities and special requirements before ordering equipment. The right is reserved to move the location of any outlet, access floor service module or lighting fixture, before installation, up to a 8'-0" radius without additional cost to the Owner.

D. Any errors or ambiguities in the drawings and specifications that are discovered by the Contractor shall be reported to the Architect before work is started. Omission of specific reference to any item obviously necessary for a complete installation and proper operation thereof, or any item omitted from schedule, but shown on the drawings, or vice versa, shall be included in the contract without additional cost. In case of a dispute concerning the true intent and meaning of these drawings and specifications, the Architect shall interpret the same and his interpretation shall be accepted by the Contractor as final. Changes from the drawings to make the work conform to the structure and to fit the work of other trades shall be submitted to the Architect for approval before any deviations are made.

1.05 ACCEPTANCE OF BASE BID MATERIALS AND SUBSTITUTION REQUIREMENTS

A. The drawings and specifications are drawn and written on the basis of using materials and equipment of certain named manufacturers. Where more than one manufacturer is specified

for a particular item of equipment, each manufacturer's equipment will be acceptable for Base Bid.

B. It is to be emphasized that all Contractor's bids shall be based on equipment specified or as approved by the Architect. Submission of substitute items of equipment by the contractor or manufacturer shall be in no way binding on the Owner for acceptance or rejection. Final approval of all equipment and materials shall be made only after final test and acceptance of the project.

1.06 SCOPE OF WORK

A. The work and materials to be furnished by this Contractor consist generally of the following items:

1. Furnish complete installation of electric service facilities, feeder wiring, panelboards, branch circuit wiring, wiring devices, and other work indicated on the drawings or called for in these specifications.

2. Grounding of the equipment of each electrical system.

3. Where necessary, install motor starters and VFDs which are provided by mechanical contractor. Electrical contractor shall install disconnects, motor starters, controllers and VFDs and all related power wiring and conduit as necessary for a complete and functional installation.

4. Furnish temporary electric power service, power distribution and lighting to construction site.

5. Unless specified otherwise, furnish power conductors, conduit, and wiring and make connections to equipment and devices installed under other Divisions and Sections.

6. Install telephone and data systems.

7. All necessary drilling, cutting, and patching of walls, floors, partitions, ceilings, etc., required for the proper installation of the work under this contract shall be done at the contractor's expense in a neat, careful, and workmanlike manner and as approved by the Architect. No concrete joints, beams, girders, or columns shall be cut by the contractor without first obtaining the written permission of the Architect. All drilling and patching for expansion bolts, hangers, and other supports shall be done by the contractor subject to the approval of the Architect.

8. Provide concrete pads for ground mounted equipment such as generators, transformers, etc.

9. Provide uni-strut frames for equipment (such as panel boards) where it is not possible to mount directly to structure.

1.07 SUBMITTALS

A. The Contractor shall submit for approval a single electronic submittal in PDF format, describing all material and equipment to be provided. Submittal file shall be organized in a

logical manner by specification subsection. Materials specified on drawings shall be submitted as well as those specified in these specifications. Include sufficient manufacturer's information to demonstrate that the material is in accordance with the specifications. Any material or equipment that is not in accordance with the specification requirements may be rejected solely at the Architect's discretion. No work shall be fabricated and no material or equipment shall be purchased, except at the Contractor's risk, until approved by the Architect. Submittals shall be complete and entire. Partial submittals will be returned to the Contractor for proper preparation and resubmission in complete form.

B. The submittal shall be delivered to the Architect as soon as possible after award of contract, allowing sufficient time for review and approval so that the work is not delayed. Submittals shall be accompanied by a letter of transmittal listing the information being submitted. Any questions regarding submittals should be referred to the Architect promptly following award of contract.

C. Any equipment or material submitted which is not in accordance with the specification requirements because of standard shop practice or other reasons, shall be specifically noted in the letter of transmittal including all points of variance. If the submittals are not marked in this way, the Contractor remains responsible to execute his work in accordance with the contract documents even if such submittals are approved. Any changes or additional costs to other trades or to the project caused by a substitution, even if approved, shall be borne by the trade making the substitution.

D. The Architect's approval of submittals indicates general compliance with the design concept, but shall not be considered as permitting any departure from the contract documents. Nor shall it relieve the Contractor's responsibility for any errors in the submittal, such as in details, dimensions, materials, etc.

E. If requested, the Contractor shall provide samples of materials or equipment he proposes to furnish. Such samples shall remain the property of the Contractor and will be returned before contract closeout.

F. Contractor shall submit dimensioned shop drawings of all electrical and telephone room layouts, and any other locations where electrical equipment is grouped. Shop drawings shall show relationship of electrical equipment with the building structure and equipment of other trades. Shop drawings shall also be provided for the following systems:

1. Telephone and data systems
2. Fire alarm system
3. Intrusion alarm system
4. Public address and sound systems
5. Lightning protection system
6. Lighting control systems

1.08 PROTECTION AND RESPONSIBILITY

A. This Contractor shall be responsible for the proper care of all his materials, equipment, etc., delivered at the site.

B. The Contractor shall protect and be responsible for any damage to his work or materials, from the date of agreement until final acceptance is made, and shall make good without cost to the Owner any damage or loss that may occur during this period. Contractor shall handle all materials as directed so that they may be inspected by the Architect.

C. Should any material be found defective or in any way conflicting with the contract, this material, no matter in what stage of completion, may be rejected by the Architect, and must be removed from the premises at once.

D. No waste material or rubbish resulting from this work shall be allowed to accumulate on or about the premises. Contractor shall remove waste and debris promptly at his expense.

1.09 ACCEPTANCE

A. Final acceptance will be made upon approval of the Owner when all systems are completed and operating properly.

1.10 GUARANTEE

A. The Contractor shall guarantee the apparatus as installed by him to perform as specified, and shall guarantee to keep the entire system except lamps, as installed by him or his subcontractors, in repair and perfect working order for one year after date of substantial completion. The Contractor shall furnish to the Owner, free of cost, all material, labor and other expenses necessary to comply with the above guarantee, said guarantee being based upon defective material, workmanship, and equipment performance.

1.11 AS-BUILT DRAWINGS AND OPERATING MANUALS

A. In order for the Architect to provide accurate as-built drawings to the Owner, the Contractor shall keep a complete set of Contract Drawings on which is shown in colored pencil any changes made in actual installation as to type, size, location, depth, routing, etc. of all equipment, conduit, fixtures, switches, panels, etc. The Contractor shall deliver the as-built drawing set to the Architect at the completion of the job and before final payment is made.

B. The Electrical Plot Plan shall show by dimension, the final location and depth of all electrical, telephone or other communication buried conduits.

C. Operations Manual: Upon completion of the project and before final payment is made the Contractor shall prepare and submit an operations manual for the Architect's approval. The manual shall include copies of complete submittal data as approved, shop drawings, engineering data, and manufacturer's operating and maintenance bulletins, and stock item parts list for each item of equipment, as well as names, phone numbers and addresses for each manufacturer. This data shall be bound in hard cover vinyl three-ring binders with clear sleeve on front, back and spine, and indexed by material type. After approval by the Architect, submit two (2) copies in electronic (PDF) format for the Owner's retention.

END OF SECTION

SECTION 26 05 01

ELECTRICAL TEMPORARY FACILITIES

PART 1: GENERAL

1.01 RELATED DOCUMENTS

A. The general provisions of the contract, including General and Supplementary Conditions and General Requirements (if any), apply to the work specified in this section.

1.02 DESCRIPTION OF WORK

A. The types of temporary facilities and uses requiring electrical work include (but are not necessarily limited to) the following:

1. Temporary power service/source.

2. Temporary power distribution.

3. Temporary lighting.

4. Temporary use of permanent electrical facilities.

5. Temporary telephone service.

B. Refer to Division 1 for basic requirements and administrative requirements relating to electrical work of temporary facilities.

1.03 QUALITY ASSURANCE

A. Governing Regulations, Permits: Comply with governing regulations for the electrical work of temporary facilities; including but not necessarily limited to code compliance's, permits, inspections, and health and safety compliance's.

PART 2: PRODUCTS

2.01 MATERIALS

A. Provide either new or used materials and equipment for electrical temporary facilities which are suitable for intended uses and will ensure safe, adequate performance of the facilities in accordance with governing regulations and codes.

PART 3: EXECUTION

3.01 INSTALLATION AND OPERATION

A. General: Connect and terminate electrical temporary facilities at locations as determined by the General Contractor to fulfill project requirements. Install meters where required for the proper allocation of charges for temporary power use. Unless specifically indicated otherwise elsewhere in these specifications, the General Contractor will pay the electric utility bills to the local power company during the period of construction.

B. Electrical Work:

1. Temporary power service to the project construction area including stand-alone power generating units where and when the connected power service, from an existing utility source is not feasible.

2. Temporary power distribution (temporary wiring) for the purpose of supplying convenience outlets; connections for construction tools and machines including hoists/cranes and elevators; connections for temporary pumping, heating; temporary lighting; and similar facilities for construction, general services, security and protection. Work includes outlets with ground fault circuit interrupter protection, overload-protected disconnect switches, and similar devices and facilities; but does not include extension cords and actual temporary mechanical equipment connections.

3. Temporary lighting for construction areas; for temporary offices, shops, storage sheds and similar temporary space enclosures; for exterior construction areas, parking roadways and walkways; and for special lighting for security, protection and project identification; but excluding plug-in type task lighting (defined as "tools"), needed to supplement general temporary lighting for specific construction activities.

4. A ground fault protective system per the N.E.C. shall be installed and maintained and shall be subject to the approval of the authority having jurisdiction.

3.02 REMOVAL AND RESTORATION

A. When no longer needed for construction work, remove electrical temporary facilities. Repair and restore or replace work damaged by installation and operation of electrical temporary facilities. Electrical equipment and devices installed as temporary facilities shall, upon removal, remain the property of the Installer. All debris and unused materials shall be removed from the site at the Contractors expense.

B. Restore any permanent equipment used for temporary facilities to original condition including lamps that have been in operation for one half or more of their rated life. All equipment shall be cleaned and touched up with manufacturer's matching paint. Light fixtures shall be carefully cleaned so as to not scratch or dull specular surfaces.

END OF SECTION

SECTION 26 05 02

ELECTRICAL DEMOLITION

PART 1: GENERAL

1.01 RELATED DOCUMENTS

A. The general provisions of the contract, including General and Supplementary Conditions and General Requirements (if any), apply to the work specified in this section.

1.02 DESCRIPTION OF WORK

A. The extent of demolition work is indicated on the drawings and by the requirements of this section. A visit to the site will be required to properly bid the demolition work.

B. Provide all demolition work required for the removal and/or relocation of electrical equipment and associated conductors, conduit, boxes, etc. to provide a complete and operable system upon completion of the project.

C. Work shall at all times be in compliance with local and national safety codes. Great care shall be taken to avoid leaving hazardous conditions unattended.

D. Schedule any required power outages in writing a minimum of 10 days in advance with the Owner.

E. Division 26 work includes removal of electrical devices, panels, lighting fixtures, conduit, wiring, etc., in the areas to be remodeled as required and as indicated on the drawings. Demolition plans were prepared from as-built drawings and site surveys. Field modifications and/or additions have been made since the preparation of the as-built drawings, and all demolition items may not be shown or exist as exactly indicated, and absolute accuracy cannot be guaranteed. Contractor shall field verify actual conditions for himself during bidding and shall anticipate and include in his bid contingencies for any necessary work that may appear after demolition work has begun.

PART 2: PRODUCTS

2.01 MATERIALS

A. Reference other specification sections as applicable for products required incidental to demolition work.

PART 3: EXECUTION

3.01 INSTALLATION

A. Where lighting, conduit, surface raceways, junction boxes or any other electrical device is removed, contractor shall patch, repair and paint or otherwise finish as necessary to make the surface match existing or new finishes as applicable for each location. This shall include patching of brick, concrete, stone, sheetrock, masonry, wood or any other finishes.

B. Where devices or equipment are indicated or required to be removed, the associated boxes, conduit, and conductors shall be removed back to their source.

C. Where devices or equipment are indicated or required to be relocated, the associated boxes, conduit, and conductors shall be removed back to a junction box and new products shall be used to extend the service to the new location.

D. Where devices or equipment are served from under a concrete floor, the conduit shall be cut off below finish floor level, capped and grouted flush with finished floor.

E. Where underfloor duct openings are deactivated the pedestal and associated fittings shall be removed and returned to the owner. Install a mud cap in the underfloor duct insert and grout flush with finished floor.

F. Where conduits are run above inaccessible ceilings or in walls which are to remain undisturbed, conductors shall be removed and the conduits capped and abandoned in place.

G. Where the demolition work renders equipment downstream inoperable, service shall be extended to the downstream devices or equipment so that they are left in operating condition.

H. Where devices or equipment are served with conduits penetrating a basement wall, the conduits shall be cut off outside the basement wall and capped. The basement wall penetration shall be sealed and made watertight.

END OF SECTION

SECTION 26 05 04

CLEANING, INSPECTION, AND TESTING OF ELECTRICAL EQUIPMENT

PART 1 GENERAL

1.1 SCOPE

A . The work under this section includes the required cleaning, repair, adjustment, calibration, maintenance and testing of electrical equipment, as specified herein. This applies only to new electrical and existing electrical equipment being furnished, modified, worked on or serviced by this Contractor for this project. Included are the following topics:

1. PART 1 – GENERAL.
   a. Scope.
   b. Related Work.
2. PART 2 – PRODUCTS.
   a. Not Used.
3. PART 3 – EXECUTION.
   a. General Inspection and Cleaning of all Equipment.
   b. Cables.

1.2 RELATED WORK

A . Applicable provisions of Division 1 govern work under this Section.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.1 GENERAL INSPECTION AND CLEANING OF ALL ELECTRICAL EQUIPMENT

A . Inspect for physical damage and abnormal mechanical and electrical conditions.

B . Any item found to be out of tolerance, or in any other way defective as a result of the required testing, shall be reported to the Engineer and Owner. Procedure for repair and/or replacement will be outlined. After appropriate corrective action is completed the item shall be re-tested.

C . Compare equipment nameplate information with the latest single line diagram and report any discrepancies.

D . Verify proper auxiliary device operation and indicators.

E . Check tightness of accessible bolted electrical joints. Use torque wrench method.

F . Make a close examination of equipment and remove any shipping brackets, insulation, packing, etc. that may not have been removed during original installation.

G . Make a close examination of equipment and remove any dirt or other forms of debris that may have collected in existing equipment or in new equipment during installation.

H . Clean All Equipment:

1. Vacuum inside of panelboards, switchboards, switchgear, transformer core and coils, horizontal and vertical busducts, MCC's, fire alarm panels, comm/data, security panel, etc.
2. Loosen attached particles and vacuum them away.
3. Wipe all insulators with a clean, dry, lint free rag.
4. Clean insulator grooves.
5. Re-vacuum inside surfaces as directed by the Owner’s Construction Representative or Inspector.

I . Inspect equipment anchorage.

J . Inspect equipment and bus alignment.

K . Check all heater elements for operation and control.

L . Lubricate nonelectrical equipment per manufacturer's recommendations.

3.2 CABLES

A . Visual and Mechanical Inspections:
1. Inspect exposed sections for physical damage.
2. Verify cable is supplied and connected in accordance with single line diagram.
3. Inspect for shield grounding, cable support and termination.
4. If cables are terminated through window type C.T.'s make an inspection to verify that neutrals and grounds are properly terminated for normal operation of protective devices.
5. Inspect for visual jacket and insulation condition.
6. Visible cable bends shall be checked against ICEA or manufacturer's minimum allowable bending radii -- 12 times the diameter for tape shielded cables.
7. Inspect for proper fireproofing in common cable areas.
8. There shall be NO tests performed on existing cable without specific direction from the Consulting Engineer.

B . Electrical Tests -- Below 600 Volts:
1. All secondary cables from the substation transformers to the secondary switchboards shall be subjected to insulation tests using a 500 vdc megger.
2. Visually inspect cables, lugs, connectors and all other components for physical damage and proper connections.
3. Check all cable connectors for tightness (with a torque wrench) and clearances. Torque test conductor and bus terminations to manufacturer's recommendations.
4. Check for proper grounding resistance at all services and at transformers. Resistance shall be 2 ohms maximum.
    a. Above 600 volts:
        1) Above 600 volt testing will be performed under a separate contract.

END OF SECTION

SECTION 26 05 19

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1: GENERAL

1.01 SCOPE

A . The work under this section includes furnishing and installing required wiring and cabling systems including pulling, terminating and splicing. Included are the following topics:

1. PART 1 – GENERAL.
    1) Scope.
    2) Related Work.
    3) References.
    4) Submittals.
    5) Project Conditions.
2. PART 2 – PRODUCTS.
    1) General.
    2) Building Wire.
    3) Variable Frequency Drive (VFD) Wire.
    4) Underground Wire for Exterior Work.
    5) Modular Wiring Systems - Light Fixtures.
    6) Modular Wiring Systems - Receptacles.
    7) Wiring Connectors.
3. PART 3 – EXECUTION.
    1) General Wiring Methods.
    2) Wiring Installation In Raceways.
    3) Modular Wiring System Installation.
    4) Wiring Connections and Terminations.
    5) Field Quality Control.
    6) Wire Color.
    7) Branch Circuits.
    8) Emergency Circuits.
    9) Construction Verification Items.

1.02 RELATED WORK

A . Applicable provisions of Division 1 govern work under this Section.

B . Section 26 05 32 – Raceway and Boxes for Electrical Systems.

C . Section 26 05 53 – Identification for Electrical Systems.

1.03 REFERENCES

A . NFPA 70 - National Electrical Code.

1.04 SUBMITTALS

A . Refer to Section 01 30 00 – Administrative Requirements, for submittal procedures.

B . Submit product data: Provide for each cable assembly type.

C . Submit factory test reports: Indicate procedures and values obtained.

D . Submit shop drawings for modular wiring system including layout of distribution devices, branch circuit conduit and cables, circuiting arrangement, and outlet devices.

E . Submit manufacturer's installation instructions. Indicate application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements.

1.05 PROJECT CONDITIONS

A . Verify that field measurements are as shown on Drawings.

B . Conductor sizes are based on copper.

C . Wire and cable routing shown on Drawings is approximate unless dimensioned. Route wire and cable as required to meet project conditions.

D . Where wire and cable routing is not shown, and destination only is indicated, determine exact routing and lengths required.

PART 2: PRODUCTS

2.01 GENERAL

A . All wire shall be new, delivered to the site in unbroken cartons and shall be less than one year old out of manufacturer's stock.

B . All wiring shall be copper.

C . Insulation shall have a 600 volt rating.

D . All conductors shall be stranded.

1. Stranded conductors may only be terminated with UL OR ETL Listed type terminations or methods: e.g. stranded conductors may not be wrapped around a terminal screw but must be terminated with a crimp type device or must be terminated in an approved back wired method.

2.02 BUILDING WIRE

A . Description: Single conductor insulated wire.

B . Insulation: Type THHN/THWN, XHHW-2 insulation for feeders and branch circuits.

C . Type XHHW-2 insulation for feeders with aluminum conductors.

2.03 VARIABLE FREQUENCY DRIVE (VFD) WIRE

A . All power wiring from the VFD output to the motor shall be type XHHW-2 insulation, single conductor wire.

2.04 UNDERGROUND WIRE FOR EXTERIOR WORK

A . Description: Stranded single or multiple conductor insulated wire.

B . Insulation: Type XHHW-2 or USE.

C . This wiring shall be used in all underground applications, except when run in a concrete-encased ductbank.

2.05 WIRING CONNECTORS

A . Split Bolt Connectors: Not acceptable.

B . Solderless Pressure Connectors: High copper alloy terminal. May be used only for cable termination to equipment pads or terminals. Not approved for splicing.

C . Spring Wire Connectors: Solderless spring type pressure connector with insulating covers for copper wire splices and taps. Use for conductor sizes 10 AWG and smaller.

D . All wire connectors used in underground or exterior pull boxes shall be gel filled twist connectors or a connector designed for damp and wet locations.

E . Mechanical Connectors: Bolted type tin-plated; high conductivity copper alloy; spacer between conductors; beveled cable entrances.

F . Compression (crimp) Connectors: Long barrel; seamless, tin-plated electrolytic copper tubing; internally beveled barrel ends. Connector shall be clearly marked with the wire size and type and proper number and location of crimps.

PART 3: EXECUTION

3.01 GENERAL WIRING METHODS

A . All wire and cable shall be installed in conduit.

B . Do not use wire smaller than 12 AWG for power and lighting circuits.

C . All conductors shall be sized to prevent excessive voltage drop at rated circuit ampacity. As a minimum use 10 AWG conductor for 20 ampere, 120 volt branch circuit home runs longer than 100 feet (30 m), and for 20 ampere, 277 volt branch circuit home runs longer than 200 feet (61 m).

D . Make conductor lengths for parallel conductors equal.

E . Splice only in junction or outlet boxes.

F . No conductor less than 10 AWG shall be installed in exterior underground conduit.

G . Identify ALL low voltage, 600v and lower, wire per section 26 05 53.

H . Neatly train and lace wiring inside boxes, equipment, and panelboards.

3.02 WIRING INSTALLATION IN RACEWAYS

A . Pull all conductors into a raceway at the same time. Use Listed wire pulling lubricant for pulling 4 AWG and larger wires and for other conditions when necessary.

B . Install wire in raceway after interior of building has been physically protected from the weather and all mechanical work likely to injure conductors has been completed.

C . Completely and thoroughly swab raceway system before installing conductors.

D . Place all conductors of a given circuit (this includes phase wires, neutral (if any), and ground conductor) in the same raceway. If parallel phase and/or neutral wires are used, then place an equal number of phase and neutral conductors in same raceway or cable.

E . VFD Installations: Install VFD input wiring and output wiring in separate conduit systems. Do not mix VFD input power and output power, or control wiring in a common raceway.

3.03 WIRING CONNECTIONS AND TERMINATIONS

A . Splice only in accessible junction boxes.

B . Wire splices and taps shall be made firm, and adequate to carry the full current rating of the respective wire without soldering and without perceptible temperature rise.

C . All splices shall be so made that they have an electrical resistance not in excess of two feet (600 mm) of the conductor.

D . Use solderless spring type pressure connectors with insulating covers for wire splices and taps, 10 AWG and smaller.

E . Use mechanical or compression connectors for wire splices and taps, 8 AWG and larger. Tape uninsulated conductors and connectors with electrical tape to 150 percent of the insulation value of conductor.

F . Thoroughly clean wires before installing lugs and connectors.

G . At all splices and terminations, leave tails long enough to cut splice out and completely re-splice.

3.04 FIELD QUALITY CONTROL

A . Field inspection and testing will be performed under provisions of Section 26 05 04.
1. Additional testing as follows shall be performed if aluminum conductors are used:
    1) Equipment terminated with aluminum conductors shall be tested with a thermal imager and recorded.
    2) Conductors shall be closely checked for loose or poor connections, and for signs of overheating or corrosion.
    3) Test procedures shall meet NETA guidelines.
    4) Test results and report shall be provided to the engineer.
    5) Contractor shall correct all deficiencies reported in the test report.

3.05 WIRE COLOR

A . General:
1. For wire sizes 10 AWG and smaller - Wire shall be colored as indicated below.
2. For wire sizes 8 AWG and larger – Use colored wire, or identify wire with colored tape at all terminals, splices and boxes. Colors to be as indicated below.
3. In existing facilities, use existing color scheme.
4. In new facilities, use black and red for single phase circuits at 120/240 volts, use Phase A black, Phase B red and Phase C blue for circuits at 120/208 volts single or three phase, and use Phase A brown, Phase B orange and Phase C yellow for circuits at 277/480 volts single or three phase. Note: This includes fixture whips except for Listed whips mounted by the fixture manufacturer on the fixture and Listed as a System.
5. All switch legs shall be the same color as their associated circuit. Traveler conductors run between 3 and 4 way switches shall be colored pink or purple.

B . Neutral Conductors: White for 120/208V and 120/240V systems, Gray for 277/480V systems. Where there are two or more neutrals in one conduit, each shall be individually identified with a different stripe.

C . Branch Circuit Conductors: Three or four wire home runs shall have each phase uniquely color coded.

D . Feeder Circuit Conductors: Each phase shall be uniquely color coded.

E . Ground Conductors: Green for 6 AWG and smaller. For 4 AWG and larger, identify with green colored wire, or with green tape at both ends and at all access points, such as panel boards, motor starters, disconnects and junction boxes. When isolated grounds are required, Contractor shall provide green with yellow tracer.

3.06 BRANCH CIRCUITS

A . The use of single-phase, multi-wire branch circuits with a common neutral is not permitted. All branch circuits shall be furnished and installed with an individual accompanying neutral, sized the same as the phase conductors.

3.07 EMERGENCY CIRCUITS

A . All emergency system wiring (level 1 and level 2) shall be installed in separate raceways after their associated transfer switches. The wiring shall be separate from each other and from all normal system wiring.

END OF SECTION

SECTION 26 05 26

ELECTRICAL GROUNDING

PART 1: GENERAL

1.01 RELATED DOCUMENTS

A. The general provisions of the contract, including General and Supplementary Conditions and General Requirements (if any), apply to the work specified in this section.

1.02 DESCRIPTION OF WORK

A. The requirements of this section apply to the grounding work specified elsewhere in these specifications.

B. The extent of grounding work is indicated on the drawings and by the requirements of this section.

1. Power system grounding

2. Communication and signaling systems grounding

3. Equipment grounding

1.03 QUALITY ASSURANCE

A. NEC Compliance: Comply with the applicable portions of the National Electrical Code (NFPA No. 70) as applicable to grounding of main service, branch and feeder circuits, conduit, equipment, separately derived systems, transformers, etc.

1.04 SUBMITTALS

A. Product Data: Submit manufacturer's data on wire, conduit, connectors, rods, accessories and devices required for a complete and proper building ground system.

1.05 TESTS

A. Measure ground resistance with earth test megger and install additional ground rods and conductors as required until resistance to ground complies with Code requirements.

PART 2: PRODUCTS

2.01 GROUNDING SYSTEM

A. Provide building grounding system consisting of 3/4" by 10' copper clad steel driven rods with #4/0 bare stranded copper interconnecting conductor as indicated on plans. Also make connection to water main, gas main and to building structural steel. Provide bonding jumpers on water lines and other piping systems as required by NEC.

PART 3: EXECUTION

3.01 POWER SYSTEM GROUNDING

A. Main Distribution System: Provide a bare copper grounding electrode conductor from made electrode system and from structural steel in electrical room to main switchboard equipment ground bus. Provide bare copper main bonding jumper between equipment ground bus and neutral bus in main switchboard. Size grounding electrode conductor per NEC table 250.66.

B. Bonding Jumpers: Provide bare copper or green insulated bonding jumpers sized in accordance with overcurrent protective device (#6 minimum). Attach to grounding bushings on conduit, and lugs on boxes and other enclosures.

C. Equipment Grounding:

1. Provide green insulated equipment grounding conductor per NEC with all power and lighting circuits.

2. Connect all equipment ground conductors to the ground bus and neutral conductors to the neutral bus at the point of origination for each circuit. All grounding paths shall be continuous back to the service entrance equipment.

3.02 COMMUNICATION GROUNDING

A. Telephone:

1. Telephone rooms shall be provided with a ground bar for grounding communication equipment.

END OF SECTION

SECTION 26 05 29

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SCOPE

A . The work under this section includes conduit and equipment supports, straps, clamps, steel channel, etc, and fastening hardware for supporting electrical work. Included are the following topics:
1. PART 1 – GENERAL.
   a. Scope.
   b. Related Work.
   c. Submittals.
   d. Quality Assurance.
2. PART 2 – PRODUCTS.
   a. Material.
3. PART 3 – EXECUTION.
   a. Installation.

1.2 RELATED WORK

A . Applicable provisions of Division 1 govern work under this Section.

1.3 SUBMITTALS

A . Refer to Section 01 30 00 – Administrative Requirements, for submittal procedures.

B . Product Data: Provide data for support channel.

1.4 QUALITY ASSURANCE

A . Support systems shall be adequate for weight of equipment and conduit, including wiring, which they carry.

PART 2 PRODUCTS

2.1 MATERIAL

A . Support Channel: Steel, Galvanized, Enameled or other corrosion resistant.

B . Hardware: Corrosion resistant.

C . Minimum sized threaded rod for supports shall be 3/8” for trapezes and single conduits 1-1/4” and larger, and 1/4” for single conduits 1” and smaller.

D . Conduit clamps, straps, supports, etc., shall be steel or malleable iron. One-hole straps shall be heavy duty type. All straps shall have steel or malleable backing plates when rigid steel conduit is installed on the interior or exterior surface of any exterior building wall.

PART 3 EXECUTION

3.1 INSTALLATION

A . Fasten hanger rods, conduit clamps, outlet, junction and pull boxes to building structure using pre-cast insert system, preset inserts, beam clamps, expansion anchors, or spring steel clips (interior metal stud walls only).

B . Use toggle bolts or hollow wall fasteners in hollow masonry, plaster, or gypsum board partitions and walls; expansion anchors or preset inserts in solid masonry walls; self-drilling anchors or expansion anchors on concrete surfaces; sheet metal screws in sheet metal studs and wood screws in wood construction. If nail-in anchors are used, they must be removable type anchors.

C . **Powder-actuated fasteners and plastic wall anchors are not permitted.**

D . File and de-bur cut ends of support channel and spray paint with cold galvanized paint to prevent rusting.

E . Do not fasten supports to piping, ductwork, mechanical equipment, cable tray or conduit. Do not fasten to suspended ceiling grid system.

F . Do not drill structural steel members unless approved by Owner.

G . Fabricate supports from galvanized structural steel or steel channel, rigidly welded or bolted to present a neat appearance. Use hexagon head bolts with spring lock washers under all nuts.

H . In wet locations, mechanical rooms and electrical rooms install free-standing electrical equipment on 3.5 inch concrete pads.

I . Install surface-mounted cabinets and panelboards with minimum of four anchors. Provide steel channel supports to stand cabinet one inch off wall (7/8” Uni-strut or 3/4” painted, fire-retardant plywood is acceptable).

J . Bridge studs top and bottom with channels to support flush-mounted cabinets and panelboards in stud walls.

K . Furnish and install all supports as required to fasten all electrical components required for the project, including free standing supports required for those items remotely mounted from the building structure, catwalks, walkways etc.

END OF SECTION

SECTION 26 05 33

ELECTRICAL RACEWAYS

PART 1: GENERAL

1.01 RELATED DOCUMENTS

A. The general provisions of the Contract, including General and Supplementary Conditions and General Requirements (if any) apply to the work specified in this Section.

1.02 DESCRIPTION OF WORK

A. The requirements of this section apply to the electrical raceway work specified elsewhere in these specifications.

B. The extent of electrical raceway work is indicated by drawings, and by the requirements of this section.

C. The types of electrical raceways required for the project include the following:

1. Rigid Galvanized Steel Conduit (RGSC)
2. PVC Coated Rigid Galvanized Steel Conduit (PVCRGSC)
3. Intermediate Metal Conduit (IMC)
4. Electrical Metallic Tubing (EMT)
5. Flexible Metal Conduit (FMC)
6. Liquid-Tight Flexible Metal Conduit (LTFMC)
7. Rigid Nonmetallic Conduit (PVC)
8. Wireways, Auxiliary Gutters and associated fittings
9. Surface Mounted Raceways

1.03 QUALITY ASSURANCE

A. Manufacturers: Firms regularly engaged in the manufacture of electrical raceways of the types and capacities required, whose products have been in satisfactory use in similar service for not less than 10 years.

B. UL Labels: Provide electrical raceways which have been approved, listed and labeled by Underwriters Laboratories.

C. NEC Compliance: Comply with National Electrical Code (NFPA No. 70) as applicable to electrical raceway construction and installation.

1.04 SUBMITTALS

A. Product Data: Submit manufacturer's data on electrical raceway system materials.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Provide color-coded thread protectors on the exposed threads of threaded rigid metal conduit. Handle conduit and tubing carefully to prevent end-damage and to avoid scoring the finish. Store conduit and tubing inside and protect from weather. When necessary to store outdoors, elevate well above grade and enclose with durable, waterproof wrapping.

PART 2: PRODUCTS

2.01 MATERIALS AND COMPONENTS

A. General: For each electrical raceway system indicated, provide a complete assembly of conduit and tubing with fittings, including, but not necessarily limited to, connectors, nipples, couplings, expansion fittings, bonding jumpers, conduit seals, conduit bodies and other components and accessories as needed to form a complete system of the type indicated.

B. Rigid Galvanized Steel Conduit:

1. Rigid galvanized steel conduit shall be hot-dip galvanized steel with threads hot-dip galvanized after cutting.

2. Rigid galvanized steel conduit shall be produced in accordance with the following standards:

a. U.L. Safety Standard #6

b. ANSI C80.1

c. CSA Standard C22.22 #45

C. PVC Externally-Coated Rigid Galvanized Steel Conduit and Fittings:

1. The galvanized conduit, prior to plastic coating, shall be new, unused material and conform to specifications given above for rigid galvanized steel conduit as well as ETL Verified PVC-001 for performance.

2. The exterior galvanized surfaces shall be coated with primer before PVC coating to insure a bond between the zinc substrate and the PVC coating.

3. Nominal thickness of the exterior coating shall be 40 mils.

4. A PVC sleeve extending one pipe diameter or two inches, whichever is less, shall be formed at every female conduit opening on fittings except unions. The inside diameter of the sleeve shall be the same as the outside diameter of the conduit to be used.

5. The PVC coating on the exterior of conduit couplings shall have a series of longitudinal ribs 40 mils thick to protect the coating from tool damage during installation.

6. A urethane coating shall be uniformly and consistently applied to the interior of all conduit and fittings. This internal coating shall be a nominal two mil thickness. Conduit having areas with thin or no coating will not be accepted.

7. All male and female threads on conduit, elbows and nipples shall be protected by application of a urethane coating.

8. Conduit bodies shall be supplied with stainless steel cover screws. Screw heads shall be encapsulated with plastic to assure corrosion protection.

D. Intermediate Metal Conduit:

1. Intermediate metal conduit shall be hot-dip galvanized steel with threads hot-dip galvanized after cutting. IMC shall be a reduced wall version of RGSC and shall be recognized for use in the same applications as RGSC, including hazardous areas.

2. Intermediate metal conduit shall be produced in accordance with the following standards:

a. U.L. Standard #1242

b. ANSI C80.6

E. Electrical Metallic Tubing:

1. Electrical metallic tubing shall be hot galvanized steel tubing with an additional outside and inside urethane or similar coating for further rust protection.

2. Electrical metallic tubing shall be produced in accordance with the following standards:

a. U.L. Standard #797

b. ANSI C80.3

3. EMT Fittings: Provide steel compression fittings. Cast fittings, setscrew fittings and indent fittings will not be accepted.

F. Flexible Metal Conduit:

1. Flexible metal conduit shall be reduced wall, zinc-coated, hot-dip galvanized steel.

2. Flexible metal conduit shall be produced in accordance with the following standards:

a. U.L. Standard #1

3. Flexible metal conduit fittings shall meet Federal Specification WW-F-406

G. Liquid-Tight Flexible Metal Conduit:

1. Provide liquid-tight flexible metal conduit comprised of single strip, continuous, flexible, interlocked, double wrapped steel, galvanized inside and outside; forming smooth internal wiring channel; liquid tight jacket of flexible polyvinyl chloride (PVC). Provide separate green insulated equipment grounding conductor.

2. Liquid-tight flexible metal conduit shall be produced in accordance with U.L. Standard #360.

3. Liquid-tight flexible metal conduit fittings shall meet Federal Specification WW-F-406

H. Rigid Nonmetallic Conduit and Fittings: Provide nonmetallic conduit and fittings of the type, grade, size and weight (wall thickness) indicated for each service. Where type and grade are not indicated, provide proper selection as determined by the Installer to fulfill the wiring requirements (Schedule 40 minimum, unless noted otherwise). Type selected shall comply with the National Electrical Code and all applicable standards.

I. Wireways and Wiring Troughs:

1. Provide wireways of appropriate size, constructed of code gauge steel with hinged covers, suitable for the environment installed. Wireways shall be painted with a rust preventing paint process and shall be provided with all necessary fittings and accessories.

2. Provide wiring troughs of size and length required. Construct of code gauge steel with screw covers suitable for the environment installed and painted with a rust preventing paint process.

3. Wireways and troughs shall meet the requirements of UL Standard 870, and NEMA.

J. Surface Mounted Raceways:

1. Manufacturer

a. The surface steel raceway system specified herein manufactured by Wiremold/Legrand. Systems of other manufacturers may be considered equal if, in the opinion, and the written approval of the engineer, they meet all the performance standards specified herein.

1) Where only a single power receptacle is located, the surface steel raceway shall be of the Wiremold V500 series Base and Blank Cover.

2) Where power receptacles and data/communications devices are located the surface raceway shall be the dual compartment V2400D Base and Blank Cover.

3) Where only data/communications devices are located the surface raceway shall be Wiremold 2400 series Base and Blank Cover.

2. Materials

a. The raceway and all system components must be US/C Listed. The base and cover shall be manufactured of steel, finish in ivory ScuffCoat™ (a polyester topcoat over an ivory base) suitable for field repainting.

3. Raceway

a. The raceway shall be a two-piece design with a base divided into two compartments of 1/3 and 2/3 the width of raceway base and snap-on cover. Total width shall be 1.90" x 0.88" [48mm x 22mm] deep with a cross sectional area of 0.374 square inches [241mm^2] for the 1/3 compartment and 0.866 square inches [559mm^2] for the 2/3 compartment. The base and cover shall be a minimum thickness of 0.040" [1mm].

b. The 1/3rd width portion of the raceway shall be used for power wiring, and the 2/3rd width portion of the raceway shall be reserved for data wiring.

4. Fittings

a. A full complement of fittings must be available including, but not limited to, couplings, flat, internal and external elbows, entrance end fittings, blank end fittings, cover clips and wire clips. The fitting covers shall be manufactured of steel and be painted with an enamel finish or a rigid plastic compound that exhibits nonflammable self-extinguishing characteristics tested to comparable specifications of UL94V-0. All fittings shall be supplied with a base where applicable. Transition fittings shall be available to adapt to V4000 Series raceway manufactured by The Wiremold Company.

5. Device and Extension Boxes

a. Device boxes shall be available to mount standard devices and Activate inserts by The Wiremold Company with faceplates in single and two gang configurations. Device bases shall be available for over-the-raceway mounting feature with twist-outs that allow for access into either raceway compartment. The boxes shall be available in 2 3/4" [70mm] depth and painted to match the raceway.

6. Communication Devices and Accessories

a. The raceway manufacturer will provide a complete line of connectivity outlets and modular inserts for UTP/STP, Fiber Optic, Coaxial and other cabling types with faceplates and bezels to facilitate mounting. A complete line of preprinted station and port identification labels, snap-in icon buttons as well as write-on station identification labels shall be available. **Outlet identification labels shall have a clear plastic coverplate.**

K. Conduit and Tubing Accessories: Provide conduit and tubing accessories including straps, hangers, supports and expansion joints, bonding jumpers and conduit seals for hazardous areas as required and as recommended by the conduit and tubing manufacturer.

L. Hanger Devices: Provide "J" type beam clamps for trapeze hangers or individual runs of conduit 2-1/2" and larger to prevent the clamp from slipping off the beam flange.

PART 3: EXECUTION

3.01 RACEWAY TYPE SELECTION

A. Unless noted otherwise, provide conduit systems as described below for the conditions given. The systems indicated are the minimum acceptable system for the conditions given.

1. Existing walls where conditions will not allow installation of conduit inside walls – Surface Mounted Raceway. Surface mounted raceway is to be utilized in dry interior locations only as covered in Article 386 of the National Electrical Code.

2. Where subject to damage - Rigid Galvanized Steel Conduit (RGSC)

3. Corrosive environments - PVC coated RGSC

4. Concealed above ceiling and within walls (except poured concrete) - Electrical Metallic Tubing (EMT)

5. Branch and system wiring exposed above 10' AFF (or 10' above walkway) and where not subject to damage - Electrical Metallic Tubing (EMT)

6. Concealed in earth or concrete - Rigid nonmetallic conduit (PVC schedule 40), unless noted otherwise

7. Motor connections, lighting, and other electrical equipment connections where subject to movement and/or vibration - Flexible metallic conduit (FMC)

8. Motor connections, lighting, and other electrical equipment connections where subject to movement and/or vibration and any of the conditions listed below - Liquid-tight flexible metallic conduit (LTFMC):

   a. Exterior location

   b. Moist or humid atmosphere

   c. Water spray

   d. Dripping oil, grease or water

3.02 INSTALLATION

A. General:

1. Install conduit and tubing products as indicated, in accordance with the manufacturer's written instructions, the applicable requirements of NEC, the National Electrical Contractors Association's "Standard of Installation", and in accordance with recognized industry practices to ensure that products serve the intended function.

2. Conduits shall be of sizes required to accommodate the number and size of conductors required in accordance with the tables given in the latest edition of the National Electrical Code. The minimum size of non-flexible conduit shall be 3/4 inch, unless noted

otherwise. Where space will not permit the installation of one conduit of sufficient size to contain the conductors required, two conduits shall be provided, each conduit shall contain duplicate phase, neutral and grounding conductors. The number and size of conduits indicated on the drawings are minimum for the various systems required. If larger conduits or greater numbers are required, they shall be provided as necessary to accommodate the wiring as recommended by the manufacturer supplying the particular equipment. Where more than three (3) current carrying conductors are installed in a raceway, comply with NEC adjustment factors for reduced ampacity and for higher ambient temperatures.

3. Conduit and electrical metallic tubing shall be cut square, reamed smooth and drawn up tight.

4. Do not use wooden plugs inserted in masonry or concrete as a base to secure conduit supports. Provide toggle bolts for use with hollow concrete masonry units (CMU), and wedge anchors in concrete or brick. Hangers and devices for mounting of electrical equipment and devices shall be galvanized or otherwise protected from rusting by an approved method.

5. Complete each electrical raceway system before installing cables or wire.

6. All conduit systems shall be equipped with a separate, green insulated equipment grounding conductor installed with the circuit conductors. In no case shall the grounding properties of the conduit itself be relied upon as the sole grounding means.

7. Wire pulling lubricants, when utilized, shall be in accordance with the requirements of Underwriters Laboratories, Inc., applicable to the specific conductor or cable insulation and raceway material.

8. Install nylon pull rope having 600 LB tensile strength in all empty conduits. Leave 12" of tail at each end.

B. Routing:

1. Route concealed conduits in as direct a line with as long bends as possible. Exposed conduits shall be routed parallel to or at right angles to the lines of the building. Where conduits are routed exposed, right angle bends shall be made with standard conduit ells or field bends to not less than the same radius. All bends shall be free from dents or flattening. Not more than the equivalent of four quarter bends shall be used in any run between terminals at cabinets, outlets, junction boxes or pull boxes.

2. Route horizontal runs of concealed conduit close to ceiling beams, passing across and above water, steam, or other piping, etc., where possible. Unless otherwise specified, support single conduits not embedded in masonry or concrete by pipe straps, hangers, or other approved fastening devices spaced no more than 8' apart, with a minimum of two supports for each 10' length and per NEC at outlet boxes and terminations.

3. Conduits shall be continuous from outlet to outlet, and from outlet to cabinets, junction or pull boxes. Conduits shall enter and be secured to all boxes in such a manner that each system forms an electrically continuous grounding path from point of service to all outlets.

4. Install all conduits in finished areas concealed, unless specifically noted otherwise. Install conduits exposed to surface mounted panels and cabinets in electrical and telephone closets, in unfinished attics or roof spaces, on unfinished walls (unless noted otherwise), and where indicated or noted on plans.

5. Do not install conduits through beams without special permission of the Architect unless specifically detailed or noted in drawings or specifications.

6. Adequately secure conduits and flexible metallic raceway routed above suspended ceilings to ceiling supporting members by means of clamps, spring clips, or other devices.

7. Provide a 1" conduit stubbed out above ceiling for each group of three spaces and/or three spare breakers provided in panelboards. Install other future conduits as noted or required for future systems as directed by Architect.

C. Terminations:

1. Terminate all rigid steel conduits with double lock nuts and bushings or hubs. For grounding purposes, secure EMT terminations at outlet boxes, junction boxes, panelboard cabinets, etc., with steel interlocking compression connectors. Set screws or indentations will not be accepted as a method of attachment of fittings to conduit or electrical metallic tubing.

2. Equip rigid steel conduit with insulated end bushings. Provide electrical metallic tubing 3/4" and larger with insulated connectors or end bushings. Bushings shall be of the type to prevent abrasion of wires without impairing the continuity of the conduit system grounding. The insulating insert material shall be thermoplastic molded and locked into the steel casing forming the body of the connector or bushing.

3. Provide the ends of each conduit or tubing in outlet boxes, pull boxes, and cabinets with blank discs ("pennies") inserted in bushings or other approved bushing closures to prevent the entrance of foreign material during the construction period. Conduits left empty for future wiring shall also be so equipped.

D. Conduit in concrete or earth:

1. Conduit routed in or beneath concrete or in direct contact with earth shall be PVC schedule 40. In no case shall PVC conduit be stubbed up through a floor slab, unless specifically noted or detailed.

2. All conduits installed in concrete slabs shall not be larger in outside diameter than 1/3 the thickness of the slab, wall, or beam in which they are embedded. Conduits shall be positioned in the middle third of the slab thickness and shall be spaced laterally a minimum of three diameters. In the slabs immediately adjacent to wire closets or distribution cabinets, a closer spacing shall be allowable provided the structural drawings indicate the slab has been thickened to accommodate conduits, or same is done in accordance with the Architect's approval.

3. Provide conduit entrances through wall or floors with pipe sleeves having suitable plastic expendable compound or oakum and lead joint on both sides of wall or floor, or cast-in-place water stops to prevent entrance of moisture.

E. Flexible conduit:

1. Flexible metal conduit shall be used only where conditions such as movement, vibration, or cramped quarters are encountered or where specifically noted. Such conditions may exist at the connection of motors or other electrical equipment subject to vibration, lighting fixtures, valve operators, etc. Where water or extremely humid conditions exist, provide liquid-tight flexible metal conduit, standard flexible metal conduit will not be accepted for use in wet or humid conditions.

F. Special raceway systems:

1. General: Install conduits for thermostats, control, interlock wiring, and as otherwise required to effect proper operation of all systems specified in this and other sections of the specifications. Also provide empty conduits for future systems as required in the specifications and as noted or shown on the drawings.

2. Communication raceways:

a. Minimum size of communications conduit shall be 1".

b. Provide conduit system suitable for installation of fiber optic cable having a minimum bend radius of 8". All sweeps, pull boxes and junction boxes shall accommodate this minimum radius. No conduit bodies shall be installed in the telephone raceway system, unless specifically indicated on the drawings.

c. Install a pull rope with 12" of tail in all empty raceways.

END OF SECTION

SECTION 26 05 34

ELECTRICAL BOXES AND FITTINGS

PART 1: GENERAL

1.01 RELATED DOCUMENTS

1) The general provisions of the contract, including General and Supplementary Conditions and General Requirements (if any), apply to the work specified in this section.

2) Description of Work:

   1. The extent of electrical box and electrical fitting work is as required by the drawings, and the requirements of this and other sections.

   2. The types of electrical boxes and fittings required for the project include the following:

      a. Outlet boxes

      b. Junction boxes

      c. Pull boxes

      d. Floor boxes

      e. Conduit bodies

      f. Bushings

      g. Locknuts

3) Quality Assurance:

   3. Manufacturers: Firms regularly engaged in the manufacture of electrical units, of types and sizes required, whose products have been in satisfactory use in similar service for not less than 10 years. Provide products produced by one of the following (for each type of box and fitting):

      a. Interior Outlet Boxes:

         1) Appleton Electric Co.

         2) Arrow Conduit and Fittings Corp.

         3) National Electric Products Co.

         4) Steel City

         5) Midland-Ross Corp.

         6) Raco

      b. Weatherproof Outlet Boxes:

         1) Appleton Electric Co.

         2) Crouse-Hinds Co.

         3) Harvey Hubbell, Inc.

         4) Pyle-National Co.

c. Junction and Pull Boxes:

1) Arrow-Hart, Inc.

2) General Electric Co.

3) Keystone Columbia, Inc.

4) Square "D" Co.

d. Conduit Bodies:

1) Appleton Electric Co.

2) Crouse-Hinds Co.

3) Killark Electric Mfg. Co.

4) Pyle-National Co.

e. Bushings, Knockout Closures and Locknuts:

1) Allen-Stevens Conduit Fittings Corp.

2) Allied Metal Stamping, Inc.

3) Appleton Electric Co.

4) Carr Co.

5) Raco, Inc.

6) Steel City

7) Midland-Ross Corp.

8) Thomas and Betts Co., Inc.

4. NEC Compliance: Comply with National Electrical Code (NFPA 70) as applicable to construction and installation of electrical boxes and fittings.

5. UL Labels: Provide boxes and fittings which have been listed and labeled by Underwriters Laboratories.

6. NEMA Compliance: Comply with National Electrical Manufacturers Association standards as applicable to nonmetallic fittings for underground installation.

7. NECA Standard: Comply with applicable portions of the National Electrical Contractors Association's "Standard of Installation:.

4) Submittals:

8. Manufacturer's Data: Submit manufacturer's data on electrical boxes and fittings.

PART 2: PRODUCTS

2.01 FABRICATED MATERIAL

A. Interior Outlet Boxes:

1. Concealed Work: Provide galvanized steel interior outlet wiring boxes of the type, shape and size, including depth of box, to suit each respective location and installation; constructed with stamped knockouts in back and sides, and with threaded holes with

screws for securing box covers or wiring devices.

2. Exposed Work: Provide die-cast alloy outlet wiring boxes of the type, shape and size, including depth of box, to suit each respective location and installation; constructed with integral conduit hubs and tapped holes for securing box covers or wiring devices.

3. Accessories: Provide outlet box accessories as required for each installation, including mounting brackets, wallboard hangers, extension rings, fixture studs, cable clamps and metal straps for supporting outlet boxes, compatible with outlet boxes being used and meeting requirements of individual wiring situations. Choice of accessories is Installer's option.

5) Boxes for use with raceway systems shall not be less than 1-1/2 inches deep except where shallower boxes required by structural conditions indicated on the drawings or in other sections of these specifications are approved. Minimum box size shall be 4" square except for lighting fixture outlets where only one conduit enters the box, or where a smaller box is necessary for the box to be installed.

6) Clock outlet, for use in other than a wired clock system, shall consist of an outlet box, a plaster cover where required, and a single receptacle with clock-outlet plate. The receptacle shall be recessed sufficiently within the box to allow the complete insertion of a standard cap, flush with the plate. A suitable clip or support for hanging the clock shall be secured to the top of the plate.

7) Weatherproof Outlet Boxes: Provide corrosion-resistant cast metal weatherproof outlet wiring boxes, of the type, shape and size, including depth of box, with threaded conduit ends, cast metal face plate with spring-hinged waterproof cap suitably configured for each application, including face plate gasket and corrosion proof fasteners.

8) Junction and Pull Boxes: Provide galvanized sheet steel junction and pull boxes, with screw-on covers; of the type, shape and size, to suit each respective location and installation; with welded seams and equipped with steel nuts, bolts, screws and washers.

9) Conduit Bodies: Provide galvanized cast metal conduit bodies (condulets), of the type, shape and size, to suit each respective location and installation, constructed with threaded conduit hubs, removable cover with gasket, and corrosion-resistant screws.

10) Bushings, Knockout Closures and Locknuts: Provide corrosion resistant punched-steel box knockout closures, conduit locknuts and malleable iron conduit bushings of the type and size to suit each respective use and installation.

11) Floorboxes:

4. Boxes in slab on-grade concrete floors:

a. Floor boxes shall be multiservice steel boxes designed for use in concrete floor slabs.

b. Power and Data Floorbox (FP):
Provide appropriate plates for four voice/data jacks and four NEMA 5-20 receptacles. Power and data compartments shall be divided. Boxes shall be four compartment approximately 13.625” L x 10”W x 2.4375”D equal to Wiremold #RFB4-SS with 2 each #RFB-RB-SS receptacle brackets to receive two duplex receptacles, and 2 each #RFB-2-SSRT communication brackets to receive Krone jacks. Data/com compartments shall be designed to receive 1-1/4” conduits. Flanged covers shall be #FPCTCBK. Route a minimum of one ¾” conduit for power and two 1-1/4” conduits for data to each floorbox unless noted otherwise.

c. Power, Data and Audio/Visual Floorbox (AV):
Provide Wiremold RFB6 Series equivalent floorbox Route a minimum of one ¾" conduit for power and three 1-1/4" conduits to each AV floorbox for communications cabling.

d. Furniture Feed Floorbox (FF):
Provide Wiremold floorbox with separate conduits for power and data. Conduit shall be a minimum of ¾" for power and 1" for data. Conductors for modular furniture will be provided by others, and terminated in floor box by electrical contractor.

5. Floor boxes in all floors not on grade :

a. Electrical contractor shall core-drill slab for poke-through floorboxes. All floorboxes shall maintain the fire rating of the floor.

b. Power and Data Floorbox (FP):
Provide Wiremold RC4AT Fire Rated Poke-Through, or approved equivalent with four CAT-6 voice/data jacks and four NEMA 5-20 receptacles.

c. Power, Data and Audio/Visual Floorbox (AV):
Provide Wiremold AV3 Fire Rated Poke-Through floorbox. Route a minimum of one 1-1/4" conduit from floorbox to ceiling cavity above floorbox for AV wiring.

d. Furniture Feed Floorbox (FF):
Provide Wiremold Fire Rated Poke-Through floorbox with separate conduits for power and data. Conduit shall be a minimum of ¾" for power and two 1-1/4" conduits for data.

6. All floorboxes shall include all internal barriers, covers, device plates and other components necessary for a complete installation.

PART 3: EXECUTION

3.01 INSTALLATION OF BOXES AND FITTINGS

A. Install electrical boxes and fittings as indicated, in compliance with NEC requirements, in accordance with the manufacturer's written instructions and with recognized industry practices to ensure that the boxes and fittings service the intended purposes. In no instance will boxes be allowed to be installed back-to-back in rooms with tenants such as, nursing homes, dormitories, hospital rooms, etc., or in rooms which need to sound isolated such as conference rooms, exam rooms, classrooms, etc.

1. Provide weatherproof outlets for interior and exterior locations exposed to weather or moisture. Provide knockout closures to cap unused knockout holes where blanks have been removed. Locate boxes and conduit bodies so as to ensure accessibility of electrical wiring. Avoid using round boxes where conduit must enter box through side of box, which would result in a difficult and insecure connection with a locknut or bushing on the rounded surface. Secure boxes rigidly to the substrate upon which they are being mounted, or solidly embed boxes in concrete or masonry.

2. Support outlet boxes above suspended ceilings from the structure above. Provide outlets occurring at locations other that at the main ceiling channels with auxiliary metal cross members of adequate strength and stiffness. Conduits above suspended ceilings and flexible metallic raceway runs from junction boxes above removable suspended ceilings shall be adequately fastened to ceiling supporting members by means of clamps, spring clips, or other positive devices.

3. All outlets for devices or electrical equipment at exterior locations or where watertight outlets are indicated on drawings or herein specified shall be provided with cast type weatherproof housing equipped with gasketed weatherproof cover. Outlet boxes for outside brackets and vaportight fixtures as indicated shall be in accordance with the NEC.

4. Furnish and install outlet boxes for the various special systems such as intercommunication, burglar alarm, television, fire alarm, etc., as well as special outlets to accommodate devices, of such size, type, material and configuration as required to suit the equipment provided, type of occupancy, and space available. In the event the approved equipment for these special systems requires boxes, the contractor shall furnish and install the boxes, conduit and all required fittings at no increase in the contract amount.

5. Install outlet boxes for switches and receptacles in finished walls, except for special applications as specified herein or indicated of one piece standard gang type, a minimum of 4" x 1 1/2" deep for one device and 6 7/8" x 4" x 1 1/2" deep for two devices, with plaster covers and rectangular openings of proper size and shape. Install other special boxes as shown on drawings or details as necessary to meet structural requirements.

6. Install outlet boxes at mounting heights indicated on the drawings. Install those not definitely located or where the heights interfere with mechanical, architectural, or structural elements as directed by the Architect. Outlet mounting heights are construed to mean the distance from centerline of cover plate to finished floor unless otherwise noted. Generally, receptacle heights shall be 18" and wall switches shall be mounted 46" high above the finished floor to the center of the device. These heights may be adjusted with permission, if necessary to more nearly fit architectural features and shall comply with the ADA. Other heights shall be as noted or as necessary to meet equipment or safety requirements.

END OF SECTION

SECTION 26 05 53

ELECTRICAL IDENTIFICATION

PART 1: GENERAL

1.01 RELATED DOCUMENTS

A. The general provisions of the Contract, including General and Supplementary Conditions and General Requirements (if any), apply to the work specified in this section, where applicable.

1.02 DESCRIPTION OF WORK

A. The extent of the electrical systems and equipment requiring identification is shown on the drawings and the extent of identification required is specified herein and in individual sections of work requiring identification.

B. The types of electrical identification specified in this section include the following:

1. Cable/conductor identification
2. Conduit identification
3. Danger signs
4. Equipment/system identification signs
5. Receptacles and switch circuit identification

C. Submittals and Manufacturer's Data:

1. Submit complete product catalog information for each type of identification material required for the project.
2. Submit a sample of each type of identification material required for the project.

PART 2: PRODUCTS

2.01 ELECTRICAL IDENTIFICATION MATERIAL

A. General: Except as otherwise indicated, provide manufacturer's standard products of the categories and types required for each application.

B. Baked Enamel Danger Signs: Provide manufacturer's standard Danger Signs of baked enamel finish on 20 gauge steel of standard red, black and white graphics with recognized standard wording where applicable. Signs shall be 14" x 10" in size except where physically too large to apply, in which case 10" x 7" signs shall be used.

C. Engraved Plastic Laminate Signs: Provide engraving stock melamine plastic laminate, complying with FS-L-P-387 for all electrical equipment provided, installed or connected by the Contractor. Signs shall be black with white core, and shall be of suitable size to for the equipment to which they are attached.

1. Thickness: 1/16" for units up to 20 square inches or 8" length 1/8" for larger units.

2. Size: Unless noted otherwise, provide single line of text, 3/8" high lettering on 1" high sign (2" high where 2 lines are required).

3. Fasteners: Self-tapping stainless steel screws, except where screws cannot or should not penetrate the substrate use contact type permanent adhesive.

D. Adhesive backed vinyl markers: Provide self-stick markers of standard color and wording for voltage and system identification of equipment, raceways and enclosures.

E. Switch and Receptacle Covers: Provide and install circuit identification label with black letters on clear adhesive tape. Size shall be 3/8" wide and a maximum of 1-3/4" long. Each label shall show panelboard and circuit number, i.e., H1A-12 with letter and numbers a minimum of 1/8" high. Champion electronic labeling system #20968GZ or approved equal. Provide labels for all receptacles and switches including those not provided by division 16. Dymo type tape system is not acceptable.

2.02 CONDUIT-CONDUCTOR IDENTIFICATION

A. Provide heat shrink circuit identification for all conductors in panels, enclosures or cabinets indicating panel and circuit number, or system and point number.

B. Provide junction box and pullbox exterior labeling indicating all panels and circuit numbers, or signal systems contained in the junction box. Label all junction boxes,

C. Provide heat shrink conduit identification to indicate origination point of all conduits stubbing up from underground into equipment. Also provide conduit identification at 20'-0" intervals along corridors, and 10'-0" intervals in electrical and mechanical rooms.

PART 3: EXECUTION

3.01 APPLICATION, INSTALLATION, AND GENERAL INSTALLATION REQUIREMENTS

A. Coordination: Install identification after completion of painting.

B. Regulations: Comply with NEC Article 110, governing regulations, and the requests of governing authorities for the identification of electrical work.

C. Equipment/System Identification Signs: Install an engraved plastic laminate sign on each major unit of electrical equipment in the building, including communication/signal systems, unless the unit is provided with its own identification labeling. As a minimum provide signs for each unit of the following categories of electrical work.

1. Panelboards, electrical cabinets, enclosures and disconnects

2. Switchboards and switchgear

3. Transformers

4. Motor starters, controllers, and remote stations

5. Disconnect and safety switches

6. Any electrical device serving a remote load

7. Fire alarm control panel and major equipment

8. Intrusion alarm control panel and major equipment

D. Underground Conduit (Plastic Marking Tape): Warning tapes shall be installed directly above the conduit, at a depth of 6 to 8 inches below finished grade unless otherwise indicated. The tape shall be acid and alkali-resistant polyethylene film, 6 inches wide with minimum thickness of 0.004 inch. Tape shall have a minimum strength of 1750 psi lengthwise and 1500 psi crosswise with an elongation factor of 350 percent. Tape color shall be as specified in Table 1 and shall bear a continuous printed inscription describing the specific utility.

Table 1 - Tape Color	
Red	Electric
Yellow	Gas, Oil, Dangerous Materials
Orange	Telephone, Telegraph, Television, Police, and Fire Communication
Blue	Water System
Green	Sewer Systems

END OF SECTION

SECTION 26 27 26

WIRING DEVICES

PART 1: GENERAL

1.01 RELATED DOCUMENTS

A. The general provisions of the contract, including General and Supplementary Conditions and General Requirements (if any), apply to the work specified in this section.

1.02 DESCRIPTION OF WORK

A. The extent of wiring device work is indicated by drawings and schedules, and by the requirements of this section. Wiring devices are defined as single discrete units of electrical distribution systems which are intended to carry but not utilize electric energy.

B. The types of general purpose wiring devices required for the project include the following:

1. Receptacles, electrical and telephone
2. Switches
3. Wall plates
4. Plugs
5. Connectors

1.03 QUALITY ASSURANCE

A. Manufacturers: Provide products produced by one of the following:

1. Hubbell Wiring Device Div.
2. Arrow-Hart, Inc.
3. Pass and Seymour, Inc.
4. General Electric
5. Leviton

B. NEC Compliance: Comply with National Electrical Code (NFPA 70) as applicable to construction and installation of electrical wiring devices.

C. UL Labels: Provide electrical wiring devices which have been listed and labeled by Underwriters Laboratories.

D. NEMA Compliance: Comply with National Electrical Manufacturers Associations standards for wiring device products.

1.04 SUBMITTALS

A. Manufacturer's Data: Submit manufacturer's data on electrical wiring devices.

PART 2 - PRODUCTS:

2.01 FABRICATED DEVICES

A. General: Provide factory-fabricated wiring devices, in the type, color, electrical rating for the service indicated, and of the same manufacturer.

B. Receptacles: Comply with NEMA Standards Pub. No. WD1 and as follows:

1. Duplex: Provide wide body industrial specification grade, NEMA 5-20R duplex receptacles constructed with one piece grounding backstrap/mounting yoke having integral ground contacts. Backstrap shall be equipped with a green hexagonal ground screw, and shall have not more than one rivet. Receptacles shall accept side or back wiring and shall be white in color. Provide Hubbell #5362, Leviton #5362 or approved equal.

2. Ground Fault Circuit Interrupting Duplex: Provide heavy duty specification grade, NEMA 5-20R duplex receptacles with integral personnel ground fault protection. Provide Hubbell #GF5362 or approved equal. Receptacles shall be capable of protecting downstream devices from ground fault. A single GFI receptacle shall not be used to protect downstream devices. In each location where a GFI device is shown, a dedicated GFI device shall be installed.

C. Plugs: Comply with NEMA Standards Pub. No. WD1 and as follows:

1. Plugs: Provide 15 ampere, 20 ampere, 125 volts, 3 wire grounding, cap plugs, parallel blades with cord clamp, and 06" cord hole; match NEMA configuration with power source.

D. Switches: Comply with NEMA Standards Pub. No. WD1 and as follows:

1. Toggle: Provide wide body industrial specification grade, single pole quiet type, rated 20 amperes at 120/277 volts AC. Switches shall accept side or back wiring. Device color shall be white and shall be equal to Hubbell #1221.

2. Three-Way and Four-Way Switches: Provide wide body industrial specification grade 3-way or 4-way AC quiet switches, 20 ampere, 120/277 volt AC, with mounting yoke insulated from mechanism. Switches shall accept side or back wiring and shall be equal to Hubbell #1223 and #1224.

3. Low Voltage: Provide heavy-duty low voltage toggle switches with yoke mount equal to General Electric #GE 5935-2G

E. Occupancy Sensors: Unless otherwise noted on plans, provide the following:

1. Wall mounted occupancy sensor switch: Provide Hubbell LHMTS or equivalent. Sensors with manual-on operation only are not acceptable. Where lighting is dual switched, provide Hubbell LHMTD dual circuit wall switch sensor.

2. Ceiling Mounted: Provide Hubbell OMNI-DT-2000-RP dual technology sensor. Provide power packs/relays as required. Where two or more sensors are shown connected by low voltage wiring, either sensor shall turn on all lights in that area. Where more than four sensors are shown connected by low voltage wiring, provide additional power packs as required by manufacturer in order to provide sufficient drive current to low-voltage sensors.

3. Ceiling Mounted in Restroom With More Than One Stall: Provide Hubbell OMNI-US-2000-RP ultrasonic sensor. Provide power packs/relays as required. Where two or more sensors are shown connected by low voltage wiring, either sensor shall turn on all lights in that area. Where more than four sensors are shown connected by low voltage wiring, provide additional power packs as required by manufacturer in order to provide sufficient drive current to low-voltage sensors.

4. Ceiling Mounted Long Range/Corridor Sensor: Provide Hubbell PIR1000H with power pack when multiple sensors are shown connected by low voltage wiring. Where two or more sensors are shown connected by low voltage wiring, either sensor shall turn on all lights in that area. Where more than four sensors are shown connected by low voltage wiring, provide additional power packs as required by manufacturer in order to provide sufficient drive current to low-voltage sensors.

5. Wall Mounted Occupancy Sensor: Provide Hubbell LODTRP with power pack when multiple sensors are shown connected by low voltage wiring. Where two or more sensors are shown connected by low voltage wiring, either sensor shall turn on all lights in that area. Where more than four sensors are shown connected by low voltage wiring, provide additional power packs as required by manufacturer in order to provide sufficient drive current to low-voltage sensors.

2.02 WIRING DEVICE ACCESSORIES

A. Wall Plates: Provide single switch and duplex outlet wall plates for wiring devices, with ganging and cutouts as indicated, or required, provided with metal screws for securing plates to devices, screw heads to match finish of plate.

1. Material and Finish: type 302 stainless steel with a nominal thickness of 0.032" and beveled edges and satin finish. Pass & Seymour Sierra or equal.

B. Weatherproof Covers: Provide cast while-in-use cover equal to Legrand WIUCAST. Polycarbonate covers are not acceptable.

PART 3: EXECUTION

3.01 INSPECTION

A. Installer must examine the areas and conditions under which wiring devices are to be installed and notify the General Contractor which wiring devices are to be installed and notify the General Contractor in writing of conditions detrimental to the proper and timely completion of

the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Architect.

3.02 INSTALLATION OF WIRING DEVICES

A. General: Install wiring devices where indicated, in accordance with the manufacturer's written instructions, the applicable requirements of NEC and the National Electrical Contractors Association's "Standard of Installation", and in accordance with recognized industry practices to ensure that products serve the intended function.

B. Delay installation of devices until wiring is completed.

C. Install receptacles and switches only in electrical boxes which are clean; free from excess building materials, debris, etc.

D. Power receptacles intended for devices for permanent use (ceiling mounted projectors, etc.) shall not be mounted above dropped ceilings. The receptacles shall be flush mounted in ceiling tiles.

E. When installing occupancy sensors, consideration shall be given to the location of the sensor and occupant locations. Sensors shall not be located behind doors or furniture where the sensor's ability to sense traffic would be affected. If sensors are not as specified and are not located where indicated on plans, the contractor will be responsible for ensuring adequate operation of the sensors. The Architect's interpretation of adequate sensor operation will be final.

3.03 TESTING

A. Test wiring devices to ensure electrical continuity of grounding connections, and after energizing circuitry demonstrate compliance with requirements.

END OF SECTION

SECTION 26 27 28

ENCLOSED SWITCHES

PART 1: GENERAL

1.01 RELATED DOCUMENTS

A. The general provisions of the Contract, including General and Supplementary Conditions and General Requirements (if any), apply to the work specified in this section.

1.02 DESCRIPTION OF WORK

A. The extent of safety disconnect switch and fuse work is indicated by drawings, by the requirements of this section, and applies to work specified elsewhere in these specifications.

B. The types of safety disconnect switch and fuses required for the project include the following:

1. Heavy duty fusible and non-fusible single throw.

1.03 QUALITY ASSURANCE

A. NEC Compliance: Comply with National Electrical Code (NFPA 70) as applicable to construction and installation of electrical safety disconnect switches and fuses.

1.04 SUBMITTALS

A. Manufacturer's Data: Submit manufacturer's data on safety disconnect switches and fuses.

PART 2: PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Provide products produced by one of the following:

1. General Electric
2. Square "D"
3. Cutler Hammer
4. Siemens

2.02 FABRICATED DEVICES

A. General: Provide factory-fabricated safety disconnect switches and fuses in the type, and electrical rating for the service indicated. Where type and grade are not indicated, provide proper selection as determined by Installer to fulfill the wiring requirements, and complying with NEC and NEMA standards for safety disconnect switches and fuses.

B. Provide safety disconnect switches designed in accordance with the following:

1. Switch Interior: Switch blades to be fully visible in the OFF position when the door is open. Dead-front construction with permanently attached arc suppressors hinged or otherwise attached to permit easy access to line-side lugs without removal of the arc suppressor. Lugs to be UL listed for copper and/or aluminum cables and front removable. Current carrying parts to be plated by electrolytic processes. Fuse holders to be of a type to reject all class H fuses.

2. Switch Mechanism: Provide a quick-made and quick-break operating handle and mechanism as a integral part of the box, not the cover. Provide a dual cover interlock to prevent unauthorized opening of the switch door in the ON position or closing of the switch mechanism with the door open.

3. Enclosures: furnish switches in NEMA 1 enclosures or as shown on the plans. Attach covers on NEMA 1 enclosures with suitable hinges. All enclosures installed where exposed to the weather shall be in NEMA 3R (raintight) enclosures. Raintight covers shall be securable in the open position. Provide NEMA 3R switches thru 200 amperes with closing caps, interchangeable hubs. Enclosures of code gauge (UL 98) sheet steel (NEMA 1) or code gauge (UL 98) galvanized steel (NEMA 3R), treated with a rust-inhibiting phosphate, finished in gray baked enamel. Provide defeatable door interlocks to prevent door from opening when the operating handle is in the "ON" position. Provide for padlocking in the open position.

4. Ratings: Switches to be horsepower rated for 250 or 600 volts AC or DC as required, with provisions for dual-element or time delay fuses as noted.

C. Provide fuses located as indicated and in accordance with the following:

1. Rating of Protective Device Less than 600A: Provide "Buss" Class RK-5, Type FRN-R, 250 volt or Type FRS-R, 600 volt with an IC of 200,000 ampere RMS symmetrical.

2. Provide any other time delay fuses for safety switches, as recommended by the switch or equipment manufacturer, and/or as shown, of class, type and rating needed to meet electrical requirements.

PART 3: EXECUTION

3.01 GENERAL

A. Install safety disconnect switches sized as indicated with a complete set of fuses, having a voltage rating not less than the circuit voltage, in all protective devices requiring fuses.

B. Size all fuses in motor branch circuits for motor running protection or as shown.

C. Provide a motor disconnect switch under this section of the specifications when required by NEC, even though not indicated.

D. Provide one set of spare fuses for each size and type fusible device installed, or as noted.

E. Install all switches to meet NEC clearance requirements for working space.

END OF SECTION

SECTION 26 28 13

FUSES

PART 1: GENERAL

1.01 RELATED DOCUMENTS

A. The general provisions of the Contract, including General and Supplementary Conditions and General Requirements (if any), apply to the work specified in this section.

1.02 DESCRIPTION OF WORK

A. The extent of fuse work is indicated by drawings, by the requirements of this section, and applies to work specified elsewhere in these specifications.

B. The types of fuses required for the project include the following:

1. Fuses rated for 250 volt and 600 volt application.

2. Interrupting capacity as required for circuit application.

3. Fuses of circuit selected for speed of interruption.

1.03 QUALITY ASSURANCE

A. NEC Compliance: Comply with National Electrical Code (NFPA 70) as applicable to construction and installation of electrical fuses.

1.04 SUBMITTALS

A. Manufacturer's Data: Submit manufacturer's data on fuses.

PART 2: PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Provide products produced by one of the following (for each type of overcurrent protection):

1. Bussman

2. Gould

2.02 FABRICATED DEVICES

A. General: Provide factory-fabricated fuses in the type, and electrical rating for the service indicated. Where type and grade are not indicated, provide proper selection

as determined by submittal to fulfill the wiring requirements, and complying with NEC and NEMA standards for safety disconnect switches and fuses.

B. Provide fuses located as indicated and in accordance with the following:

1. Rating of Protective Device Less than 600A: Provide "Buss", dual element fuses with an IC of 200,000A RMS symmetrical.

2. Provide any other time delay fuses for safety switches, as recommended by the switch or equipment manufacturer, and/or as shown, of class, type and rating needed to meet electrical requirements.

PART 3: EXECUTION

3.01 GENERAL

A. Install safety disconnect switches sized as indicated with a complete set of fuses, having a voltage rating not less than the circuit voltage, in all protective devices requiring fuses.

B. Size all fuses in motor branch circuits for motor running protection or as shown.

C. Provide one set of spare fuses for each size and type fusible device installed, or as noted.

END OF SECTION