



**ROCKFORD BOARD OF EDUCATION  
INVITATION FOR BID ON SUPPLIES, MATERIALS, EQUIPMENT OR SERVICES  
FOR SCHOOL DISTRICT NO. 205  
ROCKFORD, ILLINOIS**

IFB No. **16-45 Kennedy Middle School Boiler Replacement**

DATE: **March 21, 2016**

OFFERS WILL BE RECEIVED UNTIL: **2:00 P.M. (CDST) on Thursday, April 14, 2016**

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RE: **IFB No. 16-45 Kennedy Middle School Boiler Replacement**. The purpose of this Invitation for Bid (IFB) is to solicit bids for the replacement of boilers, univents, electrical gear, panels and outlets at Kennedy Middle School, 520 N Pierpont Avenue, Rockford, IL 61101.

IFB Opening: **Thursday, April 14, 2016 at 2:00 p.m., Rockford Board of Education, 6th floor Conference Room, 501 Seventh St., Rockford, IL 61104.**

**If you plan to hand deliver your IFB submission on the due date, please note that you must check in on the 3<sup>rd</sup> floor prior to coming to the 6<sup>th</sup> floor. Please allow time for this as late submissions will not be accepted.**

Copies of the bidding documents are available from Onvia DemandStar, by email from the Purchasing Department, BHFx Digital Imaging and Printing, DG Digital Printing, YCS Printing, Inc., or by download from the District's Purchasing Bids-RFPs webpage at [www.rps205.com](http://www.rps205.com).

**A MANDATORY PRE-BID MEETING WILL BE CONDUCTED ON, TUESDAY, MARCH 29, 2016 AT 2:30 P.M. (CDST), AT KENNEDY MIDDLE SCHOOL, 520 N PIERPONT AVENUE, ROCKFORD, IL 61101 BY OWNER'S REPRESENTATIVE. MEET IN THE LIBRARY.**

Refer all questions relative to the business aspect, Instructions to Bidders, Special Conditions, and questions concerning the technical aspect of the documents to the Purchasing Process Manager by email at [tamara.pugh@rps205.com](mailto:tamara.pugh@rps205.com).

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## **INVITATION TO BID**

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<b>Project</b>	Kennedy Middle School Boiler Replacement
<b>Location</b>	Kennedy Middle School 520 N Pierpont Avenue Rockford, Illinois 61101
<b>Owner</b>	Rockford Public School District 205 501 Seventh Street Rockford, Illinois 61104
<b>Architect</b>	Hagney Architects LLC 4615 East State Street, Suite 206 Rockford, Illinois 61108 815/397-3330 Fax: 815/397-0243
<b>Bid Scope</b>	Project includes replacement of boilers, univents, electrical gear, panels and outlets at Kennedy Middle School, 520 N Pierpont Avenue, Rockford, IL 61101
<b>Bid Due Date</b>	2:00 P.M. (CDST), Thursday, April 14, 2016
<b>Pre-Bid Meeting</b>	Mandatory Meeting: 2:30 PM (CDST), Tuesday, March 29, 2016; at Kennedy Middle School, 520 N Pierpont Avenue, Rockford, IL 61101, meet in library.
<b>Addendums</b>	Last RFI accepted; 4:30 P.M. (CDST), April 11, 2016 Last addendum issued; 4:30 P.M. (CDST), April 12, 2016
<b>Other Key Dates</b>	Tuesday, April 26, 2016; RPS Board Meeting Wednesday, April 27, 2016; Award / Notice to Proceed
<b>Bid Security</b>	5% of Base Bid.

## **INVITATION TO BID**

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### **Obtain Bid Documents By**

Emailing the District's Purchasing Department, by downloading from the on District's Purchasing Bids-RFPs webpage at [www.rps205.com](http://www.rps205.com), or by contacting the following:

Onvia Demandstar

BHFX Digital Imaging and Printing  
1404 21st Street  
Rockford, IL 61108  
P. (815) 397-8800  
F. (815) 397-8844  
[rockford@bhfx.net](mailto:rockford@bhfx.net)

DG Digital Printing  
214 N. Rockton Avenue  
Rockford, IL 61103  
P. (815) 961-0000  
F. (815) 961-0004  
<http://www.dgdplanroom.com/>

YCS Printing, Inc.  
305 E. Riverside Blvd.  
Loves Park, IL 61111  
P. (815) 636-2058  
F. (815) 636-2059  
[print@ycsprinting.com](mailto:print@ycsprinting.com)

### **Performance Bond and Labor And Material Payment Bond**

Furnish in the amount of  
100% of the Contract after award.

### **Rights Reserved by Owner**

The Owner reserves the right to waive any irregularities and/or reject any or all bids when, in the opinion of the Owner, such action will serve the best interests of the Owner.

### **Withdrawal of Bids**

No bid may be withdrawn for a period of 60 days after the opening of bids without written consent of the Owner.

## STATEMENT OF NO INTEREST - BID

NOTE: If you are unable to submit a bid for this work, please complete and return this form immediately.

The Purchasing Department of the Rockford School District wishes to keep its vendors list file current. If for any reason you cannot supply the commodity/service noted on the attached solicitation, this form must be completed and returned to remain on the particular vendor list for future projects of this type.

**We, the undersigned, have declined to submit a proposal on:**

**Bid No. & Name: Bid 16-45 Kennedy Middle School Boiler Replacement**

**We are unable to submit a proposal for this work due to the following:**

\_\_\_\_ Too busy at this time                      \_\_\_\_ Unable to meet specifications

\_\_\_\_ Bond requirement                      \_\_\_\_ Not engaged in this type work

\_\_\_\_ Insurance requirement                      \_\_\_\_ Site location too distant

\_\_\_\_ Length of time required to obtain payment

\_\_\_\_ Project is      \_\_\_\_ too large      \_\_\_\_ too small

\_\_\_\_ Remove us from your bidder's list for this commodity/service

\_\_\_\_ Other (specify below)

\_\_\_\_ Do you wish to be considered in the future for similar projects? \_\_\_\_ Yes \_\_\_\_ No

REMARKS:

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Signature: \_\_\_\_\_ Name & Title: \_\_\_\_\_

Firm: \_\_\_\_\_ Phone: \_\_\_\_\_

Fax: \_\_\_\_\_ E-mail: \_\_\_\_\_

Address: \_\_\_\_\_  
(Street Address)                      (City)                      (State)                      (Zip-Code)

Date: \_\_\_\_\_

Return to:      Executive Director of Budgeting and Purchasing  
Rockford Public School District  
501 7<sup>th</sup> Street  
Rockford, IL 61104

# **LATE BIDS CANNOT BE ACCEPTED!**

## **SEALED BID PROPOSAL**

**BID NO.: 16-45**

**OPENING DATE: April 14, 2016**

**OPENING TIME: 2:00 PM (CDST)**

**DESCRIPTION: Kennedy Middle School Boiler Replacement**

**ATTN: PURCHASING DEPT.**

**DATED MATERIAL-DELIVER IMMEDIATELY**

**PLEASE CUT OUT AND AFFIX THIS BID LABEL TO THE  
OUTERMOST ENVELOPE OF YOUR PROPOSAL TO HELP ENSURE  
PROPER DELIVERY!**

**LATE OFFERS CANNOT BE ACCEPTED!**



# AIA® Document A701™ – 1997

## ***Instructions to Bidders***

### **for the following PROJECT:**

*(Name and location or address)*

MFP Bid docs boilerplate

### **THE OWNER:**

*(Name, legal status and address)*

Board of Education

Rockford School District No. 205

Winnebago and Boone Counties, Illinois

501 Seventh Street

Rockford, Illinois 61104

### **THE ARCHITECT:**

### **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.

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## ARTICLE 1 DEFINITIONS

§ 1.1 Bidding Documents include the Bidding Requirements and the proposed Contract Documents. The Bidding Requirements consist of the Advertisement or Invitation to Bid, Instructions to Bidders, Supplementary Instructions to Bidders, the bid form, and other sample bidding and contract forms. The proposed Contract Documents consist of the form of Agreement between the Owner and Contractor, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications and all Addenda issued prior to execution of the Contract.

§ 1.2 Definitions set forth in the General Conditions of the Contract for Construction, AIA Document A201 as revised by Owner, or in other Contract Documents are applicable to the Bidding Documents.

§ 1.3 Addenda are written or graphic instruments issued by the Architect prior to the execution of the Contract which modify or interpret the Bidding Documents by additions, deletions, clarifications or corrections.

§ 1.4 A Bid is a complete and properly executed proposal to do the Work for the sums stipulated therein, submitted in accordance with the Bidding Documents.

§ 1.5 The Base Bid is the sum stated in the Bid for which the Bidder offers to perform the Work described in the Bidding Documents as the base, to which Work may be added or from which Work may be deleted for sums stated in Alternate Bids.

§ 1.6 An Alternate Bid (or Alternate) is an amount stated in the Bid to be added to or deducted from the amount of the Base Bid if the corresponding change in the Work, as described in the Bidding Documents, is accepted.

§ 1.7 A Unit Price is an amount stated in the Bid as a price per unit of measurement for materials, equipment or services or a portion of the Work as described in the Bidding Documents.

§ 1.8 A Bidder is a person or entity who submits a Bid and who meets the requirements set forth in the Bidding Documents.

§ 1.9 A Sub-bidder is a person or entity who submits a bid to a Bidder for materials, equipment or labor for a portion of the Work.

## ARTICLE 2 BIDDER'S REPRESENTATIONS

§ 2.1 The Bidder by making a Bid represents that:

§ 2.1.1 The Bidder has read and understands the Bidding Documents or Contract Documents, to the extent that such documentation relates to the Work for which the Bid is submitted, and for other portions of the Project, if any, being bid concurrently or presently under construction.

§ 2.1.2 The Bid is made in compliance with the Bidding Documents and all required information required by Owner in the Bidding Documents has been furnished by Bidder..

§ 2.1.3 The Bidder has visited the site, become familiar with local conditions under which the Work is to be performed and has correlated the Bidder's personal observations with the requirements of the proposed Contract Documents.

§ 2.1.4 The Bid is based upon the materials, equipment and systems required by the Bidding Documents without exception.

## ARTICLE 3 BIDDING DOCUMENTS

### § 3.1 COPIES

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

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



§ 3.1.3 Bidders shall use complete sets of Bidding Documents in preparing Bids; neither the Owner nor Architect assumes responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.

§ 3.1.4 The Owner and Architect may make copies of the Bidding Documents available on the above terms for the purpose of obtaining Bids on the Work. No license or grant of use is conferred by issuance of copies of the Bidding Documents.

### § 3.2 INTERPRETATION OR CORRECTION OF BIDDING DOCUMENTS

§ 3.2.1 The Bidder shall carefully study and compare the Bidding Documents with each other, and with other work being bid concurrently or presently under construction to the extent that it relates to the Work for which the Bid is submitted, shall examine the site and local conditions, and shall at once report to the Architect errors, inconsistencies or ambiguities discovered.

§ 3.2.2 Bidders and Sub-bidders requiring clarification or interpretation of the Bidding Documents shall submit inquiries to the Director of Purchasing for Owner, 501 Seventh Street, Rockford, Illinois 61104.

§ 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 and Program Manager at least ten days prior to the date for receipt of Bids. Such requests shall include the name of the material or equipment for which it is to be substituted and a complete description of the proposed substitution including drawings, performance and test data, and other information necessary for an evaluation. A statement setting forth changes in other materials, equipment or other portions of the Work, including changes in the work of other contracts that incorporation of the proposed substitution would require, shall be included. The burden of proof of the merit of the proposed substitution is upon the proposer. The Architect's decision of approval or disapproval of a proposed substitution shall be final.

§ 3.3.3 If the Architect approves a proposed substitution prior to receipt of Bids, such approval will be set forth in an Addendum. Bidders shall not rely upon approvals made in any other manner.

§ 3.3.4 No substitutions will be considered after the Contract award unless specifically provided for in the Contract Documents.

### § 3.4 ADDENDA

§ 3.4.1 Addenda will be transmitted to all who are known by the issuing office to have received a complete set of Bidding Documents.

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

§ 3.4.3 Addenda will be issued no later than four days prior to the date for receipt of Bids except an Addendum withdrawing the request for Bids or one which includes postponement of the date for receipt of Bids.

§ 3.4.4 Each Bidder shall ascertain prior to submitting a Bid that the Bidder has received all Addenda issued, and the Bidder shall acknowledge their receipt in the Bid.

## ARTICLE 4 BIDDING PROCEDURES

### § 4.1 PREPARATION OF BIDS

§ 4.1.1 Bids shall be submitted on the forms included with the Bidding Documents.



§ 4.1.2 All blanks on the bid form shall be legibly executed in a non-erasable medium.

§ 4.1.3 Sums shall be expressed in both words and figures. In case of discrepancy, the amount written in words shall govern.

§ 4.1.4 Interlineations, alterations and erasures must be initialed by the signer of the Bid.

§ 4.1.5 All requested Alternates shall be bid. If no change in the Base Bid is required, enter "No Change."

§ 4.1.6 Where two or more Bids for designated portions of the Work have been requested, the Bidder may, without forfeiture of the bid security, state the Bidder's refusal to accept award of less than the combination of Bids stipulated by the Bidder. The Bidder shall make no additional stipulations on the bid form nor qualify the Bid in any other manner.

§ 4.1.7 Each copy of the Bid shall state the legal name of the Bidder and the nature of legal form of the Bidder. The Bidder shall provide evidence of legal authority to perform within the jurisdiction of the Work. Each copy shall be signed by the person or persons legally authorized to bind the Bidder to a contract. A Bid by a corporation shall further give the state of incorporation and have the corporate seal affixed. A Bid submitted by an agent shall have a current power of attorney attached certifying the agent's authority to bind the Bidder.

#### § 4.2 BID SECURITY

§ 4.2.1 Each Bid shall be accompanied by a bid security in the form and amount required if so stipulated in the Instructions to Bidders. The Bidder pledges to enter into a Contract with the Owner on the terms stated in the Bid and will, if required, furnish bonds covering the faithful performance of the Contract and payment of all obligations arising thereunder. Should the Bidder refuse to enter into such Contract or fail to furnish such bonds if required, the amount of the bid security shall be forfeited to the Owner as liquidated damages, not as a penalty. The amount of the bid security shall not be forfeited to the Owner in the event the Owner fails to comply with Section 6.2.

§ 4.2.2 If a surety bond is required, it shall be written on AIA Document A310, Bid Bond, unless otherwise provided in the Bidding Documents, and the attorney-in-fact who executes the bond on behalf of the surety shall affix to the bond a certified and current copy of the power of attorney.

§ 4.2.3 The Owner will have the right to retain the bid security of Bidders to whom an award is being considered until either (a) the Contract has been executed and bonds, if required, have been furnished, or (b) the specified time has elapsed so that Bids may be withdrawn or (c) all Bids have been rejected.

#### § 4.3 SUBMISSION OF BIDS

§ 4.3.1 All copies of the Bid, the bid security, if any, and any other documents required to be submitted with the Bid shall be enclosed in a sealed opaque envelope. The envelope shall be addressed to the party receiving the Bids and shall be identified with the Project name, the Bidder's name and address and, if applicable, the designated portion of the Work for which the Bid is submitted. If the Bid is sent by mail, the sealed envelope shall be enclosed in a separate mailing envelope with the notation "SEALED BID ENCLOSED" on the face thereof.

§ 4.3.2 Bids shall be deposited at the designated location prior to the time and date for receipt of Bids. Bids received after the time and date for receipt of Bids will be returned unopened.

§ 4.3.3 The Bidder shall assume full responsibility for timely delivery at the location designated for receipt of Bids.

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

#### § 4.4 MODIFICATION OR WITHDRAWAL OF BID

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

§ 4.4.2 Prior to the time and date designated for receipt of Bids, a Bid submitted may be modified or withdrawn by notice to the party receiving Bids at the place designated for receipt of Bids. Such notice shall be in writing over the



signature of the Bidder. Written confirmation over the signature of the Bidder shall be received, and date- and time-stamped by the receiving party on or before the date and time set for receipt of Bids. A change shall be so worded as not to reveal the amount of the original Bid.

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

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

## **ARTICLE 5 CONSIDERATION OF BIDS**

### **§ 5.1 OPENING OF BIDS**

This bid is form a project for the Rockford Public Schools. All bids advertised, submitted, and selected for award by Owner and other matters relating to the bidding process shall adhere to the provisions of Illinois law, in particular the provisions of the School Code, including without limitation, the provisions of 105 ILCS 5/10-20.21.

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

§ 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**

*(Paragraphs deleted)*

### **SUBMITTALS**

*(Paragraphs deleted)*

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

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

§ 6.2.2 The Bidder will be required to establish to the satisfaction of the Architect, Program Manager 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, Program Manager or Architect, after due investigation, has reasonable objection to a person or entity proposed by the Bidder. If the Owner or Architect has reasonable objection to a proposed person or entity, the Bidder may, at the Bidder's option, (1) withdraw the Bid or (2) submit an acceptable substitute person or entity. The Owner may accept the substitute person or entity or disqualify the Bidder. In the event of either withdrawal or disqualification, bid security will not be forfeited.

§ 6.3.4 Persons and entities proposed by the Bidder and to whom the Owner and Architect have made no reasonable objection must be used on the Work for which they were proposed and shall not be changed except with the written consent of the Owner and Architect.

## **ARTICLE 7 PERFORMANCE BOND AND PAYMENT BOND**

### **§ 7.1 BOND REQUIREMENTS**

§ 7.1.1 If stipulated in the Bidding Documents, the Bidder shall furnish bonds covering the faithful performance of the Contract and payment of all obligations arising thereunder. Bonds may be secured through the Bidder's usual sources.

§ 7.1.2 If the furnishing of such bonds is stipulated in the Bidding Documents, the cost shall be included in the Bid. If the furnishing of such bonds is required after receipt of bids and before execution of the Contract, the cost of such bonds shall be added to the Bid in determining the Contract Sum.

§ 7.1.3 If the Owner requires that bonds be secured from other than the Bidder's usual sources, changes in cost will be adjusted as provided in the Contract Documents.

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

§ 7.2.1 The Bidder shall deliver the required bonds to the Owner not later than three days following the date of execution of the Contract. If the Work is to be commenced prior thereto in response to a letter of intent, the Bidder shall, prior to commencement of the Work, submit evidence satisfactory to the Owner that such bonds will be furnished and delivered in accordance with this Section 7.2.1.

§ 7.2.2 Unless otherwise provided, the bonds shall be written on AIA Document A312, Performance Bond and Payment Bond. Both bonds shall be written in the amount of the Contract Sum.

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

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

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

The Agreement for the Work will be written on AIA Document A101-2007 as revised by Owner and be accompanied by General Conditions on AIA Document A201-2007, as revised by Owner and further revised by Supplementary Conditions issued by Owner all as included in the Bidding Documents.

**SUPPLEMENTARY INSTRUCTIONS TO BIDDERS**

1. SPECIAL NOTICE TO BIDDERS:

- A. Proposals shall be submitted in duplicate on the forms provided. The sample proposal form bound into these Specifications is for reference only and shall not be detached. Proposals shall be enclosed in a sealed envelope, with name of the project clearly identified, and bearing the words "SEALED BID ENCLOSED".
- B. Proposals shall be based upon the drawing and specifications and each bidder shall acknowledge the receipt and inclusion of any further instruction or addenda which may be issued prior to receipt of proposal.
- C. Bids shall be opened publicly by the Owner, immediately after bid closing time at the office of the Board of Education, 501 Seventh Street, Rockford, Illinois.

2. METHOD OF BIDDING

Bids will be received for a single contract.

3. SIGNING BIDS:

- A. Bids which are signed for a partnership shall be signed by all partners or by an Attorney-In-Fact. If signed by an Attorney-In-Fact, there shall be attached to the bid, a Power of Attorney evidencing such authority.
- B. Bids which are signed for a corporation shall have the correct corporation name thereon and the signature of the president or other authorized officer of the corporation.
- C. Proposals shall be made on the form provided and shall not be altered in any way.

4. QUALIFICATIONS:

Statement as to whether the bidder has adequate equipment to do the work properly and expeditiously.



**SUPPLEMENTARY INSTRUCTIONS TO BIDDERS**

5. AWARD (SEE ARTICLE 5.3)

The Contract shall be deemed as having been awarded when formal written notice shall have been duly served by an officer or agent of the Owner duly authorized to give such notice.

6. TAXES:

The bidder shall not include any Illinois Retailers Occupation or use taxes on tangible property purchased in the State of Illinois in his bid. Exemption Certificates for these taxes will be furnished by the Board of Education to the Contractor when requested by him/her in writing. See Section 17 regarding sales of tangible property into the State of Illinois.

7. FORM OF CONTRACT:

The Owner-Contractor agreement shall be the Standard Form of Agreement between Owner and Contractor, AIA Document A101-2007 as revised by Owner, (form included in bidding documents), including the General Conditions AIA A201-2007 as revised by Owner (form included in Invitation for Bid), the Addendum included in the Invitation for Bid, the Invitation for Bid, all amendments and addenda to the Invitation for Bid issued by the Owner, and the successful bidders bid.

8. ACCEPTANCE OR REJECTION OF BIDS:

The Owner reserves the right to reject any or all bids and to waive informalities in order to accept the bid that in his judgment will be best for the interest of the School District. Any bidder may withdraw his bid either personally or by telephone written request at any time prior to the scheduled closing time for receipt of bids.

9. QUESTION ON BIDDING DOCUMENT:

Refer all questions relative to the business aspect, Instructions to Bidders, Special Conditions, and questions concerning the technical aspect of the documents to the Executive Director of Budget and Purchasing by email at [stacie.scott@rps205.com](mailto:stacie.scott@rps205.com).

10. BID DEPOSIT:

Each bidder shall provide a Bid Bond, a Certified Check or Bank Draft in the amount of 5% of the bid total. Bid deposits will be returned to unsuccessful bidders within (30) days after award. Bid deposits will be returned to successful bidder as soon as Contract is accepted for the work outlined in this proposal.

## **SUPPLEMENTARY INSTRUCTIONS TO BIDDERS**

### 11. EXAMINATION OF SITE:

Bidder shall examine the sites of the work prior to bidding. He shall satisfy himself/herself as to existing conditions, local facilities and governing factors under which he will be obliged to operate in performing his part of the work, or that may in any manner affect the work under this contract. No allowance shall be subsequently made in this connection in behalf of the Bidder for any error or negligence on his/her part due to this failure to fully examine the sites or the work prior to bidding.

### 12. PREVAILING WAGE:

This Bid requires that the successful Contractor comply with all statutes, both Federal and State, governing payment of wages to employees. The Contractor certifies that by submitting his bid that he will pay the prevailing rate of wage in this area, for the particular type of labor, in accordance with State of Illinois Codes and the Illinois department of Labor. The Contractor and each Subcontractor shall keep an accurate record to show names and occupation of all workmen employed by them in connection with this contract. The actual hourly wage paid to each shall be recorded. These records shall be open for inspection during all working hours to the Owner's agent and the agent of the Illinois Dept. of Labor. In accordance with the amendment of the Illinois Prevailing Wage Act effective 1-1-90, as amended, the following clause shall be apart of this contract. *"If during the course of this contract the Department of Labor revises the prevailing rate hourly wages to be paid under this contract for any trade or occupation, Owner will notify contractor and each Subcontractor of the change in the prevailing rate of hourly wages. Contractor shall have the sole responsibility and duty to ensure that the revised prevailing rate of hourly wage is paid by Contractor and all Subcontractors to each worker to whom a revised rate is applicable. Revisions to the prevailing wage as set forth above shall not result in an increase in the contract sum."*

### 13. DOCUMENTS TO BE RETURNED:

Forwarded with this bidding document is one complete set of specifications and bidding forms. The bidding forms are included within the bidding document, Two copies of the bidding forms are to be returned as your Bidding Document, along with the Bid Deposit, signatures, and other required information. A self-addressed label, properly identified, is provided for your use.

It is required that the Bidder's signature appears on the following bidding forms:

- A. Statement of No Interest (if applicable)
- B. Bid-Rigging Certification
- C. Minority and Women Owned Business Form
- D. Certification Regarding Debarment Form
- E. Certificate Regarding Lobbying Form
- F. OFAC Compliance Form
- G. Vendor Conflict of Interest Disclosure Form
- H. Bid Offer Form

**SUPPLEMENTARY INSTRUCTIONS TO BIDDERS**

**14. ILLINOIS FAIR EMPLOYMENT PRACTICES**

The bidder's signature on the bid form of this Face Sheet will be construed as his/her acceptance of and willingness to comply with all provisions of the Acts of the General Assembly of the State of Illinois relating to wages of laborers, preferences and discrimination and intimidation of employees. This bid and the resulting Contract are specifically subject to the Equal Employment Opportunity requirements of the Illinois Fair Employment Practices Commission and the policies of the Rockford Board of Education. Bidder agrees to comply in all respect with Federal, State and local laws and ordinances pertaining to this bid and to the performance of the Contract in the event bidder is awarded the bid. Provisions of applicable acts are hereby incorporated by reference and become a part of this proposal and specifications.

**15. EMPLOYMENT OF ILLINOIS WORKERS ON PUBLIC WORKS ACT**

Pursuant to the Employment of Illinois Workers on Public Works Act, during any time of excessive unemployment (defined as any month immediately following 2 consecutive calendar months during which the level of unemployment in the State of Illinois has exceeded 5% as measured by the United States Bureau of Labor Statistics in its monthly publication of employment and unemployment figures) any person or entity charged with the duty, either by law or contract, of (1) constructing or building any public works, as defined in this Act, or (2) the clean-up and on-site disposal of hazardous waste for the State of Illinois or any political subdivision of the State, and that clean-up or on-site disposal is funded or financed in whole or in part with State funds or funds administered by the State of Illinois, then that person or entity shall employ at least 90% Illinois laborers on such project. Persons or entities entering into a contract with the Rockford Public Schools in which they are obligated to construct or build any public works (defined any fixed work construction or improvements funded in whole or part by the State of Illinois) agree to abide by the requirements of the Employment of Illinois Workers on Public Works Act.

**16. TAX IDENTIFICATION NUMBER:**

Under Federal Law and in accordance with instructions from the Department of Treasury and the Internal Revenue Service, our School District is required to have on file appropriated tax identification information concerning you or your firm. This information will be a Federal Employer's Identification Number, but in some instances of independent contractors, it might be a Social Security Number. This information is needed to determine on which vendors we must file a Form 1099.

**SUPPLEMENTARY INSTRUCTIONS TO BIDDERS**

BEFORE A BID CAN BE CONSIDERED BY THE SCHOOL DISTRICT, THE ABOVE REFERENCED TAX IDENTIFICATION NUMBER MUST BE ON THE BID FORM IN THE SIGNATURE SECTION. WE ALSO SPECIFICALLY REQUIRE THAT YOU IDENTIFY THE LEGAL ORGANIZATIONAL STATUS OF YOUR FIRM IN THE SIGNATURE SECTION AS TO WHETHER IT IS A CORPORATION, PARTNERSHIP, PROPRIETORSHIP, ETC., SHOULD YOU HAVE ANY QUESTIONS CONCERNING THIS TAX IDENTIFICATION NUMBER, PLEASE CONTACT US.

17. **CONTRACTOR RESPONSIBILITY TO COLLECT AND REMIT ILLINOIS USE TAX**

The bidders acknowledge and understand that any resulting contract for goods and services awarded to a bidder requires that as a contractor the person or entity and all affiliates of the person or entity will collect and remit Illinois Use Tax on all sales of tangible personal property into the State of Illinois in accordance with the provisions of the Illinois Use Tax Act (35 ILCS 105/1 et seq.) regardless of whether the person/entity or affiliate is a “retailer maintaining a place of business within this State” as defined by the Use Tax Act (35 ILCS 105/2). (Reference the School Code of Illinois; 105 ILCS 5/10-20.21(b))

18. **PERFORMANCE BOND:** Shall be submitted on AIA Document 312-2010, “Performance Bond” and “Labor & Material Payment Bond”.

The successful bidder will be required to furnish a Performance Bond and a Labor & Materials Bond satisfactory to the Board of Education. The amount of said bond shall be equal to 100% of the contract award and the cost of any said bond shall be included in the Contractor’s proposal.

19. **PREQUALIFICATION OF MATERIALS:**

Approval of other “or equal” materials shall be pre-qualified by the Architect’s at least five (5) working days before the bid opening. Proposals may be offered on more than one manufacturer.

20. **PREQUALIFICATION OF BIDDER:**

A bidder may be required to furnish evidence satisfactory to the Owner that he/she and his/her proposed subcontractors have sufficient means and experience in the types of work call for to assure completion of the contract in a satisfactory manner. A new bidder may be required to properly execute AIA Document A305, “Contractor’s Qualification Statement” before submitting his bid.

**SUPPLEMENTARY INSTRUCTIONS TO BIDDERS**

21. MINORITY AND FEMALE OWNED BUSINESSES

District #205 supports the policy of the State of Illinois to support Minority Owned Business Enterprise (MBE) and Female Owned Business Enterprise (FBE). The District seeks to identify and encourage the amount of minority and female involvement in each of the construction-related contracts issued by the District. A bidder will be required to submit the minority certification form enclosed with the bid documents. Additionally, in the event and to the extent State of Illinois funds in excess of \$250,000.00 are awarded to and used by the District for capital construction costs and design services on a school construction project, and goals are established for MBE and FBE participation in such school construction project involving the use of State of Illinois funds, and to the extent such goals are not inconsistent with Federal guidelines the District will follow such goals unless waived. The successful bidder agrees to cooperate with the District to provide necessary information to meet state funding requirements and on participation by MBE and WBE and to assist in meeting goals through certification as a MBE or WBE or certification of subcontractors.



## GENERAL TERMS AND CONDITIONS

“District” means Rockford School District No. 205, Winnebago and Boone Counties, Illinois.

“IFB” means an Invitation for Bid issued by the District at any time or times, identified by a unique bid number.

“Bidder” means a person or entity submitting a bid to the District in response to an IFB; including successful Bidders.

**1. BID OPENING.** Sealed bids will be received at the District Purchasing Department until the date and time specified at which time they shall be opened in public. No other bids will be considered after this date and time unless it is evidenced and determined that the bid was in the District’s possession prior to the scheduled bid opening time and date. Late bids shall be rejected and shall remain unopened. The District does not prescribe the method by which bids are to be transmitted; therefore, it cannot be held responsible for any delay, regardless of the reason, in transmission of the bids. All bids delivered in person shall be deposited with the District Purchasing Department, 6th Floor, 501 Seventh Street, Rockford, IL, 61104.

**2. BID PREPARATION.** Bids must be submitted on this form and all information and certifications called for must be furnished. Bids submitted in any other manner, or which fail to furnish all information or certificates required, may be summarily rejected. Bids may be modified or withdrawn prior to the time specified for the opening of the bids. Bids shall be filled out legibly in ink or typewritten with all erasures, strikeouts and corrections initialed in ink by the person signing the bid. The bid shall include the legal name of the bidder, the complete mailing address, and be signed in ink by a person or persons legally authorized to bind the bidder to a contract. Name of person signing should be typed or printed below the signature.

**3. BID ENVELOPES.** Envelopes containing bids must be sealed and addressed to the District Purchasing Department. The name and address of the Bidder and the bid number must be shown on the envelope.

**4. ERRORS IN BIDS.** Bidders are cautioned to verify their bids before submission. Negligence on the part of the Bidder in preparing the bid confers no right for withdrawal or modification of the bid after it has been opened. In case of error in the extension of prices in the bid, the unit prices will govern.

**5. RESERVED RIGHTS.** The District reserves the right at any time and for any reason to cancel an IFB, accept or reject any or all bids or any portion thereof, or to accept an alternate offer. The District reserves the right to waive any minor informality defect in any IFB. Unless otherwise specified, the District will award a bid or reject bids within 60 days. The District may seek clarification from any Bidder at any time and failure to respond promptly is cause for rejection.

**6. INCURRED COSTS.** The District will not be liable for any costs incurred by Bidders in responding to an IFB.

**7. AWARD.** The District will evaluate bids and will award a contract to the lowest responsive and responsible bidder whose bid, conforming to the solicitation and specifications will be most advantageous to the District. Determination of the lowest responsible bidder conforming to the solicitation shall not be restricted to the price quotation alone, but will include such other factors (where applicable) as (a) adherence to all conditions and requirements of the technical specifications; (b) price; (c) qualifications of the bidder, including past performance, financial responsibility, general reputation, experience, service capabilities, and facilities; (d) delivery or completion date; (e) product appearance, workmanship, finish, taste, feel, overall quality, and results of product testing; (f) maintenance costs and warranty provisions; (g) repurchase or residual value; and (h) other such related items. The District is interested in obtaining the best overall value and reserves the right to make a selection based on its judgment of the bid that is best suited for the purpose intended. The District may (1) reject any or all bids, (2) accept other than the lowest bidder, and (3) waive informalities or minor irregularities in bids received. The District may accept any item or group of items of an offer, unless the bidder qualifies the bid by specific limitations. The District reserves the right to determine the lowest responsible bidder on the basis of an individual item, groups of items, or in any way determined to be in the best interests of the District. A written award or acceptance of a bid mailed or otherwise furnished to the successful Bidder within the time for acceptance specified in the bid shall result in a binding contract without further action by either party.

**8. PRICING.** The price quoted for each item is the full purchase price, **including delivery to destination**, and includes all transportation and handling charges, premiums on bonds, material or service costs, patent royalties and all other overhead charges of every kind and nature. Unless otherwise specified, prices shall remain firm for the contract period.

If at any time after a contract is awarded to the successful Bidder(s) makes a general price reduction in the comparable price of any material covered by the contract to customers generally, an equivalent price reduction based on similar quantities and/or considerations shall apply to the contract for the duration of the contract period (or until the price is further reduced). Such price reduction shall be effective at the same time and in the same manner as the reduction in the price to customers generally. For the purpose of this provision, a “general price reduction” shall mean any horizontal reduction in the price of an article or service offered (1) to successful Bidder’s customers generally, or (2) in the successful Bidder’s price schedule for the class of customers, i.e., wholesalers, jobbers, retailers, etc., which was used as the basis for bidding on this contract. An occasional sale at a lower price, or sale of distressed merchandise at a lower price, would not be considered a “general price reduction” under this provision. The successful Bidder shall invoice the District at such reduced prices indicating on the invoice that the reduction is pursuant to the “price reduction” provision of this contract. The successful Bidder, in addition, shall within ten (10) days of any general price reduction, notify the Executive Director of Budget and Purchasing of such reduction by letter. Failure to do so may result in termination of the contract.

**9. DISCOUNTS.** Prices quoted must be net after deducting all trade and quantity discounts.

**10. SPECIFICATIONS.** Reference to brand names and numbers is descriptive, but not restrictive, unless otherwise specified. Bids on equivalent items will be considered, provided the bidder clearly states exactly what is proposed to be furnished, including complete specifications. Unless the Bidder specified otherwise, it is understood the Bidder is offering a referenced brand item as specified or is bidding as specified when no brand is referenced, and does not propose to furnish an “equal.” The District reserves the right to determine whether a substitute offer is equivalent to and meets the standard of quality and salient characteristics indicated by the brand name and number.

**11. SAMPLES.** Samples of items, when called for, must be furnished free of expense. Individual samples must be labeled with the Bidder’s name, bid number, item reference, manufacturer’s brand name and number. If samples are requested, they must be sent under separate cover and not included with bid. The District will not be responsible for any bid enclosed with sample boxes.

**12. INTERPRETATION OR CORRECTION OF BIDDING DOCUMENTS.** Bidders shall promptly notify the Rockford Public School District of any ambiguity, inconsistency or error which they may discover upon examination of the IFB documents. Interpretations, corrections and changes will be made by amendment. Each Bidder shall ascertain prior to submitting a bid that all amendments have been received and acknowledged in the offer.

**13. INDEMNIFICATION.** The Bidder shall indemnify and hold harmless the District, its agents, officials, and employees from and against all injuries, losses, claims, suits, costs and expenses which may accrue against the District as a consequence of granting the contract.

**14. DEFAULT.** If delivery of acceptable items or rendering of services is not completed by the time promised, the District reserves the right, without liability, in addition to its other rights and remedies, to terminate the contract by notice effective when received by Bidder, as to stated items not yet shipped or services not yet rendered and to purchase substitute items or services elsewhere and charge the Seller with any or all losses incurred. The District shall be entitled to recover its attorney fees and expenses in any successful action by the District to enforce this contract.

**15. INSPECTION.** Materials or equipment purchased are subject to inspection and approval at the District’s destination. The District reserves the right to reject and refuse acceptance of items which are not in accordance with the IFB, instructions, specifications, drawings or data or Bidder’s warranty (express or implied). Rejected materials or equipment shall be removed by, or at the expense of, the Bidder promptly after rejection and if not removed within 10-calendar days after notice, such shall be returned via collect shipping.

**16. WARRANTY.** Bidder warrants that all goods and services furnished hereunder will conform in all respects to the terms of this proposal, including any drawings, specification or standards incorporated herein, and that they will be free from latent and patent defects in materials, workmanship and title, and will be free from such defects in design to the best of the Bidder's knowledge. In addition, Bidder warrants that said goods and services are suitable for, and will perform in accordance with, the purposes for which they are purchased, fabricated, manufactured and designed or for such other purposes as are expressly specified in this solicitation. The District may return any nonconforming or defective items to the Bidder or require correction or replacement of the item at the time the defect is discovered, all at the Bidder's risk and expense. Acceptance shall not relieve the Bidder of its responsibility.

**17. REGULATORY COMPLIANCE.** Bidder represents and warrants that the goods or services furnished hereunder (including all labels, packages and container for said goods) comply with all applicable standards, rules and regulations in effect under the requirements of all Federal, State and local laws, rules and regulations as applicable, including the Occupational Safety and Health Act as amended, with respect to design, construction, manufacture or use for their intended purpose of said goods or services. Bidder shall furnish "Material Safety Data Sheets" in compliance with the Illinois Toxic Substances Disclosure to Employees Act, if applicable.

**18. ROYALTIES AND PATENTS.** Bidder shall pay all royalties and license fees. Bidder shall defend all suits or claims for infringement of any patent, copyright or trademark rights and shall hold the District harmless from loss on account thereof.

**19. COMPLIANCE WITH LAWS AND REGULATIONS.** Bidder represents and warrants that throughout the term of any contract arising from award of a bid and any extension thereof, Bidder and all products shall be and shall remain in compliance with all applicable federal, state, and local laws and regulations.

**20. TERMINATION.** (a) The District may terminate this contract in whole or in part, without liability, if deliveries are not made at the time and in the quantities specified, if the Bidder fails to perform any of the provisions of this contract, or so fails to make progress as to endanger performance of this contract in accordance with its terms, and in either of these circumstances does not cure such failure within such period of time as the District may direct, if it is determined the successful Bidder knowingly falsified information provided to the District, if it is determined the successful Bidder offered substantial gifts or gratuities to a District official, employee, or agent whether in their official capacity or not, or in the event of a breach or failure of the Contractor to comply with any of the other terms or conditions herein. The District shall notify the contractor in writing of the specific nature of the breach and shall request that it be cured. If the Contractor does not cure the breach within thirty (30) days of such notice, the District may immediately terminate this contract. To terminate, the District shall give notice to the Contractor in writing, and to the extent specified therein, Contractor shall immediately terminate deliveries under the contract. Termination of the contract shall not preclude the District from pursuing any and all remedies available to it at law or at equity.

(b) Any termination by the District, whether for default or otherwise, shall be without prejudice to any claims for damages or other rights of the District against Contractor.

(c) The District shall have the right to audit all elements of any termination claim and Contractor shall make available to the District on request all books, records, and papers relating thereto.

(d) The Contractor shall be paid only for the performance of work up to the date of termination if the District exercises its right to terminate.

**21. TERMINATION WITHOUT CAUSE.** Unless otherwise specified in the Invitation for Bid, a contract formed by award of a bid may be unilaterally terminated by the District, for any or no reason, upon sixty (60) days written advance notice to the Bidder. Bidder may submit claims for actual work performed up to and including the day of notice of termination with appropriate documentation supporting such claim for materials, labor, or acquired inventory for equitable adjustment and any such material shall become the property of the District upon settlement.

**22. ASSIGNMENT.** The Bidder may not assign, subcontract, delegate or otherwise transfer this contract or any of its rights or obligations hereunder, nor may it contract with third parties to perform any of its obligations hereunder except as contemplated in this contract, without the District's prior written consent.

**23. FORCE MAJEURE.** The obligations of the Bidder to perform under this contract will be excused during each period of delay caused by acts of God or by shortages of power or materials or government orders which are beyond the reasonable control of the Bidder obligated to perform ("Force Majeure Event"). In the event that the Bidder ceases to perform its obligations under any contract formed by award of bid due to the occurrence of a Force Majeure Event, the Bidder shall: (1) immediately notify the District in writing of such Force Majeure Event and its expected duration; (2) take all reasonable steps to recommence performance of its obligations under this contract as soon as possible. In the event that any Force Majeure Event delays Bidder's performance for more than thirty (30) days following notice pursuant to this contract, the District may terminate this contract immediately upon written notice to the Contractor.

**24. BID CERTIFICATION.** The Bidder's signature on a bid certifies: (a) The bid is genuine and not made in the interest of, or on the behalf of, any undisclosed persons, firms or corporation and is not submitted in conformity with any agreement or rules of any group association, or organization. (b) Bidder has not directly or indirectly induced or solicited any other Bidder to enter a false or sham bid. (c) Bidder has not solicited or induced any person, firm or group to refrain from bidding. (d) Bidder has not sought by collusion or otherwise to obtain for self-interest any advantage over any other Bidder or the Owner. The Bidder's signature on the Bid Form certifies that they have read and understand the contents of this solicitation and agree to furnish at the prices shown any or all of the items and/or services, subject to all instructions, conditions, specifications and attachments hereto. Failure to have read all the provisions of the IFB shall not be cause to alter any resulting contract, request additional compensation, or relieve Bidder from obligation to perform under this contract.

**25. MODIFICATIONS.** This contract can be modified only by written bi-lateral modification signed by the parties or duly authorized agents.

**26. ADDENDA.** If it becomes necessary to revise any part of this bid, a written addendum will be provided to all bidders. If the District issues written addenda, such addenda shall become part of the contract documents. A Bidder who fails to receive the District's addenda, and who has previously submitted an offer, shall not be relieved from any obligation in the bid submitted.

**27. BINDING EFFECT.** The terms, conditions, provisions, and undertakings of any contract formed by award of a bid shall be binding upon and inure to the benefit of each of the parties thereto and their respective successors and assigns.

**28. EQUAL OPPORTUNITY EMPLOYER.** The Rockford Public School District is an Equal Opportunity Employer and encourages bids or proposals from any company or individual regardless of race, gender, national origin, religion or age.

## **SUPPLEMENTARY CONDITIONS**

The following supplements modify, change, delete from or add to the General Conditions of the Contract for Construction, AIA document A201 2007, as revised by Owner; hereinafter referred to as General Conditions. References herein to Owner shall mean the Board of Education of Rockford School District No. 205, Winnebago-Boone Counties, Illinois.

Where any Article of the General Conditions is modified or any paragraph, subparagraph, or clause thereof is modified or deleted by these supplements the unaltered provisions of that article, paragraph, subparagraph or clause shall remain in effect. In the event of a conflict between the General Conditions and these Supplementary Conditions, which are complementary, the Supplementary Conditions shall prevail.

### **1. INSURANCE**

- A. Contractor's Liability Insurance shall include all major divisions of coverage and be on a comprehensive basis including:
  - 1. Premises operations
  - 2. Independent Contractor's protective
  - 3. Products and completed operations
  - 4. Personal injury liability with employment exclusion deleted.
  - 5. Contractual, including specified provision for Indemnification under General Conditions paragraph 3.18.
  - 6. Owned and non-owned motor vehicles
  - 7. Broad form property damage including completed operations.
- B. The insurance required by General Conditions paragraph 11.1.1 shall be written for not less than the following limits, or greater if required by law:
  - 1. Workman's Compensation:
    - a. Statutory Workman's compensation.
    - b. Employers' liability - \$500,000.00 per accident and aggregate disease.
  - 2. Builder's Risk Insurance will be carried and covered by the Board of Education separately.

Comprehensive general liability and contractual liability limits, automobile liability and umbrella coverage will depend on the category of the project. Category 1 projects will have a contract amount in the range of \$0.00 to \$1,000,000.00 and category 2 projects will have a contract amount in excess of \$1,000,000.00. The minimum liability limits per category are as follows:

**SUPPLEMENTARY CONDITIONS**

## 3. Comprehensive general liability and contractual liability

	<u>CATEGORY 1 CONTRACTS</u>	<u>CATEGORY 2 CONTRACTS</u>
a. Bodily injury:	\$1,000,000.00 each person \$1,000,000.00 each occurrence \$1,000,000.00 aggregate	\$2,000,000.00 each person \$2,000,000.00 each occurrence \$4,000,000.00 aggregate
b. Property damage:	\$1,000,000.00 each occurrence \$1,000,000.00 aggregate	\$1,000,000.00 each occurrence \$1,000,000.00 aggregate
c.	Shall include products and completed operations insurance as above for 1 year after final payment (Category 1 AND Category 2).	

## 4. Comprehensive Automobile Liability Category 1 AND Category 2

- |    |                  |  |
|----|------------------|--|
| a. | Bodily Injury:   | \$1,000,000.00 each person<br>\$1,000,000.00 each occurrence |
| b. | Property Damage: | \$1,000,000.00 each occurrence<br>\$1,000,000.00 aggregate   |

## 5. If the general liability coverage is provided by a commercial liability policy, the:

- |    |  |
|----|--|
| a. | General aggregate shall not be less than \$2,000,000 for Category 1 and \$4,000,000.00 for Category 2 and shall apply in total, to this project. |
| b. | Fire damage limit shall be not less than \$50,000 on any one fire.   |

## 6. Umbrella liability coverage:

<u>CATEGORY 1</u>	<u>CATEGORY 2</u>
\$3,000,000.00 each occurrence \$3,000,000.00 aggregate	\$5,000,000.00 each occurrence \$5,000,000.00 aggregate

## C. Certificate of Insurance:

The insurance shall be written on the Comprehensive General Liability Policy Form. The certificate shall be submitted on current AIA Document G705. A copy of this document is included herein.

### **SUPPLEMENTARY CONDITIONS**

- D. Cancellation Notice:  
All certificates and policies shall indicate that the carrying company will not cancel without giving the Owner notice in writing thirty (30) days prior to date cancellation is to become effective.
  - E. Subcontractors Comprehensive Insurance:  
Contractor should protect himself/herself by requiring his subcontractors to maintain workman's compensation insurance and insurance of the same kind in amounts specified above.
  - F. Contractors Comprehensive Insurance:  
Contractor shall carry sufficient comprehensive insurance on his/her equipment at site of work and in route to and from site to fully protect him/her. Contractor shall require same coverage of his/her subcontractors. It is expressly understood and agreed that the Owner and/or Architect shall have no responsibility thereof.
  - G. At no time shall the Contractor's workers be considered employees of the Board of Education.
2. **CLEANING AND PROTECTION OF BUILDING:**
- A. The Contractor shall not allow rubbish, debris, or unused material related to the execution of this Contract to accumulate on the premises. Contractor shall on a daily basis or otherwise as directed by the Owner's representative or designee, clean or pay the cost of cleaning all debris and dirt, etc., which may accumulate on the site due to the execution of this Contract.
  - B. The Owner has contracted with an Owner's representative or designee for certain projects under the Master Facilities Plan. In the event this project is managed by the Owner's representative or designee, all communications, requests and instructions shall be copied to the Owner's representative or designee. Contractor shall follow the instructions and decisions of Owner's representative or designee as though made and issued by Owner. Owner's representative or designee shall designate the permitted hours of construction activity for this project and Contractor shall not conduct construction or other activities relating to this project at the project site outside the permitted hours without the express prior consent of the Owner's representative or designee.
3. **SCHEDULE OF VALUES:**  
Contractor shall submit a schedule of values to the Architect before submitting the first payment request. Use AIA Document G703. File in accordance with Article 9 of General Conditions.

### **SUPPLEMENTARY CONDITIONS**

4. APPLICATION FOR PAYMENTS:

- A. Payment requests shall be with 10% retainage. First request, per school, may be made when the work is substantially completed at that school. Final request for the “retainage” amount shall be after completion of “Final Acceptance of Contracted Project” form.
- B. “Request for Payment” shall be submitted to the Architect on AIA Document G702/G703. Contract’s Partial Waiver of Lien will be required, current with each payment request, in the net amount of each request. Waivers of Lien from each subcontractor and material supplier to whom payment has been made, shall be required with the following payment request. Final waiver of lien from subcontractors and material suppliers shall be submitted with final pay request.
- C. The Board of Education regular meetings generally occur on the second and fourth Tuesdays of each month as specified by Board of Education Resolution and found on the web site for the Board of Education as the Board Calendar ([www.rps205.com](http://www.rps205.com)). Architect approved payment requests must be received in the Finance Department not less than 10 calendar days prior to a scheduled Board meeting for the request to be considered at that Board meeting.
- D. The Board of Education shall comply with the provisions of the Local Government Prompt Payment Act, 50 ILCS 515/1, et. seq.
- E. The provisions of the Addendum shall govern.

5. GUARANTEES:

If within one (1) year after the date of “Final Acceptance of Contracted Project” any of the work is found to be defective or not in accordance with 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.

6. CONFLICT OF INTEREST:

The State of Illinois School Code is very explicit in its direction as to the relationship of the parties involved in contracts and transactions. Below please find a reproduction of Section 33-5 (105 ILCS 5/33-5) of said code:

*No member or employee of the Board of Education shall be directly or indirectly interested in any contract, work, or business of the District, or in the sale of any article, the expense, price or consideration of which is paid by the District nor in the purchase of any real estate or property belonging to the District or which shall be sold by virtue of legal process at the suit of the District. Whoever violates any provision of this Section shall be guilty of a Class A misdemeanor. (P.A.-2267)*



### **SUPPLEMENTARY CONDITIONS**

7. **TEMPORARY USE OF FACILITIES:**

A. Utilities. Owner will allow Contractor use of Owner's existing electric, gas and water utilities conditioned on full compliance by Contractor with Architect's connection and use specifications. Owner may revoke any or all utility use at any time or times in the event such use by Contractor disrupts or interferes with the normal daily operations of Owner's schools.

B. The Contractor may NOT use Owners toilet facilities or washrooms.

8. **EMPLOYEE CONDUCT:**

**All of Contractor's employees, agents, principals, and consultants shall abide by Federal, State and Local Laws and Board of Education policy while on District premises. No employee, agent or principal of Contractor and its consultants and vendors shall fraternize with any student of the school district. Any employee whose conduct is judged unfit by District shall not be permitted to work on the project. Contractor agrees to comply with and abide by all rules, regulations and policies of the District and the direction of the Owner's representative or designee relating to access to and conduct upon District Premises.**

**Contractor employees, agents and principals and its consultants and consultants employees and agents shall not perform work within District buildings for more than 30 school days within any school year (July 1 to June 30) unless a criminal history records check has been conducted by Contractor, the individual(s) is found to have not violated any of the drug or criminal offenses listed in the criminal history records check provisions in the School Code 105 ILCS 5/10-21.9(f) (the Act), and the Contractor so certifies the same to be true on the Certified Cleared Employee List.**

**Contractor employees, agents and principals and its consultants and consultant's employees and agents shall not be permitted to be present on District grounds unless a Statewide Sex Offender Database check and a Statewide Child Murderer and Violent Offender Against Youth Database check has been conducted regarding all such employees in accordance with and subject to the provisions of the Act. Contractor employees, agents and principals and its consultants and consultant's employees and agents who are found to have had convictions of the enumerated criminal or drug offenses listed in the Act or who appear in the noted databases shall not be permitted at any time to be present on school grounds.**

**Contractor employees accessing school grounds are required to have in their possession identification issued by the District. All such persons must check in with the school main office to receive a visitor's identification at which time the individual must present a government issued photo identification which will be used to verify the individual's name appears on the Certified Cleared Employee List. At the conclusion of the work day, plastic or hard cover identification must be returned to the school.**

### **SUPPLEMENTARY CONDITIONS**

**Not less than 10 days prior to the commencement of work, Contractor shall submit to Owner, with a copy to Owner's representative or designee, a written certification on a form provided by Owner (Certified Cleared Employee List), signed by Contractor under oath that the employees listed on the certification have been the subject of a criminal history records check (for employees working more than 30 school days in District buildings), and a Statewide Sex Offender Database check and a Statewide Child Murderer and Violent Offender Against Youth Database check for all employees accessing District grounds. Contractor shall update the certification as and when necessary to keep such certification list current.**

**The Owner and Owner's representative or designee may from time to time and at multiple times in their discretion and without notice check the identification of all persons accessing school grounds by or through the Contractor to assure such persons appear on the certification list and have in their possession a valid District issued identification. Contractor warrants that it shall immediately notify the District if a certified cleared employee is convicted of an enumerated offense or their name appears on any of the noted Databases. A violation of this section 6 is a material breach of contract.**

**9. MANDATORY PRE-CONSTRUCTION CONFERENCE:**

Prior to beginning the work, contractor shall meet at project site with Owner's representative or designee/Owner, installers, installers of related items, and other entities including (where applicable) Owner's insurer and Architect. A Record of discussions and agreements will be kept and a copy furnished to each participant.

The conference shall be conducted not less than 7 nor more than 21 days prior to the commencement of construction and shall be scheduled by the Owner's representative or designee. Owner's representative or designee may schedule additional mandatory conferences in its discretion. Owner's representative or designee shall provide advance notice to participants prior to convening Pre-construction Conferences.

**10. COMPLETION REQUIREMENTS:**

The Order to Proceed, which will be issued by the Owner at a date following the contract award, will indicate the date the work is to commence and establish the completion date.

**11. MEASUREMENT AND LAYOUT:**

Before ordering material or doing work, each Contractor shall be responsible for measuring the physical dimensions of the site to his/her needs sufficient to execute the work desired by the Owner. Each Contractor shall be responsible for the correctness of his/her measurements. Measurements given on the drawings are for references only, for which the Owner accepts no responsibility for accuracy.

**SUPPLEMENTARY CONDITIONS**

12. **SITE SECURITY.**

Contractor shall be responsible for site security including the erection of temporary construction site fencing which shall be of a chain link variety and which shall be maintained by contractor at all times from commencement of construction to final acceptance of the Work. Contractor shall take reasonable actions in order to restrict access to construction sites, both inside and outside of District buildings, 24 hours per day, 7 days per week until construction is complete. Contractor shall provide site security to assure that unauthorized persons do not access the construction site (outside of school buildings) and proper barricades and safety notices and warnings are posted within buildings to assure the integrity and safety of persons and property in buildings and on the construction site, construction activities and construction materials.

13. **CONSTRUCTION ACTIVITIES:**

No construction activities shall occur on construction sites and within school buildings outside the limits established by Owner or Owner's representative or designee. Owner's representative or designee shall issue construction time periods with proper description as to when and where construction activities may occur at each construction and school site. No construction activities shall proceed in the absence of appropriate barricades and warnings.

14. **BID PROPOSAL:**

Each Contractor is to return two (2) sets of their proposal with original signatures.

15. **HOLD HARMLESS:**

To the fullest extent permitted by applicable law, Contractor and its employees and consultants shall and do agree to indemnify and hold harmless the District, and its respective Board members, officers, directors, and employees, and Owner's representative or designee from and against all claims, damages, losses, causes of action, suits, judgments and expenses, including reasonable attorney's fees to the extent arising out of, caused by or resulting from the performance or non-performance of the Work by Contractor, anyone directly or indirectly employed by it or anyone for whose acts it may be liable even if caused in part by District. This paragraph shall be construed in accordance with the Construction Contract Indemnification for Negligence Act (740 ILCS 35/1).

School District #205 will require that any Contractor or Subcontractors performing work in connection with any Drawings and Specifications hold harmless, indemnify and defend School District #205 and each of their officers, agents and employees from any and all liability claims, losses or damage arising out of alleged to arise from the Contractor's (or Subcontractor's) negligence in the performance of the work described in the Contract Documents.

16. **ASSIGNMENT OF WARRANTIES/DELIVERY OF MANUALS**

On or before the date of substantial completion of the project, Contractor shall assign to Owner all right, title and interest in and to equipment and product warranties issued by the product manufacturer. Contractor shall provide to Owner's representative or designee a complete list of all products and equipment furnished and or installed by

### **SUPPLEMENTARY CONDITIONS**

Contractor in and to the project along with the name of the manufacturer of each product and item of equipment and take all necessary steps to transfer warranties to the Owner. Contractor shall within the same time frame deliver to Owner all product and equipment manuals installation instructions and operating instructions and registration materials.

#### **17. COMPLIANCE WITH FREEDOM OF INFORMATION ACT**

The District is required by law to comply with the provisions of the Freedom of Information Act, 5ILCS 140/1 et seq., as amended from time to time ("Act"). The Act requires the District to provide, if requested to do so by any person, copies of documents that maybe in your possession and related to this contract. As a condition of this contract, Contractor agrees to and shall provide to the District, copies of any and all such documents when directed to do by the District. All such documents shall be delivered to the District's Legal Department NO LATER THAN five (5) working days after the date of the District's direction to provide such documents. Failure of the

Contractor to provide documents within said five (5) working days as provided above shall result in the assessment of any and all penalties, damages, and/or costs incurred by the District to the Contractor which shall be paid immediately by the Contractor upon demand of the same by the District.

#### **18. RECORDS, RETENTION, AUDIT**

- a. Records. The Contractor shall have or upon award of bid establish and maintain a reasonable accounting system that enables the District to readily identify Contractor's assets, expenses, costs of goods and use of funds related to the Project (the Records). Such Records shall include, but not limited to, accounting records, written policies and procedures; subcontractor files (including proposals of successful and unsuccessful bidders, bid recaps, etc.); all paid vouchers, including those for out-of-pocket expenses, other reimbursement supported by invoices; ledgers; cancelled checks; deposit slips, bank statements; journals; original estimates; estimating work sheets; contract amendments and change order files; backcharge logs and supporting documentation; insurance documents, payroll documents; timesheets; memoranda; and correspondence.
- b. Retention. The Contractor shall, at all times during its performance of the Project and for a period of seven years after the completion of the Project, maintain Records, together with all supporting or underlying documents and materials. The Contractor shall upon written request by the District at any time or times, whether during or after completion of the Project, and at the Contractor's expense, produce the Records for inspection, copying and audit (including copies and extracts of records as required) by the District. The Records shall be made available to the District, upon three-day written notice, during normal business hours at Contractor's principal office if located in Rockford, Illinois or at such other location specified by the District including the District offices. Upon expiration of the retention period specified in this paragraph 18b, prior to destruction of the Records, Contractor shall provide not less than 30 days written notice of its intent to destroy any part or all of the Records, specifying the nature, character and extent

### **SUPPLEMENTARY CONDITIONS**

of Records to be destroyed and the District may at its discretion and expense obtain all Records or copies of Records intended to be destroyed. The Contractor shall ensure the District's right to access and audit the Records in the possession, created or maintained by Contractor's agents, assigns, successors, and subcontractors. Contractor shall notify in writing its agents, assigns, successors and subcontractors of the requirements of records, retention and audit as set forth in this paragraph 18. Any and all contracts or agreements between Contractor and any other party related to the Project shall expressly include the records, retention and audit provisions of this paragraph 18.

- c. The District and its authorized representatives shall have the right to audit, to examine, and to make copies of or extracts from all Records (in whatever form they may be kept, whether written, electronic, or other), including, but not limited to, those kept by the Contractor, its agents, assigns, successors, and subcontractors.

Cost of any examination or audit of Records conducted by the District will be borne by the District (excluding any cost to produce Records under paragraph 18b), except where the examination or audit identifies overpricing or overcharges (of any nature) by the Contractor to the District in excess of one-half of one percent (0.5%) of the total contract billings in which event the entire cost of the examination or audit shall be Contractor's cost and Contractor shall reimburse the District for the total cost of the examination or audit. If the examination or audit reveals substantive findings of fraud, misrepresentation, or non-performance by Contractor, its employees, agents, representatives, assigns, successors or subcontractors, the Contractor shall pay all costs of the examination or audit; and if paid by the District, reimburse the District for all such costs. In the event Contractor fails to pay such costs within 30 days of demand by the District, District may offset any such costs unpaid by Contractor from any balance due Contractor by the District or at the election of the District proceed to collect such costs by any available means including litigation in which event the costs of collection including reasonable attorney's fees shall also be paid by Contractor.

### **QUESTIONS**

Any questions regarding this bid; may be referred to Stacie Talbert Scott, Executive Director of Budget and Purchasing at [stacie.scott@rps205.com](mailto:stacie.scott@rps205.com) or 815-966-3097.

# Winnebago County Prevailing Wage for July 2015

(See explanation of column headings at bottom of wages)

Trade Name Trng	RG	TYP	C	Base	FRMAN	M-F>8	OSA	OSH	H/W	Pensn	Vac
=====	==	===	=	=====	=====	=====	===	===	=====	=====	=====
ASBESTOS ABT-GEN 0.800		BLD		31.790	32.790	1.5	1.5	2.0	8.420	15.17	0.000
ASBESTOS ABT-MEC 0.000		BLD		18.950	0.000	1.5	1.5	2.0	2.700	3.350	0.000
BOILERMAKER 0.400		BLD		47.070	51.300	2.0	2.0	2.0	6.970	18.13	0.000
BRICK MASON 0.640		BLD		37.050	39.800	1.5	1.5	2.0	9.230	12.57	0.000
CARPENTER 0.600		BLD		37.890	42.060	1.5	1.5	2.0	9.300	12.70	0.000
CARPENTER 0.490		HWY		42.630	44.380	1.5	1.5	2.0	8.600	11.00	0.000
CEMENT MASON 0.500		ALL		35.740	38.490	1.5	1.5	2.0	9.750	14.04	0.000
CERAMIC TILE FNSHER 0.560		BLD		32.850	0.000	1.5	1.5	2.0	8.600	5.210	0.000
COMMUNICATION TECH 0.760		BLD		36.440	40.080	1.5	1.5	2.0	10.39	12.09	0.000
ELECTRIC PWR EQMT OP 0.380		ALL		37.890	51.480	1.5	1.5	2.0	5.000	11.75	0.000
ELECTRIC PWR EQMT OP 0.390		HWY		39.220	53.290	1.5	1.5	2.0	5.000	12.17	0.000
ELECTRIC PWR GRNDMAN 0.290		ALL		29.300	51.480	1.5	1.5	2.0	5.000	9.090	0.000
ELECTRIC PWR GRNDMAN 0.300		HWY		30.330	53.290	1.5	1.5	2.0	5.000	9.400	0.000
ELECTRIC PWR LINEMAN 0.450		ALL		45.360	51.480	1.5	1.5	2.0	5.000	14.06	0.000
ELECTRIC PWR LINEMAN 0.470		HWY		46.950	53.290	1.5	1.5	2.0	5.000	14.56	0.000
ELECTRIC PWR TRK DRV 0.300		ALL		30.340	51.480	1.5	1.5	2.0	5.000	9.400	0.000
ELECTRIC PWR TRK DRV 0.310		HWY		31.400	53.290	1.5	1.5	2.0	5.000	9.730	0.000
ELECTRICIAN 0.860		BLD		42.960	47.260	1.5	1.5	2.0	10.39	17.47	0.000
ELEVATOR CONSTRUCTOR 0.600		BLD		46.830	52.680	2.0	2.0	2.0	13.57	14.51	3.770
GLAZIER 1.250		BLD		35.980	37.980	1.5	1.5	1.5	10.30	8.200	0.000
HT/FROST INSULATOR 0.480		BLD		33.930	38.550	0.0	0.0	0.0	7.950	14.77	0.000
IRON WORKER 0.500		ALL		36.290	38.100	2.0	2.0	2.0	10.24	23.19	0.000
LABORER 0.800		BLD		31.790	32.790	1.5	1.5	2.0	8.420	15.17	0.000
LABORER 0.800		HWY		34.340	35.090	1.5	1.5	2.0	8.420	17.42	0.000
LABORER, SKILLED 0.800		HWY		36.990	37.740	1.5	1.5	2.0	8.420	17.42	0.000
LATHER 0.600		BLD		37.890	42.060	1.5	1.5	2.0	9.300	12.70	0.000
MACHINIST 0.000		BLD		45.350	47.850	1.5	1.5	2.0	7.260	8.950	1.850
MARBLE FINISHERS 0.560		BLD		32.850	0.000	1.5	1.5	2.0	8.600	5.210	0.000
MARBLE MASON 0.590		BLD		35.530	35.780	1.5	1.5	2.0	8.600	7.520	0.000
MATERIAL TESTER I 0.800		ALL		33.560	0.000	1.5	1.5	2.0	8.240	16.39	0.000
MATERIALS TESTER II 0.800		ALL		33.560	0.000	1.5	1.5	2.0	8.240	16.39	0.000
MILLWRIGHT 0.500		BLD		37.220	40.940	1.5	1.5	2.0	9.050	15.00	0.000
OPERATING ENGINEER 1.300		BLD	1	48.300	47.800	2.0	2.0	2.0	17.55	11.80	2.350
OPERATING ENGINEER 1.300		BLD	2	43.100	47.800	2.0	2.0	2.0	17.55	11.80	2.350

OPERATING ENGINEER 1.300	BLD	3	40.650	47.800	2.0	2.0	2.0	17.55	11.80	2.350
OPERATING ENGINEER 1.300	BLD	4	38.650	47.800	2.0	2.0	2.0	17.55	11.80	2.350
OPERATING ENGINEER 1.300	BLD	5	47.550	47.800	2.0	2.0	2.0	17.55	11.80	2.350
OPERATING ENGINEER 1.300	BLD	6	46.800	47.800	2.0	2.0	2.0	17.55	11.80	2.350
OPERATING ENGINEER 1.300	BLD	7	43.800	47.800	2.0	2.0	2.0	17.55	11.80	2.350
OPERATING ENGINEER 1.300	HWY	1	43.650	47.650	1.5	1.5	2.0	17.55	11.80	2.350
OPERATING ENGINEER 1.300	HWY	2	43.100	47.650	1.5	1.5	2.0	17.55	11.80	2.350
OPERATING ENGINEER 1.300	HWY	3	41.800	47.650	1.5	1.5	2.0	17.55	11.80	2.350
OPERATING ENGINEER 1.300	HWY	4	40.350	47.650	1.5	1.5	2.0	17.55	11.80	2.350
OPERATING ENGINEER 1.300	HWY	5	38.900	47.650	1.5	1.5	2.0	17.55	11.80	2.350
OPERATING ENGINEER 1.300	HWY	6	46.650	47.650	1.5	1.5	2.0	17.55	11.80	2.350
OPERATING ENGINEER 1.300	HWY	7	44.650	47.650	1.5	1.5	2.0	17.55	11.80	2.350
PAINTER 1.350	ALL		36.500	38.500	1.5	1.5	1.5	10.30	8.460	0.000
PILEDRIIVER 0.600	BLD		38.890	43.170	1.5	1.5	2.0	9.300	12.70	0.000
PILEDRIIVER 0.490	HWY		42.630	44.380	1.5	1.5	2.0	8.600	11.00	0.000
PIPEFITTER 1.000	ALL		43.100	46.120	1.5	2.0	2.0	8.220	11.29	0.000
PIPEFITTER 1.000	BLD		43.100	46.120	1.5	1.5	2.0	8.220	11.29	0.000
PLASTERER 0.500	BLD		34.250	37.680	1.5	1.5	2.0	9.300	12.30	0.000
PLUMBER 1.000	ALL		43.100	46.120	1.5	2.0	2.0	8.220	11.29	0.000
PLUMBER 1.000	BLD		43.100	46.120	1.5	1.5	2.0	8.220	11.29	0.000
ROOFER 0.530	BLD		41.000	44.000	1.5	1.5	2.0	8.280	10.54	0.000
SHEETMETAL WORKER 0.290	BLD		37.930	40.210	1.5	1.5	2.0	6.000	16.92	0.520
SPRINKLER FITTER 0.350	BLD		37.120	39.870	1.5	1.5	2.0	8.420	8.500	0.000
STONE MASON 0.640	BLD		37.050	39.800	1.5	1.5	2.0	9.230	12.57	0.000
<del>SURVEY WORKER</del> 13.95 0.000 0.800	--> NOT IN EFFECT			ALL	35.650	36.400	1.5	1.5	2.0	8.240
TERRAZZO FINISHER 0.560	BLD		32.850	0.000	1.5	1.5	2.0	8.600	5.210	0.000
TERRAZZO MASON 0.590	BLD		35.530	35.780	1.5	1.5	2.0	8.600	7.520	0.000
TILE LAYER 0.600	BLD		37.890	42.060	1.5	1.5	2.0	9.300	12.70	0.000
TILE MASON 0.590	BLD		35.530	35.780	1.5	1.5	2.0	8.600	7.520	0.000
TRUCK DRIVER 0.200	ALL	1	35.020	0.000	1.5	1.5	2.0	8.600	8.600	0.000
TRUCK DRIVER 0.200	ALL	2	35.170	0.000	1.5	1.5	2.0	8.600	8.600	0.000
TRUCK DRIVER 0.200	ALL	3	35.370	0.000	1.5	1.5	2.0	8.600	8.600	0.000
TRUCK DRIVER 0.200	ALL	4	35.480	0.000	1.5	1.5	2.0	8.600	8.600	0.000
TUCKPOINTER 0.640	BLD		37.050	39.800	1.5	1.5	2.0	9.230	12.57	0.000

Legend:    RG (Region)  
TYP (Trade Type - All,Highway,Building,Floating,Oil & Chip,Rivers)  
C (Class)  
Base (Base Wage Rate)  
FRMAN (Foreman Rate)  
M-F>8 (OT required for any hour greater than 8 worked each day, Mon through Fri.  
OSA (Overtime (OT) is required for every hour worked on Saturday)  
OSH (Overtime is required for every hour worked on Sunday and Holidays)  
H/W (Health & Welfare Insurance)  
Pensn (Pension)  
Vac (Vacation)  
Trng (Training)

# Explanations

## WINNEBAGO COUNTY

The following list is considered as those days for which holiday rates of wages for work performed apply: New Years Day, Memorial Day, Fourth of July, Labor Day, Thanksgiving Day, Christmas Day and Veterans Day in some classifications/counties. Generally, any of these holidays which fall on a Sunday is celebrated on the following Monday. This then makes work performed on that Monday payable at the appropriate overtime rate for holiday pay. Common practice in a given local may alter certain days of celebration. If in doubt, please check with IDOL.

## EXPLANATION OF CLASSES

ASBESTOS - GENERAL - removal of asbestos material/mold and hazardous materials from any place in a building, including mechanical systems where those mechanical systems are to be removed. This includes the removal of asbestos materials/mold and hazardous materials from ductwork or pipes in a building when the building is to be demolished at the time or at some close future date.

ASBESTOS - MECHANICAL - removal of asbestos material from mechanical systems, such as pipes, ducts, and boilers, where the mechanical systems are to remain.

## CERAMIC TILE FINISHER, MARBLE FINISHER, TERRAZZO FINISHER

Assisting, helping or supporting the tile, marble and terrazzo mechanic by performing their historic and traditional work assignments required to complete the proper installation of the work covered by said crafts. The term "Ceramic" is used for naming the classification only and is in no way a limitation of the product handled. Ceramic takes into consideration most hard tiles.

## COMMUNICATIONS TECHNICIAN

Installing, manufacturing, assembling and maintaining sound and intercom, protection alarm (security), fire alarm, master antenna television, closed circuit television, low voltage control for computers and/or door monitoring, school communications systems, telephones and servicing of nurse and emergency calls, and the installation and maintenance of transmit and receive antennas, transmitters, receivers, and associated apparatus which operates in conjunction with above systems. All work associated with these system installations will be included EXCEPT the installation of protective metallic conduit in new construction projects (excluding less than ten-foot, runs strictly for protection of cable) and 120 volt AC (or higher) power wiring and associated hardware.

## LABORER, SKILLED - HIGHWAY

Individuals engaged in the following types of work, irrespective of the site of the work: asbestos abatement worker, handling of any materials with any foreign matter harmful to skin or clothing, track laborer, cement handlers, chloride handlers, the unloading and loading with steel workers and re-bars, concrete workers wet, tunnel helpers in free air, batch dumpers, mason tenders, kettle and tar men, tank cleaners, plastic installers, scaffold workers, motorized buggies or motorized unit used for wet concrete or handling of building materials, laborers with de-watering systems, sewer workers plus depth, rod and chainmen with technical engineers, rod and chainmen with land surveyors, rod and chainmen with surveyors, vibrator operators, cement silica, clay, fly ash, lime and plasters, handlers (bulk or bag), cofferdam workers plus depth, on concrete paving, placing, cutting and tying of reinforcing, deck hand, dredge hand, and shore laborers, bankmen on floating plant, grade checker, power tools, front end man on chip spreaders, cession workers plus depth, gunnite nozzle men, lead man on sewer work, welders, cutters, burners and torchmen, chainsaw operators, jackhammer and drill operators, layout man and/or drainage tile layer, steel form setter - street and highway, air tamping hammermen, signal man on crane, concrete saw operator, screedman on asphalt pavers, laborers tending masons with hot material or where foreign materials are used, mortar mixer operators, multiple concrete duct - leadsman, lumen, asphalt raker,



curb asphalt machine operator, ready mix scalemen (permanent, portable or temporary plant), laborers handling masterplate or similar materials, laser beam operator, concrete burning machine operator, coring machine operator, plaster tender, underpinning and shoring of buildings, pump men, manhole and catch basin, dirt and stone tamper, hose men on concrete pumps, hazardous waste worker, lead base paint abatement worker, lining of pipe, refueling machine, assisting on direct boring machine, the work of laying watermain, fire hydrants, all mechanical joints to watermain work, sewer worker, and tapping water service and forced lift station mechanical worker.

MATERIAL TESTER I: Hand coring and drilling for testing of materials; field inspection of uncured concrete and asphalt.

MATERIAL TESTER II: Field inspection of welds, structural steel, fireproofing, masonry, soil, facade, reinforcing steel, formwork, cured concrete, and concrete and asphalt batch plants; adjusting proportions of bituminous mixtures.

#### OPERATING ENGINEERS - BUILDING

Class 1. Asphalt Plant; Asphalt Spreader; Autograde; Backhoes with Caisson Attachment; Batch Plant; Benoto (requires Two Engineers); Boiler and Throttle Valve; Caisson Rigs; Central Redi-Mix Plant; Combination Back Hoe Front End-loader Machine; Compressor and Throttle Valve; Concrete Breaker (Truck Mounted); Concrete Conveyor; Concrete Paver (over 27E cu. ft.); Concrete Paver (27 cu. ft. and under); Concrete Placer; Concrete Pump (Truck Mounted); Concrete Conveyor (Truck Mounted); Concrete Tower; Cranes, All; GCI and similar types (required two operators only); Cranes, Hammerhead; Cretex Crane; Crusher, Stone, etc.; Derricks, All; Derricks, Traveling; Formless Curb and Gutter Machine; Grader, Elevating; Grouting Machines; Highlift Shovels or Front Endloader 2-1/4 yd. and over; Hoists, Elevators, outside type rack and pinion and similar machines; Hoists, one, two and three Drum; Hoists, Two Tugger One Floor; Hydraulic Backhoes; Hydraulic Boom Trucks; Hydro Vac (and similar equipment - excluding hose work and any sewer work); Locomotives, All; Lubrication Technician; Manipulators; Motor Patrol; Pile Drivers and Skid Rig; Post Hole Digger; Pre-Stress Machine; Pump Cretes Dual Ram; Pump Cretes: Squeeze Cretes - Screw Type Pumps, Gypsum Bulker and Pump; Raised and Blind Hole Drill; Rock Drill (self-propelled); Rock Drill - Truck Mounted; Roto Mill Grinder; Scoops - Tractor Drawn; Slipform Paver; Scrapers Prime Movers; Straddle Buggies; Tie Back Machine; Tractor with Boom and Side Boom; Trenching Machines.

Class 2. Bobcat (over 3/4 cu. yd.); Boilers; Brick Forklift; Broom, All Power Propelled; Bulldozers; Concrete Mixer (Two Bag and Over); Conveyor, Portable; Forklift Trucks; Highlift Shovels or Front Endloaders under 2-1/4 yd.; Hoists, Automatic; Hoists, Sewer Dragging Machine; Hoists, Tugger Single Drum; Laser Screed; Rollers, All; Steam Generators; Tractors, All; Tractor Drawn Vibratory Roller; Winch Trucks with "A" Frame.

Class 3. Air Compressor; Asphalt Spreader; Combination - Small Equipment Operator; Generators; Heaters, Mechanical; Hoists, Inside Elevators - (Rheostat Manual Controlled); Hydraulic Power Units (Pile Driving, Extracting, or Drilling - with a seat); Lowboys; Pumps, Over 3" (1 to 3 not to exceed total of 300 ft.); Pumps, Well Points; Welding Machines (2 through 5); Winches, 4 Small Electric Drill Winches; Bobcat (up to and including 3/4 cu. yd.).

Class 4. Elevator push button with automatic doors; Hoists, Inside; Oilers; Brick Forklift.

Class 5. Assistant Craft Foreman

Class 6. Mechanics; Welders.

Class 7. Gradall

#### OPERATING ENGINEERS - HIGHWAY CONSTRUCTION

Class 1. Asphalt Plant; Asphalt Heater and Planer Combination; Asphalt Heater Scarfire; Asphalt Silo Tender; Asphalt Spreader; Autograder; ABG Paver; Backhoes with Caisson Attachment; Ballast Regulator; Belt Loader; Caisson Rigs; Car Dumper; Central Redi-Mix Plant; Backhoe w/shear attachments; Combination Backhoe Front Endloader Machine, (1 cu. yd. Backhoe Bucket or over or with attachments); Concrete Breaker

(Truck Mounted); Concrete Conveyor; Concrete Paver over 27E cu. ft.; Concrete Placer; Concrete Tube Float; Cranes, all attachments; Cranes, Tower of all types; Creter Crane; Crusher, Stone, etc.; Derricks, All; Derrick Boats; Derricks, Traveling; Directional Boring Machine over 12"; Dredges; Formless Curb and Gutter Machine; Grader, Elevating; Grader, Motor Grader, Motor Patrol, Auto Patrol, Form Grader, Pull Grader, Subgrader; Guard Rail Post Driver Mounted; Hoists, One, Two and Three Drum; Hydraulic Backhoes; Hydro Vac, Self Propelled, Truck Mounted (excluding hose work and any sewer work); Lubrication Technician; Manipulators; Pile Drivers and Skid Rig; Pre-Stress Machine; Pump Cretes Dual Ram; Rock Drill - Crawler or Skid Rig; Rock Drill - Truck Mounted; Rock/Track Tamper; Roto Mill Grinder; Slip-Form Paver; Snow Melters; Soil Test Drill Rig (Truck Mounted); Straddle Buggies; GCI Crane; Hydraulic Telescoping Form (Tunnel); Tie Back Machine; Tractor Drawn Belt Loader; Tractor Drawn Belt Loader with attached pusher; Tractor with Boom; Tractaire with Attachments; Traffic Barrier Conveyor Machine; Raised or Blind Hole Drills; Trenching Machine (over 12"); Truck Mounted Concrete Pump with Boom; Truck Mounted Concrete Conveyor; Work Boat (no license required - 90 h.p. or above); Underground Boring and/or Mining Machines; Wheel Excavator; Widener (APSCO).

Class 2. Batch Plant; Bituminous Mixer; Boiler and Throttle Valve; Bulldozers; Car Loader Trailing Conveyors; Combination Backhoe Front Endloader Machine (less than 1 cu. yd. Backhoe Bucket or over or with attachments); Compressor and Throttle Valve; Compressor, Common Receiver (3); Concrete Breaker or Hydro Hammer; Concrete Grinding Machine; Concrete Mixer or Paver 7S Series to and including 27 cu. ft.; Concrete Spreader; Concrete Curing Machine, Burlap Machine, Belting Machine and Sealing Machine; Concrete Wheel Saw (large self-propelled - excluding walk-behinds and hand-held); Conveyor Muck Cars (Haglund or Similar Type); Drills, all; Finishing Machine - Concrete; Highlift Shovels or Front Endloader; Hoist - Sewer Dragging Machine; Hydraulic Boom Trucks (All Attachments); Hydro Blaster; All Locomotives, Dinky; Off-Road Hauling Units; Non-Self Loading Dump; Ejection Dump; Pump Cretes: Squeeze Cretes - Screw Type Pumps, Gypsum Bulker and Pump; Roller, Asphalt; Rotary Snow Plows; Rototiller, Seaman, etc., self-propelled; Scoops - Tractor Drawn; Self-Propelled Compactor; Spreader - Chip - Stone, etc.; Scraper; Scraper - Prime Mover in Tandem (Regardless of Size); Tank Car Heater; Tractors, Push, Pulling Sheeps Foot, Disc, Compactor, etc.; Tug Boats.

Class 3. Boilers; Brooms, All Power Propelled; Cement Supply Tender; Compressor, Common Receiver (2); Concrete Mixer (Two Bag and Over); Conveyor, Portable; Farm-Type Tractors Used for Mowing, Seeding, etc.; Fireman on Boilers; Forklift Trucks; Grouting Machine; Hoists, Automatic; Hoists, All Elevators; Hoists, Tugger Single Drum; Jeep Diggers; Low Boys; Pipe Jacking Machines; Post-Hole Digger; Power Saw, Concrete Power Driven; Pug Mills; Rollers, other than asphalt; Seed and Straw Blower; Steam Generators; Stump Machine; Winch Trucks with "A" Frame; Work Boats; Tamper - Form - Motor Driven.

Class 4. Air Compressor - Small and Large; Asphalt Spreader, Backend Man; Bobcat (Skid Steer) all; Brick Forklift; Combination - Small Equipment Operator; Directional Boring Machine up to 12"; Generators; Heaters, Mechanical; Hydraulic Power Unit (Pile Driving, Extracting, or Drilling); Hydro-Blaster; Light Plants, All (1 through 5); Pumps, over 3" (1 to 3 not to exceed a total of 300 ft.); Pumps, Well Points; Tractaire; Trencher 12" and under; Welding Machines (2 through 5); Winches, 4 Small Electric Drill Winches.

Class 5. Oilers and Directional Boring Machine Locator.

Class 6. Field Mechanics and Field Welders

Class 7. Gradall and machines of like nature.

SURVEY WORKER - Operated survey equipment including data collectors, G.P.S. and robotic instruments, as well as conventional levels and transits.

TRUCK DRIVER - BUILDING, HEAVY AND HIGHWAY CONSTRUCTION

Class 1. Two or three Axle Trucks. A-frame Truck when used for transportation purposes; Air Compressors and Welding Machines, including those pulled by cars, pick-up trucks and tractors; Ambulances; Batch Gate Lockers; Batch Hopperman; Car and Truck Washers; Carry-alls; Fork Lifts and Hoisters; Helpers; Mechanics Helpers and Greasers; Oil Distributors 2-man operation; Pavement Breakers; Pole Trailer, up to 40 feet; Power Mower Tractors; Self-propelled Chip Spreader; Skipman; Slurry Trucks, 2-man operation; Slurry Truck Conveyor Operation, 2 or 3 man; TTeamsters

Unskilled dumpman; and Truck Drivers hauling warning lights, barricades, and portable toilets on the job site.

Class 2. Four axle trucks; Dump Crets and Adgetors under 7 yards; Dumpsters, Track Trucks, Euclids, Hug Bottom Dump Turnapulls or Turnatrailers when pulling other than self-loading equipment or similar equipment under 16 cubic yards; Mixer Trucks under 7 yards; Ready-mix Plant Hopper Operator, and Winch Trucks, 2 Axles.

Class 3. Five axle trucks; Dump Crets and Adgetors 7 yards and over; Dumpsters, Track Trucks, Euclids, Hug Bottom Dump Turnatrailers or turnapulls when pulling other than self-loading equipment or similar equipment over 16 cubic yards; Explosives and/or Fission Material Trucks; Mixer Trucks 7 yards or over; Mobile Cranes while in transit; Oil Distributors, 1-man operation; Pole Trailer, over 40 feet; Pole and Expandable Trailers hauling material over 50 feet long; Slurry trucks, 1-man operation; Winch trucks, 3 axles or more; Mechanic--Truck Welder and Truck Painter.

Class 4. Six axle trucks; Dual-purpose vehicles, such as mounted crane trucks with hoist and accessories; Foreman; Master Mechanic; Self-loading equipment like P.B. and trucks with scoops on the front.

#### Other Classifications of Work:

For definitions of classifications not otherwise set out, the Department generally has on file such definitions which are available. If a task to be performed is not subject to one of the classifications of pay set out, the Department will upon being contacted state which neighboring county has such a classification and provide such rate, such rate being deemed to exist by reference in this document. If no neighboring county rate applies to the task, the Department shall undertake a special determination, such special determination being then deemed to have existed under this determination. If a project requires these, or any classification not listed, please contact IDOL at 217-782-1710 for wage rates or clarifications.

#### LANDSCAPING

Landscaping work falls under the existing classifications for laborer, operating engineer and truck driver. The work performed by landscape plantsman and landscape laborer is covered by the existing classification of laborer. The work performed by landscape operators (regardless of equipment used or its size) is covered by the classifications of operating engineer. The work performed by landscape truck drivers (regardless of size of truck driven) is covered by the classifications of truck driver.

# **AIA® Document A201™ – 2007**

## ***General Conditions of the Contract for Construction***

### **for the following PROJECT:**

Rockford Public Schools Master Facilities Plan Construction  
General Conditions template

### **THE OWNER:**

*(Name, legal status and address)*

Board Of Education of Rockford School District No.205 Winnebago and Boone Counties  
Illinois

### **THE ARCHITECT:**

*(Name, legal status and address)*

### **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.

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## **ARTICLE 1 GENERAL PROVISIONS**

### **§ 1.1 BASIC DEFINITIONS**

#### **§ 1.1.1 THE CONTRACT DOCUMENTS**

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive or (4) a written order for a minor change in the Work issued by the Architect. The Contract Documents include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of Addenda relating to bidding requirements.

#### **§ 1.1.2 THE CONTRACT**

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

#### **§ 1.1.3 THE WORK**

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

#### **§ 1.1.4 THE PROJECT**

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

#### **§ 1.1.5 THE DRAWINGS**

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

#### **§ 1.1.6 THE SPECIFICATIONS**

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

#### **§ 1.1.7 INSTRUMENTS OF SERVICE**

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

#### **§ 1.1.8 INITIAL DECISION MAKER**

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

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

**§ 1.2.1** The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all.

**§ 1.2.2** Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.



§ 1.2.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

### § 1.3 CAPITALIZATION

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

### § 1.4 INTERPRETATION

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

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

§ 1.5.1 The Owner shall be deemed the owner of the 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 prior written consent of the Owner.

### § 1.6 TRANSMISSION OF DATA IN DIGITAL FORM

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

## ARTICLE 2 OWNER

### § 2.1 GENERAL

§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization except where otherwise required by law or Owners policy or practice. 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.

§ 2.1.3 Owner has procured and contracted with a Program Manager for this project. Program Manager is responsible to the Owner for overall project management. In all cases where notice is required or permitted to be given under the Agreement, a copy is to be furnished to Program Manager. The Program Manager is the Owner's agent (provided, the Owner does not delegate to Program Manager any statutory powers and authority nor the authority to bind the Owner absent express consent in each instance approved by the Owner's Board of Education). Contractor will interact with the Program Manager in the same manner as with the Owner.

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

§ 2.2.1 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.



§ 2.2.2 The Owner may furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

§ 2.2.3 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.

§ 2.2.4 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.

*(Paragraph deleted)*

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

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

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

### ARTICLE 3 CONTRACTOR

#### § 3.1 GENERAL

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

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

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

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

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

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.2.3, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall



promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

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

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

### **§ 3.3 SUPERVISION AND CONSTRUCTION PROCEDURES**

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

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

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

### **§ 3.4 LABOR AND MATERIALS**

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

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

**§ 3.4.3** The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them.



### § 3.5 WARRANTY

The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects. 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 or Program Manager, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

### § 3.6 TAXES

The Contractor shall pay consumer, use and similar taxes for the Work provided by the Contractor, as and when due, 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 permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded.

§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work.

§ 3.7.3 If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

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

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

### § 3.8 ALLOWANCES

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

§ 3.8.2 Unless otherwise provided in the Contract Documents,

- .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 full-time superintendent and necessary assistants who shall be in attendance at each Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner, Program Manager and 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, Program Manager or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

### § 3.10 CONTRACTOR'S CONSTRUCTION SCHEDULES

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall prepare and submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall not exceed time limits current under the Contract Documents, shall be revised at appropriate intervals as required by the conditions of the Work and Project, shall be related to the entire Project to the extent required by the Contract Documents, and shall provide for expeditious and practicable execution of the Work.

§ 3.10.2 The Contractor shall prepare a submittal schedule, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, and shall submit the schedule(s) for the Architect's approval. The Architect's approval shall not unreasonably be delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

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

### § 3.11 DOCUMENTS AND SAMPLES AT THE SITE

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

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

§ 3.12.1 Shop Drawings are drawings, diagrams, schedules and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier or distributor to illustrate some portion of the Work.

§ 3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.



§ 3.12.3 Samples are physical examples that illustrate materials, equipment or workmanship and establish standards by which the Work will be judged.

§ 3.12.4 Shop Drawings, Product Data, Samples and similar submittals are not Contract Documents. Their purpose is to demonstrate the way by which the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve and submit to the Architect Shop Drawings, Product Data, Samples and similar submittals required by the Contract Documents in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of separate contractors.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

§ 3.12.7 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples or similar submittals until the respective submittal has been approved by the Architect.

§ 3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples or similar submittals unless the Contractor has specifically informed the Architect in writing of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples or similar submittals by the Architect's approval thereof.

§ 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such written notice, the Architect's approval of a resubmission shall not apply to such revisions.

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



### § 3.13 USE OF SITE

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

### § 3.14 CUTTING AND PATCHING

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

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

### § 3.15 CLEANING UP

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

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

### § 3.16 ACCESS TO WORK

The Contractor shall provide the Owner, its administrators and Board Members, the Program Manager 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, Program Manager 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 and Program Manager.

### § 3.18 INDEMNIFICATION

§ 3.18.1 To the fullest extent permitted by law the Contractor shall indemnify and hold harmless the Owner, Program Manager 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 acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Section 3.18.

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



## ARTICLE 4 ARCHITECT

### § 4.1 GENERAL

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

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

§ 4.1.3 If the employment of the Architect is terminated, the Owner may employ a successor architect whose status under the Contract Documents shall be that of the Architect.

### § 4.2 ADMINISTRATION OF THE CONTRACT

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

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

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

### § 4.2.4 COMMUNICATIONS FACILITATING CONTRACT ADMINISTRATION

Except as otherwise provided in the Contract Documents or when direct communications have been specially authorized, the Owner and Contractor shall endeavor to communicate with each other through the Program Manager 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 or Program Manager.

§ 4.2.5 Based on the Architect's evaluations of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.5.2 and 13.5.3, whether or not such Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, material and equipment suppliers, their agents or employees, or other persons or entities performing portions of the Work.

§ 4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and



completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5 and 3.12. The Architect's review shall not constitute approval of safety precautions or, unless otherwise specifically stated by the Architect, of any construction means, methods, techniques, sequences or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

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

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

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

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

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

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

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

## ARTICLE 5 SUBCONTRACTORS

### § 5.1 DEFINITIONS

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

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

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

§ 5.2.1 Unless otherwise stated in the Contract Documents or the bidding requirements, the Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Program Manager with a copy to the Architect the names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for each principal portion of the Work. The Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to any such



proposed person or entity or (2) that the Architect requires additional time for review. Failure of the Owner or Architect to reply within the 14-day period shall constitute notice of no reasonable objection.

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

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

§ 5.2.4 The Contractor shall not substitute a Subcontractor, person or entity previously selected if the Owner or Architect makes reasonable objection to such substitution.

### § 5.3 SUBCONTRACTUAL RELATIONS

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

### § 5.4 CONTINGENT ASSIGNMENT OF SUBCONTRACTS

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

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

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

§ 5.4.2 Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation may, in the sole discretion of the Owner, be equitably adjusted for increases in cost resulting from the suspension.

§ 5.4.3 Upon such assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity. If the Owner assigns the subcontract to a successor contractor or other entity, the Owner shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.



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

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

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

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

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

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

### **§ 6.2 MUTUAL RESPONSIBILITY**

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

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

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

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

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

### **§ 6.3 OWNER'S RIGHT TO CLEAN UP**

If a dispute arises among the Contractor, separate contractors and the Owner as to the responsibility for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up the actual cost of which to the Owner shall be deducted from monies due Contractor at any time under the Agreement.

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

### **§ 7.1 GENERAL**

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



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

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

## § 7.2 CHANGE ORDERS

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

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

## § 7.3 CONSTRUCTION CHANGE DIRECTIVES

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

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

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

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

§ 7.3.4 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed in a proposed Change Order or Construction Change Directive so that application of such unit prices to quantities of Work proposed will cause substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

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

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

§ 7.3.7 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the method and the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.7 shall be limited to the following:



- .1 Costs of labor, including social security, old age and unemployment insurance, fringe benefits required by agreement or custom, and workers' compensation insurance;
- .2 Costs of materials, supplies and equipment, including cost of transportation, whether incorporated or consumed;
- .3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;
- .4 Costs of premiums for all bonds and insurance, permit fees, and sales, use or similar taxes related to the Work; and
- .5 Additional costs of supervision and field office personnel directly attributable to the change.

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be reasonably justified. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

§ 7.3.10 When the Owner and Contractor agree with a determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Architect will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

#### § 7.4 MINOR CHANGES IN THE WORK

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

### ARTICLE 8 TIME

#### § 8.1 DEFINITIONS

§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

§ 8.1.2 The date of commencement of the Work is the date established in the Agreement.

§ 8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8.

§ 8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

§ 8.1.5 The term "School Day" when used in any Contract Documents including documents issued following execution of the Agreement shall mean those student attendance days during the Owner's "School Year" which is defined as the period of July 1 to the following June 30 of any year.

#### § 8.2 PROGRESS AND COMPLETION

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, prematurely commence operations on the site or elsewhere prior to the effective date of insurance required by Article 11 to be furnished by the Contractor and Owner. The date of commencement of the Work shall not be changed by the effective date of such insurance.



§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

### § 8.3 DELAYS AND EXTENSIONS OF TIME

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by an act or neglect of the Owner or Architect, or of an employee of either, or of a separate contractor employed by the Owner; or by changes ordered in the Work; or by labor disputes, fire, unusual delay in deliveries, unavoidable casualties or other causes beyond the Contractor's control; or by delay authorized by the Owner pending mediation and arbitration; or by other causes that the Architect determines may justify delay, then the Contract Time shall be extended by Change Order for such reasonable time as the Architect may determine.

§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15.

§ 8.3.3 This Section 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.

## ARTICLE 9 PAYMENTS AND COMPLETION

### § 9.1 CONTRACT SUM

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

### § 9.2 SCHEDULE OF VALUES

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

### § 9.3 APPLICATIONS FOR PAYMENT

§ 9.3.1 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 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.

*(Paragraph deleted)*

§ 9.3.2 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.

*(Paragraph deleted)*

### § 9.4 CERTIFICATES FOR PAYMENT

§ 9.4.1 The Architect will, within ten 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. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work, (2) reviewed construction means, methods, techniques, sequences or procedures, (3) reviewed copies of requisitions received from Subcontractors and material suppliers and other data requested by the Owner to substantiate the Contractor's right to payment, or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

#### § 9.5 DECISIONS TO WITHHOLD CERTIFICATION

§ 9.5.1 The Architect may withhold a Certificate for Payment in whole or in part at the Owner's request, or 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 agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the agreed 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 upon Contractor's application for payment in due form for which the Architect issues an approved certificate for payment and subject to the payment procedures identified in the Addendum attached hereto..

§ 9.5.3 If the Architect withholds certification for payment under Section 9.5.1.3, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or material or equipment suppliers to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Architect will reflect such payment on the next Certificate for Payment.

#### § 9.6 PROGRESS PAYMENTS

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

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

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



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

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

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

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

## § 9.7

*(Paragraphs deleted)*

### **SUBSTANTIAL COMPLETION**

§ 9.7.1 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.

§ 9.7.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 9.7.3 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.

§ 9.7.4 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.

§ 9.7.5 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 PARTIAL OCCUPANCY OR USE**

§ 9.8.1 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.

**§ 9.8.2** 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.

**§ 9.8.3** 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.

*(Paragraphs deleted)*

### **§ 9.9 FINAL COMPLETION AND FINAL PAYMENT**

**§ 9.9.1** 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.

**§ 9.9.2** 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.

**§ 9.9.3** 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.

*(Paragraphs deleted)*

**§ 9.9.4** 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

Init.



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

§ 9.9.5 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.

§ 10.2.5 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 3.1.8.

§ 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 and accepted by Owner and Architect.

§ 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

### § 10.2.8 INJURY OR DAMAGE TO PERSON OR PROPERTY

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



### § 10.3 HAZARDOUS MATERIALS

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

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

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

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

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

*(Paragraph deleted)*

### § 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:

Init.



- .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. 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, Program Manager, 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

*(Paragraphs deleted)*

### PROPERTY INSURANCE

*(Paragraphs deleted)*

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

*(Paragraphs deleted)*

§ 11.2.1.1 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)*

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

*(Paragraph deleted)*

§ 11.2.1.3 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.

*(Paragraph deleted)*

#### § 11.2.2 BOILER AND MACHINERY INSURANCE

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

*(Paragraphs deleted)*

#### § 11.2.3 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.

*(Paragraph deleted)*

§ 11.2.4 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.

*(Paragraph deleted)*

§ 11.2.5 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.

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

#### § 11.2.7 WAIVERS OF SUBROGATION

The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents and employees, each of the other, and (2) the Architect, Architect's consultants, separate contractors described in Article 6, if any, and any of their subcontractors, sub-subcontractors, agents and employees, for damages caused by fire or other causes of loss to the extent covered by property insurance obtained pursuant to this Section 11.3 or other property insurance applicable to the Work, except such rights as they have to proceeds of such insurance held by the



Owner as fiduciary. The Owner or Contractor, as appropriate, shall require of the Architect, 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.

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

§ 11.2.9 If required in writing by a party in interest, the Owner as fiduciary shall, upon occurrence of an insured loss, give bond for proper performance of the Owner's duties. The cost of required bonds shall be charged against proceeds received as fiduciary. The Owner shall deposit in a separate account proceeds so received, which the Owner shall distribute in accordance with such agreement as the parties in interest may reach, or as determined in accordance with the method of binding dispute resolution selected in the Agreement between the Owner and Contractor. If after such loss no other special agreement is made and unless the Owner terminates the Contract for convenience, replacement of damaged property shall be performed by the Contractor after notification of a Change in the Work in accordance with Article 7.

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

#### § 11.4 PERFORMANCE BOND AND PAYMENT BOND

§ 11.4.1 The Contractor shall furnish bonds covering faithful performance of the Contract and payment of obligations arising thereunder in an amount equal to 100.00% of the bid award of bid number 13-16.

§ 11.4.2 The Contractor shall furnish a copy of the bonds at the time of execution of the Agreement.

### 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 except that, if the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.

### **§ 13.2 SUCCESSORS AND ASSIGNS**

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

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



### § 13.3 WRITTEN NOTICE

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

### § 13.4 RIGHTS AND REMEDIES

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

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

### § 13.5 TESTS AND INSPECTIONS

§ 13.5.1 Tests, inspections and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner unless otherwise specified in the Contract documents 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 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.

*(Paragraphs deleted)*

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## 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;

*(Paragraphs deleted)*

§ 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. § 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon thirty days' written notice to the Owner, Program Manager and Architect, terminate the Contract and recover from the Owner payment for Work completed.

*(Paragraphs deleted)*

### § 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 breach of a provision of the Contract Documents.

§ 14.2.2 When any of the above reasons exist, the Owner may without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' 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 may be adjusted by Owner in Owner's sole discretion 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 completed.

### **ARTICLE 15 CLAIMS AND DISPUTES**

#### **§ 15.1 CLAIMS**

##### **§ 15.1.1 DEFINITION**

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

##### **§ 15.1.2 NOTICE OF CLAIMS**

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

##### **§ 15.1.3 CONTINUING CONTRACT PERFORMANCE**

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

##### **§ 15.1.4 CLAIMS FOR ADDITIONAL COST**

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

##### **§ 15.1.5 CLAIMS FOR ADDITIONAL TIME**

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

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

##### **§ 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

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- .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, 11.2.9, and 11.2.10, 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 (provided that neither party hereto is bound to proceed to mediation) of any Claim arising prior to the date final payment is due, unless 30 days have passed after the Claim has been referred to the Initial Decision Maker with no decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

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

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

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

§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties; provided that the parties may each independently agree to submit the claim to mediation and or arbitration however, such agreement must be mutual by all parties to the Agreement. The claim may also be submitted by either party to a court of competent jurisdiction for enforcement of the Agreement terms.

§ 15.2.6 Either party may request voluntary mediation of an initial decision at any time.

*(Paragraph 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.



### § 15.3 MEDIATION

§ 15.3.1 The parties may by their independent agreement on a case by case basis agree to submit any one or more 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 to mediation. Each party must agree in writing to the submission of any claim, dispute or other matter in controversy to mediation. Notwithstanding anything to the contrary set forth in this Agreement, no party to this Agreement is required or mandated to submit to mediation. Submission to mediation is not a prerequisite to voluntary arbitration nor to submission of claims, disputes or other matters in controversy to a court of competent jurisdiction.

§ 15.3.2 If the parties independently agree to mediation, mediation shall be conducted by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement and shall be conducted in Rockford, Illinois. The parties shall jointly submit a mediation request if both agree to mediation.

§ 15.3.3 The parties shall share the mediator's fee and any filing fees equally. 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, The parties may, but are not required, to agree to submit a dispute to binding arbitration. Any agreement to arbitrate must be the subject of an agreement to proceed to arbitration in writing signed by all parties to this Agreement. The agreement to arbitrate shall set forth with specificity all matters in controversy being submitted to arbitration. Arbitration if agreed to by the parties hereto shall be administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules in effect on the date of the Agreement.

*(Paragraph deleted)*

§ 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.

*(Paragraph deleted)*

### § 15.4.4 SUBMISSION TO COURT

The parties agree, absent the express agreement of the parties to submit a matter to mediation or arbitration, the means of dispute resolution shall be submission to a court of competent jurisdiction. This Agreement shall be interpreted in accordance with the laws of the state of Illinois and venue for all purposes shall lie in the Circuit court of the 17th Judicial Circuit, Winnebago County Illinois.

*(Paragraphs deleted)*

FORM FOR REFERENCE

**ADDENDUM**

**ADDENDUM TO A CERTAIN CONTRACT FOR CONSTRUCTION BY AND BETWEEN \_\_\_\_\_  
[CONTRACTOR] \_\_\_\_\_ AND THE BOARD OF EDUCATION OF  
ROCKFORD SCHOOL DISTRICT No. 205, WINNEBAGO AND BOONE COUNTIES, ILLINOIS**

**THIS ADDENDUM IS ATTACHED TO AND MADE A PART OF SUCH CONTRACT**

This Addendum is attached to and made a part of the contract for construction (Agreement) dated \_\_\_\_  
\_\_\_\_\_ between \_\_\_\_\_ (Contractor) (\_\_\_\_\_  
\_\_\_\_\_) Project-IFB\_\_\_\_-\_\_\_\_) and the Board of Education of Rockford School  
District No. 205, Winnebago and Boone Counties, Illinois (District).

**1. Conflict.**

In the event of conflict between the terms of the Agreement and this Addendum, the terms of this Addendum shall govern.

**2. Certifications.**

Upon or prior to execution of this Addendum, Contractor shall deliver to the District the following fully executed Certifications in the form as advertised by the District or as otherwise required by the District:

1. Certificate regarding Debarment, Suspension, Ineligibility, and Voluntary Exclusion;
2. Bid Rigging Certification;
3. Certificate Regarding Lobbying;
4. Certification regarding the Office of Foreign Asset Control;
5. Certified Cleared Employee List;
6. Vendor Conflict of Interest Disclosure Form.

By execution of this Addendum, Contractor represents and warrants that the certifications set forth in certificates 1, 2, 3, 4, 5 and 6 shall remain true at all times during the existence of this Addendum and the Agreement and shall immediately notify the District in the event Contractor becomes subject to debarment, suspension, ineligibility, or voluntarily excludes itself from federal programs; or, becomes barred from participation in public contracts due to a violation of the bid-rigging or bid-rotating statutes of the State of Illinois, or in the event an employee of Contractor becomes ineligible to be present on District grounds.

Contractor further certifies by execution of this Agreement that it shall comply, if the Project is funded in whole or in part with federal grant funds, with the Pilot Program for Enhancement of Employee Whistleblower Protection applicable to Contractors under federal grant funded programs as specified in the National Defense Authorization Act (NDAA) for Fiscal Year (FY) 2013 (Pub. L. 112-239, enacted January 2, 2013). Contractor shall comply with the following requirements of such Act if providing services funded by federal grants:

1. Inform its employees working on the Projects they are subject to the Whistleblower rights and remedies of the pilot program;
2. Inform its employees in writing of employee whistleblower protections under 41 U.S.C. §4712 in the predominantly native language of the workforce; and
3. Include such requirements in and agreements made with any subcontractor.

Whistleblower rights include that an employee of a Consortium may not be discharged, demoted, or otherwise discriminated against as a reprisal for "Whistleblowing"; and such rights cannot be waived by



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agreement, policy, form or condition of employment. Whistleblowing is defined as making a disclosure to an authorized person or entity that the employee reasonably believes is evidence of:

1. Gross mismanagement of a federal contract or grant;
2. A gross waste of federal funds;
3. An abuse of authority relating to a federal contract or grant;
4. A substantial and specific danger to public health or safety; or
5. A violation of law, rule, or regulation related to a federal contract or grant (including competition for, or negotiation of, a contract or grant).

### **3. Conflict of Interest.**

Contractor and its officers, employees and agents shall at all times during the duration of this Addendum and the Agreement refrain from violation of conflict of interest statutes in the state of Illinois.

### **4. Illinois Use Tax.**

Contractor shall require in applicable circumstances that all vendors who supply goods or services to Contractor in the performance of its obligations under the Addendum and Agreement will comply with the terms of 105 ILCS 5/10-20.21(b) relating to Illinois Use Tax.

### **5. Employment Costs and Compliance with Laws.**

Contractor shall keep and perform and be solely responsible for all the duties and responsibilities of an employer in the state of Illinois including without limitation providing and paying for Unemployment Compensation coverage and Workers Compensation coverage for its employees. Contractor herewith stipulates and agrees that all persons acting by and through Contractor are employees of Contractor or its consultants, and not the District, and Contractor shall keep and hold harmless the District from and against any and all claims relating to employment matters of Contractor employees. Contractor herewith expressly stipulates and agrees that it will adhere to and abide by all Federal, State and local laws, ordinances, regulations and rules applicable to its performance under the Addendum and Agreement. Contractor is an "independent contractor" and the Agreement and this Addendum shall not create nor infer an employer/employee relationship between the District and Contractor. Contractor shall bear all risk of loss and remain liable for any Federal or State Income, Social Security, Unemployment Compensation and Workers Compensation taxes, contributions or deductions and shall indemnify the District, its Board members, agents, officers, employees, successors and assigns for any liability including interest and penalties and attorney's fees, if any, assessed against the District as a result of any violation of this provision.

### **6. Access to School Grounds, Activities and Conduct.**

All of Contractor's employees, agents, principals, and consultants shall abide by Federal, State and Local Laws and Board of Education policy while on District premises. No employee, agent or principal of Contractor and its consultants and vendors shall fraternize with any student of the school district. Any employee whose conduct is judged unfit by District shall not be permitted to work on the Projects. Contractor agrees to comply with and abide by all rules, regulations and policies of the District and the direction of any District representative relating to access to and conduct upon District Premises.

Contractor employees, agents and principals and its consultants and consultants employees and agents shall not perform work within District buildings for more than 30 school days within any school year (July 1 to June 30) unless a criminal history records check has been conducted by Contractor, the individual(s) is found to have not violated any of the drug or criminal offenses listed in the criminal history records check provisions in the School Code 105 ILCS 5/10-21.9(f) (the Act), and the Contractor so certifies the same to be true on the Certified Cleared Employee List. Contractor employees, agents and principals and its consultants and consultant's employees and agents shall not be permitted to be present on District

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grounds unless a Statewide Sex Offender Database check and a Statewide Child Murderer and Violent Offender Against Youth Database check has been conducted regarding all such employees in accordance with and subject to the provisions of the Act. Contractor employees, agents and principals and its consultants and consultant's employees and agents who are found to have had convictions of the enumerated criminal or drug offenses listed in the Act or who appear in the noted databases shall not be permitted at any time to be present on school grounds.

All persons accessing school grounds pursuant to this Addendum and the Agreement are required to have in their possession identification issued by the District. All such persons must check in with the school main office to receive a visitor's identification at which time the individual must present a government issued photo identification which will be used to verify the individual's name appears on the Certified Cleared Employee List. At the conclusion of the work day, plastic or hard cover identification must be returned to the school.

Not less than 10 days prior to the commencement of work, Contractor shall submit to the District a written certification on a form provided by the District (Certified Cleared Employee List), signed by Contractor under oath that the employees listed on the certification have been the subject of a criminal history records check (for employees working more than 30 school days in District buildings), and a Statewide Sex Offender Database check and a Statewide Child Murderer and Violent Offender Against Youth Database check for all employees accessing District grounds. Contractor shall update the certification as and when necessary to keep such certification list current.

The District and Program Manager, if any, may from time to time and at multiple times in their discretion and without notice check the identification of all persons accessing school grounds by or through the Contractor to assure such persons appear on the certification list and have in their possession a valid District issued identification. Contractor warrants that it shall immediately notify the District if a certified cleared employee is convicted of an enumerated offense or their name appears on any of the noted Databases. A violation of this section 6 is a material breach of contract.

### **7. Certifications of Hours Worked.**

In all circumstances where Contractor seeks payment based upon an hourly rate for itself or its consultants, time cards or time records of such person or persons for whom such hourly rate compensation is requested shall be kept and maintained by Contractor. At any time or times, at the election of the District, the District may inspect and audit all time records kept by Contractor. Each submission of requests for payment of hourly rate amounts shall be accompanied by a certification under oath that the payment requested is for time actually worked which has been verified by Contractor.

### **8. Drugs, Alcohol and Smoking.**

The District maintains a drug and alcohol free workplace. Contractor shall prohibit the use of drugs and alcohol on District premises at all times. The District also maintains all its properties as smoke free, tobacco free environments. Smoking and tobacco use (including chewing tobacco and snuff) is not permitted on any District property; Contractor shall require all its employees, agents and representatives and its consultants to refrain from smoking and tobacco use on District property.

**8.01** No Contractor employee, agent, representative, consultant and consultant's employees, agents and representatives may use, possess, distribute, deliver, or be under the influence of a drug, or use or be under the influence of alcohol, while performing work on a public works project. An employee is considered to be under the influence of alcohol for purposes of this Act (820 ILCS 265) if the alcohol concentration in his or her blood or breath at the time alleged as shown by analysis of the employee's blood or breath is at or above 0.02.

**8.02** Contractor acknowledges and agrees that the provisions and requirements established by the Substance Abuse Prevention on Public Works Projects Act has been complied with and



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Contractor has in place all requirements for testing of its employees suspected of or challenged to be tested by the District as provided under the Act (820 ILCS 265).

### **9. Contract Payments.**

All contract payments shall be processed in the manner specified in the Agreement. The Board of Education regular meetings generally occur on the second and fourth Tuesdays of each month as specified by the Board Calendar. The Board Calendar may be accessed at the District web site [www.rps205.com](http://www.rps205.com). Payment applications by the Contractor must be received in the District Finance Department not less than 10 calendar days prior to a scheduled Board meeting for the approved application for payment to be considered at that Board meeting.

The Board of Education will comply with the provisions of the Local Government Prompt Payment Act, 50 ILCS 515/1.

### **10. Records Maintenance and Security.**

A. Records. The Contractor shall establish and maintain a reasonable accounting system that enables the District to readily identify Contractor's assets, expenses, costs of goods and use of funds related to the Project (the Records). Such Records shall include, but not limited to, accounting records, written policies and procedures; all paid vouchers, including those for out-of-pocket expenses, other reimbursement supported by invoices; ledgers; cancelled checks; deposit slips, bank statements; journals; original estimates; estimating work sheets; contract amendments and change order files; back-charge logs and supporting documentation; insurance documents, payroll documents; timesheets; memoranda; and correspondence.

B. Retention. The Contractor shall, at all times during its performance of the Project and for a period of seven years after the completion of the Project, maintain Records, together with all supporting or underlying documents and materials. The Contractor shall upon written request by the District at any time or times, whether during or after completion of the Project, and at the Contractor's expense, produce the Records for inspection, copying and audit (including copies and extracts of records as required) by the District. The Records shall be made available to the District, upon three-day written notice, during normal business hours at Contractor's principal office if located in Rockford, Illinois or at such other location specified by the District including the District offices. Upon expiration of the retention period specified in this paragraph 10B, prior to destruction of the Records, Contractor shall provide not less than 30 days written notice of its intent to destroy any part or all of the Records, specifying the nature, character and extent of Records to be destroyed and the District may at its discretion and expense obtain all Records or copies of Records intended to be destroyed. The Contractor shall ensure the District's right to access and audit the Records in the possession of, created or maintained by Contractor and Contractor's agents and representatives. Contractor shall notify in writing its agents and representatives of the requirements of records, retention and audit as set forth in this paragraph 10. Any and all contracts or agreements between Contractor and any other party related to the Project shall expressly include the records, retention and audit provisions of this paragraph 10.

C. Audit. The District and its authorized representatives shall have the right to audit, to examine, and to make copies of or extracts from all Records (in whatever form they may be kept, whether written, electronic, or other), including, but not limited to, those kept by the Contractor, its agents and representatives. Cost of any examination or audit of Records conducted by the District will be borne by the District (excluding any cost to produce Records under paragraph 10B), except where the examination or audit identifies overpricing or overcharges (of any nature) by the Contractor to the District in excess of one-half of one percent (0.5%) of the total contract billings in which event the entire cost of the examination or audit shall be Contractor's cost and Contractor shall reimburse the District for the total cost of the examination or audit. If the examination or audit reveals substantive findings of fraud, misrepresentation, or non-performance by Contractor, its employees, agents or representatives, the Contractor shall pay all costs of the examination or audit; and if paid by the District, reimburse the District for all such costs. In the

## FORM FOR REFERENCE

event Contractor fails to pay such costs within 30 days of demand by the District, District may offset any such costs unpaid by Contractor from any balance due Contractor by the District or at the election of the District proceed to collect such costs by any available means including litigation in which event the costs of collection including reasonable attorney's fees shall also be paid by Contractor.

D. **Records ownership and security.** Contractor hereby acknowledges and agrees that all records and documents, whether in electronic or written form or otherwise, received by Contractor from the District and all records, whether in electronic or written form or otherwise, created by Contractor in performance of its obligations under the Agreement shall be and remain owned by the District. Contractor shall use all reasonable and timely means to protect and preserve all such records and to deliver the same to the District upon demand. The Records are subject to access and examination by the District and any federal agency with relevant responsibility for any federal grant funds providing funding for the Project. Contractor shall cooperate and produce all records of the Project for inspection and examination by any governmental agency, including District, providing funding for the Program.

E. **Confidentiality.** The Records and all documents and information received, accessed or observed by Contractor in performance of the Agreement shall be and remain confidential. In the performance of its obligations under the Agreement Contractor may acquire access to certain information, including but not limited to, information concerning students and/or school personnel, and other confidential and/or proprietary information (collectively, "Confidential Information"). Contractor will not, without the prior written consent of the Board, and regarding student record information, without the express prior written consent of the parent/guardian, disclose, re-disclose or make available to anyone, at any time, either during Contractor's engagement with the Board or following termination of this Agreement, for any reason whatsoever, any of the Confidential Information. The provisions of this Section shall survive the termination of the Agreement.

### **11. Miscellaneous.**

**11.1** To the fullest extent permitted by applicable law, Contractor and its employees and consultants shall and do agree to indemnify and hold harmless the District, and its respective Board members, officers, directors, and employees from and against all claims, damages, losses, causes of action, suits, judgments and expenses, including reasonable attorney's fees, to the extent arising out of, caused by or resulting from the performance or non-performance of the Contractor regarding work under the Agreement caused in whole or in part by any negligent act or omission of Contractor, anyone directly or indirectly employed by it or anyone for whose acts it may be liable even if caused in part by District. This paragraph shall be construed in accordance with the Construction Contract Indemnification for Negligence Act (740 ILCS 35/1).

**11.2** Notwithstanding any other provision in any document, the District shall not, in any manner, be deemed or intended to have waived any claim by making a payment of any amount.

**11.3** The Certificate of Insurance and all insurance policies required to be obtained by Contractor shall provide that coverages afforded under the policies will not be cancelled, reduced or allowed to expire without at least thirty (30) days prior written notice to the District.

**11.4** Under no circumstances shall the District be deemed to have waived any of the insurance requirements of this Agreement by any action or omission.

**11.5** Subject to the waiver of subrogation as may otherwise apply by agreement, nothing contained in the insurance requirements of the Agreement is to be construed as limiting the liability of Contractor or any of its insurance carriers. District does not represent that the coverages or limits of insurance specified is sufficient or adequate to protect the District or Contractor's interest or liabilities but are mere minimums. The obligation of Contractor to purchase insurance shall not limit its obligations to the District in the event the District should suffer an injury or loss in excess of the amount recoverable through insurance, or any loss or portion of loss which is not covered by insurance.



## FORM FOR REFERENCE

**11.6** Contractor shall notify District, in writing, of any actual or potential claim for personal injury or property damage relating to the Project and of any occurrence which might give rise to such claim, promptly upon receiving first knowledge of same.

**11.7** Contractor agrees to fully comply with the requirements of the Illinois Human Rights Act, 775 ILCS 5/1-101 et. seq. including but not limited to the provisions regarding sexual harassment policies and procedures under Section 2-105 of said Act. Contractor further agrees to comply with all federal Equal Employment Opportunity laws including, without limitation, the American's with Disabilities Act and the rules and regulations promulgated thereunder. Pursuant to the requirements of the regulations of the Illinois Department of Human Rights (Department), Title 44, Part 750 of the Illinois Administrative Code and to the extent applicable Contractor will comply with Illinois human rights laws. In the event of non-compliance with the provisions of this Equal Employment Opportunity Clause, the Illinois Human Rights Act or the rules and regulations of the Illinois Department of Human Rights, this Agreement may be cancelled or voided in whole or in part, and Contractor acknowledges that it may be subject to further sanctions or penalties imposed by the Illinois Human Rights Commission, as provided for in the Illinois Human Rights Act, and to such other sanctions or penalties may be imposed or remedies invoked as provided by statute or regulations. During the performance of this Agreement, Contractor agrees:

**A.** It will not discriminate against any employee or applicant for employment because of race, color, religion, creed, sex, marital status, national origin or ancestry, age, citizenship, physical or mental handicap or disability, military status, or an unfavorable discharge from military service or arrest record status; and further that it will examine all job classifications to determine if minority persons or women are underutilized and will take appropriate affirmative action to rectify any such underutilization.

**B.** If it hires additional employees in order to perform this Agreement it will determine the availability (in accordance with applicable agency rules) of minorities and women in the areas(s) from which it may reasonably recruit and it will hire for each job classification for which employees are hired in such a way that minorities and women are not underutilized.

**C.** In all solicitations or advertisements for employees placed by it or on its behalf, it will state that all applicants will be afforded equal opportunity without discrimination because of race, color, religion, sex, marital status, national origin, ancestry, age, physical or mental handicap unrelated to ability, or an unfavorable discharge from military service.

**D.** It will send to each labor organization or representative of workers with which it has or is bound by a collective bargaining agreement or understanding, a notice advising such labor organization or representative of Contractor's obligation under the Illinois Human Rights Act and the Rules of the Department. If any such labor organization or representative fails or refuses to cooperate with Contractor in its efforts to comply with such Act and Rules, Contractor will promptly so notify the Department and the contracting agency and will recruit employees from other sources when necessary to fulfill its obligations thereunder.

**E.** Contractor will submit reports as required by the District's rules, furnish all relevant information as may, from time to time, be requested by the Department or the District, and in all respects comply with the Illinois Human Rights Act and the Department rules.

**F.** Contractor will permit access to all relevant books, records, accounts and work sites by personnel of the contracting agency and the Department for purposes of investigation to ascertain compliance with the Illinois Human Rights Act and Department rules.

**G.** Contractor will include verbatim or by reference the provisions of this clause in every subcontract it awards under which any portion of the Agreement obligations are undertaken or assumed. In the same manner as with other provisions of the Agreement, Contractor will be liable for compliance with applicable provisions of this clause by its consultants or contractors; and further it will promptly notify the contracting agency and the Department in the event any consultant or contractor fails or refuses to comply therewith. In addition, Contractor will not utilize any consultant or contractor

## FORM FOR REFERENCE

declared by the Illinois Human Rights Commission to be ineligible for contracts or subcontracts with the State of Illinois or any of its political subdivisions or municipal corporations.

**11.8 Weapons.** Neither Contractor nor any of its employees, officers, agents or representatives shall be in possession of any firearm or weapon (as defined by the District's designated representative) while on District premises, including on the person or within any vehicle parked on or adjacent to any District property. Violation of this section may result in immediate removal from District premises and referral to local law enforcement.

### **12. Federal Funds Contract.**

The Agreement provides for the construction of certain improvements on behalf of the District identified as the Projects. If the Projects are funded in whole or in part by federal grant funds the Projects are subject to certain rules and regulations as may be contained in the regulations of the funding agency, in the federal common rule as set forth in 45 CFR Part 92, and in the grant award. Contractor agrees to abide by all such rules and regulations as part of its basic services.

### **13. No Waiver.**

No failure of either party to exercise any powers granted in this Agreement or to insist upon strict compliance by the other party with any obligation hereunder and no custom or practice of the District or Contractor at variance with the terms hereof shall constitute a waiver of the right of either party to demand exact compliance with the terms of this Agreement.

### **14. Representation of Authority.**

Contractor herewith covenants, represents and warrants that the person executing this Addendum and the Agreement and any and all amendments hereto and thereof, as and if such may occur, are fully empowered to execute this Addendum, the Agreement and any amendments thereto in such fashion as to fully and completely bind Contractor to these agreements and undertakings; the signature on this Addendum and the Agreement further serves to assure the District that any and all action necessary by law, and under the terms of Contractor's by-laws, and pursuant to the policies of Contractor have been taken prior to execution of this document on behalf of Contractor; the signatures on the Agreement and this Addendum are a representation that the Contractor is a corporation in good standing in the state of Illinois. This representation, covenant and warranty are made by Contractor with the intent that the District fully rely hereon and as an inducement to the District to execute this Addendum and the Agreement.

### **15. Entire Agreement.**

The Agreement together with all its Exhibits and this Addendum shall constitute the complete understanding between the parties and no other or further agreement shall be or constitute an amendment to or modification of this Agreement absent the same being reduced to writing and executed by both parties hereto.

**DISTRICT:**  
**BOARD OF EDUCATION OF ROCKFORD**  
**SCHOOL DISTRICT NO. 205, WINNEBAGO**  
**AND BOONE COUNTIES, ILLINOIS**

**BY:** \_\_\_\_\_  
**Its President**

**Attest:** \_\_\_\_\_  
**Its Secretary**

**CONTRACTOR:**

\_\_\_\_\_  
\_\_\_\_\_

**BY:** \_\_\_\_\_  
**Its President**

**ATTEST:** \_\_\_\_\_  
**Its Secretary**



**ROCKFORD PUBLIC SCHOOLS**  
**REQUIRED BID FORMS CHECK LIST**  
**Bid/RFP/RFQ No.: 16-45 Kennedy Middle School Boiler Replacement**

**Listed below are the REQUIRED forms all bidders are REQUIRED to submit with sealed bids on or before the bid due date and time. Failure to submit ALL required forms may result in bidder being deemed non-responsive.**

Required Forms	Yes	Comments
Bid Security Bond	<input type="checkbox"/>	5% of Base Bid
Section 004100 – Bid Form	<input type="checkbox"/>	
Bid Rigging Certification	<input type="checkbox"/>	
Minority and Women Owned Business Concern Representation	<input type="checkbox"/>	
Certificate Regarding Debarment, Suspension, Ineligibility, and Voluntary Exclusion	<input type="checkbox"/>	
Certificate Regarding Lobbying	<input type="checkbox"/>	
OFAC Compliance	<input type="checkbox"/>	
Vendor Conflict of Interest Disclosure Form	<input type="checkbox"/>	
Certified Cleared Employee List	<input type="checkbox"/>	Complete, sign, and notarize the form. If you are uncertain of which employees will be working on the project, note this information on the form that the employee information will be forth coming BEFORE you start on the project, if awarded the contract.
Asbestos Notification	<input type="checkbox"/>	
AIA Document A305-1986 Contractor's Qualification Statement	<input type="checkbox"/>	
Section 004115 – References	<input type="checkbox"/>	

**Listed below are REQUIRED FORMS/DOCUMENTS that must be submitted prior to starting work, if awarded the contract. Failure to submit forms below may result in project start delay.**

<input type="checkbox"/> Certificate of Liability Insurance	<input type="checkbox"/> Performance Bond (100% of contract)
<input type="checkbox"/> AIA Document A101-2007 Standard Form of Agreement between Owner and Contractor	<input type="checkbox"/> Labor and Material Payment Bond (100% of contract)

SECTION 004100 BID FORM

TO:

Director of Purchasing  
Rockford Board of Education, School District No. 205  
501 Seventh Street, 6th Floor Conference Room  
Rockford, Illinois 61104

FROM:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Operating as (strike out conditions that do not apply) (an Individual,) (a Corporation, organized and existing under the law of the State of \_\_\_\_\_,) (a Partnership,) (a Joint Venture consisting of the firm of:)

\_\_\_\_\_

**BASE PROPOSAL:**

In response to your invitation to submit a proposal for the execution of all work described by the Drawings and Specifications dated 02.23.16 and titled: RPS 205 - Boiler Replacement Project at Kennedy Middle School, located in Rockford, IL and having examined the sites where the work is to be executed; and having become familiar with local conditions as they might in any way affect the cost and/or execution of the work; and having carefully examined the aforesaid drawings, specifications and other related documents and addenda thereto, the undersigned Bidder hereby proposes and agrees to provide all labor, materials, plant, equipment, transportation, and other facilities as necessary and/or required for the complete and satisfactory execution of the work for which this proposal is submitted, for the lump-sum consideration as stated hereinafter:

Bidders must show bid amount in both words and figures. In case of discrepancy, amount shown in words shall govern.

**BASE PROPOSAL:**

**Base Bid:** For Boiler Replacement at Kennedy Middle School, Bidder agrees to perform all work described and shown on the drawings for the sum of:

Bid \_\_\_\_\_ Dollars \_\_\_\_\_  
(in writing) (in figures)

**ADDENDA ACKNOWLEDGEMENT:**

The undersigned acknowledges receipt of the following addenda:

(List by number and date appearing on each addenda. If all addenda are not acknowledged, the bid will be considered irregular).

ADDENDUM No.	Date

The undersigned agrees to complete all work at the school, as required by the contract as follows:

	Boiler Replacement Kennedy Middle School
Contract Award:	
Commence Work on:	
Substantial Completion:	
Final Completion:	

**BID SECURITY:**

Bid Security is attached, without endorsement, in the sum of (5% of Bid Amount):

\_\_\_\_\_ Dollars \_\_\_\_\_

**GENERAL STATEMENT:**

The undersigned has checked all of the figures contained in this proposal and further understands that the Owner will not be responsible for any errors or omissions made therein by the undersigned

The undersigned agrees to assist and cooperate with the Owner in preparing the formal Contract, and shall execute same and return it to the Owner along with surety bonds and insurance certificates, as may be required by the specifications and other Contract Documents, within 10 days following its receipt.

The undersigned further agrees to begin work on said contract as soon as practicable after date of "Contract" or "Notice to Proceed," whichever is earlier; or, in any case the undersigned fails or neglects to appear within the specified time to execute the Contract, the undersigned will be considered as having abandoned it, and the Bid Security accompanying this proposal will be forfeited to Owner as liquidated damages for delay and loss caused to Owner by reason of such failure on the part of the undersigned.

It is understood that the right is reserved by Owner to reject any or all proposals, to waive all informalities and irregularities in connection therewith, and to award a contract for any part of the work or the project as a whole. It is agreed that this proposal may not be withdrawn for a period of 60 days after it has been opened, without permission to the Owner.

The undersigned declares that the person(s) signing this proposal is/are fully authorized to sign on behalf of the named firm and to fully bind the named firm to all the conditions and provisions thereof.

It is agreed that no person(s) or company other than the firm listed below or as otherwise indicated hereinafter has any interest whatsoever in this proposal or the Contract that may be entered into as a result thereof, and that in all respects the proposal is legal and fair, submitted in good faith, without collusion or fraud.



It is agreed that the undersigned has complied or will comply with all requirements concerning licensing and with all other local, state, and national laws, and that no legal requirements has been or will be violated in making or accepting this proposal, in awarding the Contract to him, or in the prosecution of the work required thereunder.

The contractor certifies that the contractor is not barred from bidding on the contract as a result of a conviction for either bid-rigging or bid rotating under Article 33E of the Criminal Code of 1961.

Name of Contractor (Typed)

Contractor's Signature

**SUBCONTRACTOR LISTING:** (By Bidders of General Construction category of work):

RPS 205 is requesting the following breakdown of the bids. The amounts provided are for information only and will not be used for the purpose of determining the low bidder; **however, all \$ amounts shall equal the amount of the entire bid entered above.**

This proposal has been prepared using sub bids received from the firms listed below:

Boiler Replacement **Kennedy Middle School:**

Classification of Work	Name of Sub-Bidder	Total Bid Amt. (\$\$)
General Conditions & Fee		\$
Plumbing		\$
HVAC		\$
Electrical		\$
<b>Total Bid Amount</b>		<b>\$\$</b>

**BOILER MANUFACTURER:**

RPS 205 is requesting the manufacturer name as well as the model number of the boiler unit;

This proposal has been prepared using the boiler listed below:

Boiler Replacement **Kennedy Middle School:**

Classification	Name of Manufacturer	Model #
Boiler Unit		

**BIDDER SIGNATURE:**

Respectfully submitted this \_\_\_\_\_ day of \_\_\_\_\_, 2016

Legal Name of  
Firm: \_\_\_\_\_

Federal Tax Identification Number: \_\_\_\_\_

BY: \_\_\_\_\_

**CERTIFICATE OF ELIGIBILITY TO CONTRACT**

\_\_\_\_\_, Contractor, Pursuant to section 33E-11 of the Illinois Criminal Code of 1961 as amended, hereby certifies that neither (he, she, it) nor any of (his, her, its) partners, officers, or owners of (his, her, its) business has been convicted in the past five (5) years of the offense of bid-rigging under section 33E-3 of the Illinois Criminal Code of 1961 as amended; that neither (he, she, it) nor any of (his, her, its) partners, officers or owners has ever been convicted of the offense of bid-rotating under section 33E-4 of the Illinois Criminal Code of 1961 as amended; and that neither (he, she, it) nor any of (his, her, its) partners, officers or owners has ever been convicted of bribing or attempting to bribe an officer or an employee of the State of Illinois, or has made an admission of guilt of such conduct which is a matter of record.

Date: \_\_\_\_\_

SUBSCRIBED and SWORN TO before me

This \_\_\_\_\_ day of \_\_\_\_\_

\_\_\_\_\_  
NOTARY PUBLIC

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

END OF BID FORM

**ROCKFORD PUBLIC SHOOOLS**  
**BID-RIGGING CERTIFICATION**

I, \_\_\_\_\_, a duly authorized agent of  
(Agent)

\_\_\_\_\_, do hereby certify that neither  
(Contractor)

\_\_\_\_\_ nor any individual presently  
(Contractor)

affiliated with \_\_\_\_\_ has been barred from bidding on a  
(Contractor)

public contract as a result of a violation of either Section 33E-3 (bid-rigging) or Section 33E-4 (bid rotating) of the Illinois Criminal Code, contained in Chapter 750, Article 5 of the Illinois Compiled Statutes.

\_\_\_\_\_  
Authorized Agent

\_\_\_\_\_  
Contractor



# ROCKFORD PUBLIC SCHOOLS

## MINORITY, WOMEN and DISABLED-OWNED BUSINESS CONCERN REPRESENTATION

**Minority-Owned Business:** a minority-owned business concern means a business concern that: (1) is at least 51 percent unconditionally owned by one or more individuals who are considered to be a member of a minority group, or a publicly owned business having at least 51 percent of its stock unconditionally owned by one or more members of a minority group; and (2) has its management and daily business controlled and operated by one or more such individuals. Individuals who certify that they are members of minority groups (African Americans, Hispanic Americans, Native Americans, Asian-Pacific Americans, Asian-Indian Americans, and other minorities) are to be considered minority-owned enterprises.

**Women-Owned Business:** a business that is at least 51 percent owned by a woman or women who also control and operate it.

**Disabled Owned Business:** a business that is at least 51 percent owned by a person or persons with severe physical or mental disabilities which substantially limits one or more of the person's major life activities and which person or persons control and operate such business.

"Control" in this referenced context means exercising the power to make policy decisions. "Operate" means being actively involved in the day- to-day management of the business.

The District shall rely on written representations of concerns regarding their status as minority/women/disabled-owned businesses. Offeror agrees to submit information regarding the minority ownership of its subcontractors on request of District.

**COMPLETE THE SECTION BELOW AND RETURN THIS FORM WITH BID. FAILURE TO DO SO MAY RENDER THE OFFEROR'S BID UNACCEPTABLE.**

A. Representation. The offeror represents that it is ( ), is not ( ) a minority-owned business concern.

B. Representation. The offeror represents that it is ( ), is not ( ) a women-owned business concern.

C. Representation. The offeror represents that it is ( ), is not ( ) a disabled-owned business concern.

### Please Check Appropriate Box/Boxes

☐ African American (AFRAM)

☐ Caucasian (CAUC)

☐ Native American (NAAM)

☐ Hispanic American (HISP)

☐ Asian-Pacific (ASIAP)  
American

☐ Asian-Indian (ASIAI)  
American

☐ Other \_\_\_\_\_

☐ Woman Owned (W)

☐ Disabled Owned (D)

Please identify

The offeror has ☐/ has not ☐ used the following procedures in searching for and obtaining suppliers and subcontractors:

- Place qualified Minority-Owned Businesses on solicitation lists
- Ensure that Minority-Owned Businesses are solicited whenever they are potential sources
- Consider contracting with consortia of Minority-Owned Businesses when an intended contract is too large for any one such firm to handle on its own or, if economically feasible, divide larger requirements into smaller transactions for which such organizations might compete
- Make information on contracting opportunities available and establish delivery schedules that encourage participation by Minority-Owned Businesses
- Use the services and assistance of the SBA and Department of Commerce Minority Business Development Agency, as appropriate.

Company Name \_\_\_\_\_ Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Phone # \_\_\_\_\_ Fax # \_\_\_\_\_ FEIN # \_\_\_\_\_

Signature of Company Official \_\_\_\_\_ Title \_\_\_\_\_

Date \_\_\_\_\_

**ILLINOIS STATE BOARD OF EDUCATION**

100 North First Street  
Springfield, IL 62777-0001

**CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY, AND VOLUNTARY  
EXCLUSION LOWER TIER COVERED TRANSACTIONS**

This certification is required by the regulations implementing Executive Orders 12549 and 12689, Debarment and Suspension, 2 CFR 417 Subpart C Responsibilities of Participants Regarding Transactions. The regulations were published in the May 25, 2010 Federal Register (pages 29183-29189). Copies of the regulations may be obtained by contacting the Illinois State Board of Education.

**BEFORE COMPLETING CERTIFICATION, READ INSTRUCTIONS BELOW.**

**CERTIFICATION**

The prospective lower tier participant certifies, by submission of this Certification, that:

- (1) Neither it nor its principals are presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency;
- (2) It will provide immediate written notice to whom this Certification is submitted if at any time the prospective lower tier participant learns its certification was erroneous when submitted or has become erroneous by reason of changed circumstances;
- (3) It shall not knowingly enter any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated;
- (4) It will include the clause titled Certification Regarding Debarment, Suspension, Ineligibility, and Voluntary Exclusion—Lower Tier Covered Transactions, without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions;
- (5) The certifications herein are a material representation of fact upon which reliance was placed when this transaction was entered into; and
- (6) Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this Certification.

\_\_\_\_\_  
*Organization Name*

\_\_\_\_\_  
*PR/Award Number or Project Name*

\_\_\_\_\_  
*Name of Authorized Representative*

\_\_\_\_\_  
*Title*

\_\_\_\_\_  
*Original Signature of Authorized Representative*

\_\_\_\_\_  
*Date*

**Instructions for Certification**

1. By signing and submitting this Certification, the prospective lower tier participant is providing the certifications set out herein.
2. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal government, the department or agency with which this transaction originated may pursue all available remedies, including suspension and/or debarment.
3. Except for transactions authorized under paragraph 3 above, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal government, the department or agency with which this transaction originated may pursue all available remedies, including suspension and/or debarment.
4. The terms covered transaction, debarred, suspended, ineligible, lower tier covered transaction, participant, person, primary covered transaction, principal, proposal, and voluntarily excluded, as used herein, have the meanings set out in the Definitions and Coverage sections of the rules implementing Executive Order 12549 and Executive Order 12689. You may contact the person to which this Certification is submitted for assistance in obtaining a copy of those regulations.
5. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that it is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows the certification is erroneous. A participant may decide the method and frequency by which it determines the eligibility of its principals. Each participant may, but is not required to, check the "GSA Excluded Parties List System" at <http://epls.arnet.gov/>.
6. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required herein. The knowledge and information of a participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

**ILLINOIS STATE BOARD OF EDUCATION**  
100 North First Street  
Springfield, IL 62777-0001

**CERTIFICATE REGARDING LOBBYING**

The undersigned certifies, to the best of his or her knowledge and belief, that:

- (1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.
- (2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit ISBE 85-37, "Disclosure of Lobbying Activities," in accordance with its instructions.
- (3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by Section 1352, Title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

\_\_\_\_\_  
*Organization Name*

\_\_\_\_\_  
*PR/Award Number or Project Name*

\_\_\_\_\_  
*Name of Authorized Representative*

\_\_\_\_\_  
*Title*

\_\_\_\_\_  
*Original Signature of Authorized Representative*

\_\_\_\_\_  
*Date*



## OFAC Compliance

**BID No.:** \_\_\_\_\_

The undersigned hereby certifies and represents that products and/or services provided under any contract with the Rockford Public Schools resulting from this bid shall be in compliance with economic or trade sanctions or restrictions implemented by the United States government such as those administered by the Office of Foreign Assets Control (“OFAC”) of the U.S. Department of the Treasury and shall not utilize or engage, for performance of any activities related to the products and/or services, any persons or entities that, (i) appear on OFAC's Specially Designated Nationals and Blocked Persons List (“SDN List”), as that list may be updated from time to time or any other similar list maintained by OFAC; (ii) are owned or controlled by any person or entities appearing on OFAC's SDN List, as that list may be updated from time to time or any other similar list maintained by OFAC; or (iii) are located in any country subject to U.S. economic or trade sanctions, such as those administered by OFAC.

\_\_\_\_\_  
Organization Name

\_\_\_\_\_  
Name of Authorized Representative

\_\_\_\_\_  
Title

\_\_\_\_\_  
Original Signature of Authorized Representative

\_\_\_\_\_  
Date

# **ROCKFORD PUBLIC SCHOOLS**

## **VENDOR CONFLICT OF INTEREST DISCLOSURE FORM**

### **DISCLOSURE STATEMENT:**

All businesses ("Vendors" or "Vendor" or "Vendor's") that wish to conduct business with the Rockford Public Schools "RPS" must complete this form. Please note that all contracts with RPS are subject to RPS Code of Ethics which prohibits RPS employees and Board of Education members from having certain relationships with persons or entities conducting (or proposing to conduct) business with RPS and which limits the acceptance of gifts from Vendors. The entire Board Member Conflict of Interest Board Policy 2.100 and Board Policy 5.120 may be viewed at <http://www2.rps205.com/District/BOE/Pages/GP-200.aspx>. The Code and its definitions are incorporated by reference into this Disclosure Form. If a Vendor has a disclosable relationship, the Vendor should assume the relationship may pose a conflict of interest until notified to the contrary in writing by a RPS administrative staff member authorized to confirm that a determination has been made that a conflict does not exist. A principle of the Code of Ethics is to ensure that relationships do not influence any official decision or judgment of RPS employees or Board of Education members. Accordingly, disclosure also should be made for any person connected with Vendor (e.g., officer, director, partner, shareholder, employee,) that is likely to: (i) materially contribute to Vendor's preparation, drafting, or presentation of a proposal or bid for services and/or supplies, (ii) materially contribute to Vendor's negotiation of a contract with RPS, or (iii) perform material services under a contract with RPS. Below, these persons are referred to as "Disclosable Persons."

### **CERTIFICATION:**

I hereby certify that, except as disclosed below, to Vendor's knowledge, there is no conflict of interest involving the Vendor named below that would violate the RPS Code of Ethics, including that: (a) after inquiry, neither Vendor nor any Disclosable Person is involved or engaged in any private business venture or enterprise, directly or indirectly, with any RPS employee or Board of Education member or his or her family member; (b) no RPS employee or Board member or his or her family member owns or has a material personal financial interest (directly or indirectly) in Vendor or is engaged in a material personal business transaction with Vendor; and (c) no RPS employee or board of Education member or his or her family is employed by Vendor.

I further certify that neither the Vendor nor anyone acting on its behalf has requested that any RPS employee or RPS Board of Education member exert any influence to secure the award of this bid to the Vendor. Furthermore, no RPS Board of Education member, employee or agent has offered to influence to secure the award of this bid to the Vendor

### **VENDOR INFORMATION:**

Vendor Name: \_\_\_\_\_

Vendor Address: \_\_\_\_\_

\_\_\_\_\_

Vendor Phone Number \_\_\_\_\_

Vendor Email: \_\_\_\_\_

Vendor FEIN: \_\_\_\_\_

# ROCKFORD PUBLIC SCHOOLS

## VENDOR CONFLICT OF INTEREST DISCLOSURE FORM

### DISCLOSURE STATEMENT:

I BELIEVE THE VENDOR NAMED ABOVE DOES have a potential conflict(s) of interest with a current RPS employee(s), or RPS Board of Education member(s).

☐ YES, the above statement is true.

☐ NO, the above statement is **NOT** true.

If you checked “**YES**” above, please provide the following information:

List all the Name(s) of RPS employee(s), RPS Board of Education member(s), or RPS employees’ or RPS Board of Education’s family member(s) with whom there may be a conflict of interest:

1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

Provide a brief description of the nature of the potential conflict(s) of interest:

### SIGNATURE:

By my signature below, I certify that I am the Authorized Representative of the VENDOR named above and that all of the information provided above by signor is true and complete to the best of the signor’s knowledge:

\_\_\_\_\_  
Print the Name of the Vendor’s Authorized Representative

\_\_\_\_\_  
Print the Position Title of the Vendor’s  
Authorized Representative

\_\_\_\_\_  
Print the Name of the Vendor’s Authorized Representative

\_\_\_\_\_  
Date



## CERTIFIED CLEARED EMPLOYEE LIST

The undersigned \_\_\_\_\_, a vendor, supplier, professional services firm or contractor, hereby certifies under oath as follows:

1- a criminal history records check, a Statewide Sex Offender Database check and a Statewide Child Murderer and Violent Offender Against Youth Database check has been conducted for all employees as indicated by a check mark in the appropriate box in accordance with 105 ILCS 5/10-21.9 (the Act); and

2- that such employees have not been convicted of any of the enumerated criminal or drug offenses listed in the Act and their name does not appear on the noted Databases; and

3-the undersigned is an owner (if sole proprietor) or officer, member or partner of the undersigned authorized to execute this document binding the undersigned.

No.	Last Name	M.I.	First Name	SS # (last four)	Crim. Hst.	Databases

By:\_\_\_\_\_

This certificate Subscribed and Sworn to before me this \_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_.

\_\_\_\_\_

Notary Public

Commission Expires :\_\_\_\_\_

\_\_\_\_\_

Vendor Cert. Employee List No.\_\_\_\_

# ROCKFORD PUBLIC SCHOOLS

## ASBESTOS NOTIFICATION

**DATE:** \_\_\_\_\_

I, \_\_\_\_\_, (Person/Company) understand that

\_\_\_\_\_ School Building contains asbestos-containing building material and have been informed of the types and locations of this material by the Building Engineer. Furthermore, I will not disturb these materials without written permission from one of the following Building Services Department Officials.

Todd Schmidt, Chief Operating Officer

Rockford Public Schools Project Manager, Operations and Facilities

\_\_\_\_\_  
Signature

cc: Building Engineer

Contractor

**ROCKFORD BOARD OF EDUCATION**  
**SCHOOL DISTRICT #205**  
501 7<sup>TH</sup> Street  
Rockford, Illinois 61104  
Phone: Area Code 815-966-3098  
Fax: Area Code 815-966-3088

**W - 9**

**SUBSTITUTE IRS FORM W-9 – IMPORTANT TAX INFORMATION**

IRS regulations require our School District to have on file appropriate taxpayer identification data concerning you or your firm. This information consists of either a Federal Employer Identification Number (F.E.I.N.) or Social Security Number (S.S.N.) and will have their payments reported to the IRS on form #1099–Misc.

Below is the legal name and address for you or your firm as shown on our official records. Please make any necessary corrections. Space is also provided to enter the appropriate tax identification number and to indicate (by checking a box) the correct legal status. Failure to complete and return this form could result in a \$50,000 IRS penalty. In addition, we would be required to withhold 20% of payments due and remit this amount to the IRS until we receive the correct tax data.

**For your convenience we request you fax this form back to sender (or to Purchasing at 815-966-3088). Please do this today so we can both fulfill our reporting obligations and ensure prompt payments.**

Reminder: If LEGAL STATUS is “Sole Proprietorship”, the Taxpayer Identification Number must be either the Social Security Number of the owner or assigned FEIN.

**LEGAL STATUS: (Check One)**

☐ Corporation

☐ Limited

☐ Partner(ship) \_\_\_\_\_ (one owner)

☐ Religious, Charitable, Educational or  
Governmental Agency (**circle one**)

☐ Sole Proprietorship (legal owner's name):  
\_\_\_\_\_

☐ Individual

☐ Other – Please identify: \_\_\_\_\_

**TAXPAYER (federal) ID# -- FEIN or Soc Sec**

(use the line corresponding to your legal status line)

FEIN: \_\_\_\_\_ - \_\_\_\_\_

FEIN: \_\_\_\_\_ - \_\_\_\_\_

FEIN: \_\_\_\_\_ - \_\_\_\_\_

FEIN: \_\_\_\_\_ - \_\_\_\_\_

FEIN: \_\_\_\_\_ - \_\_\_\_\_ or

SSN: \_\_\_\_\_ - \_\_\_\_\_ - \_\_\_\_\_

Owner's Social Security Number

SSN: \_\_\_\_\_ - \_\_\_\_\_ - \_\_\_\_\_

FEIN: \_\_\_\_\_ - \_\_\_\_\_

**UNDER PENALTIES OF PERJURY, I CERTIFY THE INFORMATION PROVIDED ON THIS FORM IS TRUE, CORRECT, AND COMPLETE.**

Signature: \_\_\_\_\_ Title: \_\_\_\_\_ Date: \_\_\_\_\_

Phone: (\_\_\_\_\_) \_\_\_\_\_ Fax: (\_\_\_\_\_) \_\_\_\_\_

Website & Email address: \_\_\_\_\_

If minority/women owned business, list here: \_\_\_\_\_

**Vendor:** Enter Name and Address Below

Vendor #: \_\_\_\_\_

School: \_\_\_\_\_



# CONFIRMATION OF CALLED INSPECTION RECORDS

☐ 2009 International Building Code Called Inspection Records

	Called Inspection Type	Approval to Proceed Date	A/E or Qualified Inspector Signature	ISBE ID Number or A/E License Number
1.	Footings			
2.	Foundation			
3.	Concrete Slab / Under-floor			
4.	Lowest Floor Elevation			
5.	Framing			
6.	Lathe and Gypsum Board			
7.	Fire Resistant Penetrations			
8.	Energy Efficiency			
9.	Special Inspection			
10.	Final IBC			

☐ 2009 International Electrical Code (Appendix K) Called Inspection Records

	Called Inspection Type	Approval to Proceed Date	A/E or Qualified Inspector Signature	ISBE ID Number or A/E License Number
1.	Prefabricated Assembly Evaluation Report			
2.	Underground			
3.	Rough-in			
4.	Final IEC			

☐ 2009 International Energy Conservation Code Called Inspection Records

	Called Inspection Type	Approval to Proceed Date	A/E or Qualified Inspector Signature	ISBE ID Number or A/E License Number
1.	Foundation (thermal envelope)			
2.	Framing (thermal envelope)			
3.	Insulation (thermal envelope)			
4.	Rough-in "Okay to Cover" (mechanical, service water heating, electrical, lighting)			
5.	Final (mechanical, service water heating, electrical, lighting)			
6.	Final IECC			

☐ 2009 International Fire Code Called Inspection Records

	Called Inspection Type	Approval to Proceed Date	A/E or Qualified Inspector Signature	ISBE ID Number or A/E License Number
1.	Final IFC			

☐ 2009 International Mechanical and Fuel Gas Code Called Inspection Records

	Called Inspection Type	Approval to Proceed Date	A/E or Qualified Inspector Signature	ISBE ID Number or A/E License Number
1.	Prefabricated Assembly Evaluation Report			
2.	Underground Piping			
3.	Rough-in			
4.	Final IMC & IFGC			

# AIA® Document A305™ – 1986

## ***Contractor's Qualification Statement***

The Undersigned certifies under oath that the information provided herein is true and sufficiently complete so as not to be misleading.

**SUBMITTED TO:**

**ADDRESS:**

**SUBMITTED BY:**

**NAME:**

**ADDRESS:**

**PRINCIPAL OFFICE:**

- ☐ Corporation
- ☐ Partnership
- ☐ Individual
- ☐ Joint Venture
- ☐ Other

**NAME OF PROJECT:** *(if applicable)* Sample

**TYPE OF WORK:** *(file separate form for each Classification of Work)*

- ☐ General Construction
- ☐ HVAC
- ☐ Electrical
- ☐ Plumbing
- ☐ Other: *(Specify)*

### **§ 1 ORGANIZATION**

**§ 1.1** How many years has your organization been in business as a Contractor?

**§ 1.2** How many years has your organization been in business under its present business name?

**§ 1.2.1** Under what other or former names has your organization operated?

**§ 1.3** If your organization is a corporation, answer the following:

**§ 1.3.1** Date of incorporation:

**§ 1.3.2** State of incorporation:

**§ 1.3.3** President's name:

### **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.

This form is approved and recommended by the American Institute of Architects (AIA) and The Associated General Contractors of America (AGC) for use in evaluating the qualifications of contractors. No endorsement of the submitting party or verification of the information is made by AIA or AGC.

§ 1.3.4 Vice-president's name(s)

§ 1.3.5 Secretary's name:

§ 1.3.6 Treasurer's name:

§ 1.4 If your organization is a partnership, answer the following:

§ 1.4.1 Date of organization:

§ 1.4.2 Type of partnership (if applicable):

§ 1.4.3 Name(s) of general partner(s)

§ 1.5 If your organization is individually owned, answer the following:

§ 1.5.1 Date of organization:

§ 1.5.2 Name of owner:

§ 1.6 If the form of your organization is other than those listed above, describe it and name the principals:

## § 2 LICENSING

§ 2.1 List jurisdictions and trade categories in which your organization is legally qualified to do business, and indicate registration or license numbers, if applicable.

§ 2.2 List jurisdictions in which your organization's partnership or trade name is filed.

## § 3 EXPERIENCE

§ 3.1 List the categories of work that your organization normally performs with its own forces.

§ 3.2 Claims and Suits. (If the answer to any of the questions below is yes, please attach details.)

§ 3.2.1 Has your organization ever failed to complete any work awarded to it?

§ 3.2.2 Are there any judgments, claims, arbitration proceedings or suits pending or outstanding against your organization or its officers?

§ 3.2.3 Has your organization filed any law suits or requested arbitration with regard to construction contracts within the last five years?

§ 3.3 Within the last five years, has any officer or principal of your organization ever been an officer or principal of another organization when it failed to complete a construction contract? (If the answer is yes, please attach details.)



§ 3.4 On a separate sheet, list major construction projects your organization has in progress, giving the name of project, owner, architect, contract amount, percent complete and scheduled completion date.

§ 3.4.1 State total worth of work in progress and under contract:

§ 3.5 On a separate sheet, list the major projects your organization has completed in the past five years, giving the name of project, owner, architect, contract amount, date of completion and percentage of the cost of the work performed with your own forces.

§ 3.5.1 State average annual amount of construction work performed during the past five years:

§ 3.6 On a separate sheet, list the construction experience and present commitments of the key individuals of your organization.

#### § 4 REFERENCES

§ 4.1 Trade References:

§ 4.2 Bank References:

§ 4.3 Surety:

§ 4.3.1 Name of bonding company:

§ 4.3.2 Name and address of agent:

#### § 5 FINANCING

§ 5.1 Financial Statement.

§ 5.1.1 Attach a financial statement, preferably audited, including your organization's latest balance sheet and income statement showing the following items:

Current Assets (e.g., cash, joint venture accounts, accounts receivable, notes receivable, accrued income, deposits, materials inventory and prepaid expenses);

Net Fixed Assets;

Other Assets;

Current Liabilities (e.g., accounts payable, notes payable, accrued expenses, provision for income taxes, advances, accrued salaries and accrued payroll taxes);

Other Liabilities (e.g., capital, capital stock, authorized and outstanding shares par values, earned surplus and retained earnings).

§ 5.1.2 Name and address of firm preparing attached financial statement, and date thereof:

§ 5.1.3 Is the attached financial statement for the identical organization named on page one?

§ 5.1.4 If not, explain the relationship and financial responsibility of the organization whose financial statement is provided (e.g., parent-subsidiary).

§ 5.2 Will the organization whose financial statement is attached act as guarantor of the contract for construction?

## § 6 SIGNATURE

§ 6.1 Dated at this    day of

Name of Organization:

By:

Title:

§ 6.2

M    being duly sworn deposes and says that the information provided herein is true and sufficiently complete so as not to be misleading.

Subscribed and sworn before me this    day of

Notary Public:

My Commission Expires:

# **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 20\_\_.

**BETWEEN** the Owner:

Board of Education of Rockford School District No.205  
Winnebago and Boone Counties, Illinois  
501 7th Street  
Rockford, Illinois 61104

and the Contractor:  
*(Paragraphs deleted)*

for the following Project:

Bid No.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

The Architect:

Program Manager:

The Owner and Contractor agree as follows.

Owner is an Illinois public school district. This Contract is the result of the award of a publicly bid contract pursuant to the provisions of the Illinois School Code pertaining to public contracts, particularly the provisions of 105 ILCS 5/10-20.21. The invitation to bid No. \_\_\_\_\_, all amendments thereof and Contractor's bid all form a part of this Contract. The terms of Illinois statutes applicable hereto shall govern all terms and conditions of this contract as though fully set forth herein.

Init.



**TABLE OF ARTICLES**

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

**ARTICLE 1 THE CONTRACT DOCUMENTS**

The Contract Documents consist of this Agreement, Conditions of the Contract (General, Supplementary and other Conditions) AIA Document A201-2007, as revised by Owner, Drawings, Specifications, Addenda issued prior to execution of this Agreement with Bid No. \_\_\_\_\_, 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 Work is comprised of multiple dates of commencement of the Work. The construction start date, substantial completion date and final completion date are as follows:

Construction start date:

Substantial completion date:

Final Completion date: \_\_\_\_\_

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

**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 consistent with the award of a public bid # \_\_\_\_\_ awarded by Owner to Contractor shall be the total contract sum of

( \_\_\_\_\_ ) subject to additions and deductions as provided in the Contract Documents.

Init.

§ 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:

§ 4.3 Unit prices, if

any, including all associated costs including, but not limited to, excavation, backfilling offsite transportation/site fee, labor, overhead, insurance and bond;

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

## **ARTICLE 5 PAYMENTS**

### **§ 5.1 PAYMENTS**

§ 5.1.1 Based upon Applications for Payment submitted to and approved by the Architect by the Contractor and Certificates for Payment issued by the Architect, the Owner shall make payments on account of the Contract Sum to the Contractor pursuant to its policies and procedures more fully explained in the Addendum attached hereto and made a part hereof marked Exhibit A, and as provided elsewhere in the Contract Documents.

§ 5.1.2 Contractor shall submit to the Architect not more than one Application for Payment per month. The payment may cover a time period up to and including the date of submission of the draft Application for Payment. Contractor shall submit a draft Application for Payment on or before the date established by Program Manager. A supplemental Application for Payment may be required at the end of Owner's School Year (June 30).

§ 5.1.3 Payments to Contractor shall be pursuant to the policies and procedures of Owner as set forth in Addendum Exhibit A attached.

§ 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 payment shall be the amount of Architect approved certificate for payment 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 TEN percent (10.00%). 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 as revised by Owner;
- .2 Subtract the aggregate of previous payments made by the Owner.

§ 5.1.7 The 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

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

**NONE**

Init.



**§ 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, as revised by Owner, 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:

**In accordance with Owners policies and procedures for payment as described in the Addendum Exhibit A attached hereto.**

**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 as revised by Owner.

**§ 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, as revised by Owner, the method of binding dispute resolution shall be as follows:

Owner and Contractor may but shall not be required to submit claims to arbitration or mediation. If Owner and Contractor each independently agree to mediation or arbitration of claims, such mediation and arbitration shall proceed according to the provisions of AIA Document A201-2007 as revised by Owner. Mediation or arbitration may be requested by either party in writing. If the responding party declines to mediate or arbitrate or fails to respond to the request within 7 days of receipt of a request the sole remedy and method of dispute resolution for such claim shall be litigation in a court of competent

jurisdiction. **Jurisdiction for purposes of this Agreement and all parties hereto shall be the laws of the State of Illinois and venue shall lie in the 17<sup>th</sup> Judicial Circuit Court, Winnebago County, Illinois.**

**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 as revised by Owner.

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

**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; however, in the case of AIA Document A201-2007, it shall refer to AIA Document A201-2007 as revised by Owner and attached as Exhibit B.

**§ 8.2** The Owner's representative:

Todd Schmidt  
Chief of Operations  
Rockford Public Schools  
501 Seventh Street  
Rockford, Illinois 61104

**§ 8.3** The

Contractor's representative:

Init.



**§ 8.4**

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

**§ 8.5 Other provisions:**

If Owner has contracted with a Program Manager for this project, in all cases in which notices are required or permitted to be given by Contractor, a copy of each such notice shall be simultaneously given to Program Manager.

Program Manager:

**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 as revised by Owner.

**§ 9.1.2** The General Conditions are AIA Document A201-2007 as revised by Owner and attached hereto marked Exhibit B, General Conditions of the Contract for Construction and Supplementary Conditions attached to Bid 14-52.

**§ 9.1.3** The Supplementary and other Conditions of the Contract:

As contained in the Invitation to Bid # \_\_\_\_\_ and as attached hereto marked Exhibit C.

**§ 9.1.4** The Specifications:

As set forth in invitation to bid # \_\_\_\_\_ and addenda thereto attached hereto as Exhibit C and D.

**§ 9.1.5** The Drawings:

As set forth in invitation to bid # \_\_\_\_\_ and addenda thereto attached hereto as Exhibit C and D.

**§ 9.1.6** The Addenda, if any:

As set forth and referenced in the document attached hereto marked Exhibit D.

**§ 9.1.7** Documents forming the Contract Documents:

1. The Addendum attached hereto marked Exhibit A
2. General Conditions attached hereto marked as Exhibit B.
3. Bid No. \_\_\_\_\_ issued by Owner attached as Exhibit C (compact disk).

Init.

4. Addenda to Bid as referenced and attached as Exhibit D (compact disk).  
5. Contractor's bid dated attached hereto as Exhibit E.

**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, as revised by Owner and attached hereto and including the Supplementary Conditions issued by Owner.

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

**OWNER:**

**CONTRACTOR:**

***BOARD OF EDUCATION OF ROCKFORD  
SCHOOL DISTRICT NO. 205, WINNEBAGO  
AND BOONE COUNTIES, ILLINOIS***

**BY:** \_\_\_\_\_  
***ITS PRESIDENT***

**BY:** \_\_\_\_\_  
***ITS PRESIDENT***

**ATTEST:** \_\_\_\_\_  
***ITS SECRETARY***

**ATTEST:** \_\_\_\_\_  
***ITS SECRETARY***



# CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

**IMPORTANT:** If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER	CONTACT NAME:	
	PHONE (A/C, No, Ext):	FAX (A/C, No):
INSURED	E-MAIL ADDRESS:	
	INSURER(S) AFFORDING COVERAGE	
	NAIC #	
	INSURER A:	
	INSURER B:	
	INSURER C:	
	INSURER D:	
INSURER E:		
INSURER F:		

## COVERAGES

CERTIFICATE NUMBER:

REVISION NUMBER:

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL SUBR INSR: WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS
	<b>GENERAL LIABILITY</b>					EACH OCCURRENCE \$
	<input type="checkbox"/> COMMERCIAL GENERAL LIABILITY					DAMAGE TO RENTED PREMISES (Ea occurrence) \$
	<input type="checkbox"/> CLAIMS-MADE <input type="checkbox"/> OCCUR					MED EXP (Any one person) \$
						PERSONAL & ADV INJURY \$
						GENERAL AGGREGATE \$
	GEN'L AGGREGATE LIMIT APPLIES PER:					PRODUCTS - COMP/OP AGG \$
	<input type="checkbox"/> POLICY <input type="checkbox"/> PROJECT <input type="checkbox"/> LOC					\$
	<b>AUTOMOBILE LIABILITY</b>					COMBINED SINGLE LIMIT (Ea accident) \$
	<input type="checkbox"/> ANY AUTO					BODILY INJURY (Per person) \$
	<input type="checkbox"/> ALL OWNED AUTOS	<input type="checkbox"/> SCHEDULED AUTOS				BODILY INJURY (Per accident) \$
	<input type="checkbox"/> HIRED AUTOS	<input type="checkbox"/> NON-OWNED AUTOS				PROPERTY DAMAGE (Per accident) \$
						\$
	<b>UMBRELLA LIAB</b>	<input type="checkbox"/> OCCUR				EACH OCCURRENCE \$
	<b>EXCESS LIAB</b>	<input type="checkbox"/> CLAIMS-MADE				AGGREGATE \$
	<input type="checkbox"/> DED <input type="checkbox"/> RETENTION \$					\$
	<b>WORKERS COMPENSATION AND EMPLOYERS' LIABILITY</b>					WC STATUTORY LIMITS OTHER
	ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICE/MEMBER EXCLUDED? <input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> N/A					E.L. EACH ACCIDENT \$
	(Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below					E.L. DISEASE - EA EMPLOYEE \$
						E.L. DISEASE - POLICY LIMIT \$

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (Attach ACORD 101, Additional Remarks Schedule, if more space is required)

## CERTIFICATE HOLDER

## CANCELLATION

Rockford Public School District 205  
Attn: Jim Heathscott  
501 Seventh Street  
Rockford, IL 61104

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE



SECTION 00 4115 - REFERENCES

- 1.1 The undersigned Contractor has actively engaged in work of the nature of the project described, and have adequate specialized men and machines to do the work. The following list of construction projects that have been completed within the last five years and relate to the type of work specified.

1 Name of Project:

Amount (\$) of Contract:

Date Completed:

Owner:

Address:

Contact Person:

Telephone Number:

Architect:

Contact Person:

Telephone Number:

2 Name of Project:

Amount (\$) of Contract:

Date Completed:

Owner:

Address:

Contact Person:

Telephone Number:

Architect:

Contact Person:

Telephone Number:

3 Name of Project:

Amount (\$) of Contract:

Date Completed:

Owner:

Address:

Contact Person:

Telephone Number:

Architect:

Contact Person:

Telephone Number:

4 Name of Project: \_\_\_\_\_  
Amount (\$) of Contract: \_\_\_\_\_  
Date Completed: \_\_\_\_\_  
Owner: \_\_\_\_\_  
Address: \_\_\_\_\_  
Contact Person: \_\_\_\_\_  
Telephone Number: \_\_\_\_\_  
Architect: \_\_\_\_\_  
Contact Person: \_\_\_\_\_  
Telephone Number: \_\_\_\_\_

BIDDER SIGNATURE: \_\_\_\_\_

Respectfully submitted this                      day of                      2016.

END OF SECTION 008115

DOCUMENT 006000 - FORMS

1.1 FORM OF AGREEMENT AND GENERAL CONDITIONS

- A. The following form of Owner/Contractor Agreement and form of the General Conditions shall be used for Project:
  - 1. AIA Document A101-2007, "Standard Form of Agreement between Owner and Contractor, Stipulated Sum."
    - a. The General Conditions for Project are AIA Document A201-2007, "General Conditions of the Contract for Construction."
  - 2. The General Conditions are included in the Project Manual.
  - 3. The Supplementary Conditions for Project are incorporated into a modified copy of the General Conditions included in the Project Manual.
  - 4. Owner's document(s) bound following this Document.

1.2 ADMINISTRATIVE FORMS

- A. Administrative Forms: Additional administrative forms are specified in Division 01 General Requirements.
- B. Copies of AIA standard forms may be obtained from the American Institute of Architects; <http://www.aia.org/contractdocs/purchase/index.htm>; [docspurchases@aia.org](mailto:docspurchases@aia.org); (800) 942-7732.
- C. Preconstruction Forms:
  - 1. Form of Performance Bond and Labor and Material Bond: AIA Document A312, "Performance Bond and Payment Bond."
  - 2. Form of Certificate of Insurance: AIA Document G715, "Supplemental Attachment for ACORD Certificate of Insurance 25-S."
- D. Information and Modification Forms:
  - 1. Form attached or Form for Requests for Information (RFIs): AIA Document G716, "Request for Information (RFI)."
  - 2. Form of Request for Proposal: AIA Document G709, "Work Changes Proposal Request."
  - 3. Change Order Form: AIA Document G701, "Change Order."
  - 4. Form of Architect's Memorandum for Minor Changes in the Work: AIA Document G707, "Architect's Supplemental Instructions."
  - 5. Form of Change Directive: AIA Document G714, "Construction Change Directive."
- E. Payment Forms:
  - 1. Schedule of Values Form: AIA Document G703, "Continuation Sheet."
  - 2. Payment Application: AIA Document G702/703, "Application and Certificate for Payment and Continuation Sheet."
  - 3. Form of Contractor's Affidavit: AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
  - 4. Form of Affidavit of Release of Liens: AIA Document G706A, "Contractor's Affidavit of Payment of Release of Liens."
  - 5. Form of Consent of Surety: AIA Document G707, "Consent of Surety to Final Payment."

END OF DOCUMENT 006000



**PROJECT MANUAL**

**ROCKFORD PUBLIC SCHOOLS DISTRICT 205**

**KENNEDY MIDDLE SCHOOL  
BOILER REPLACEMENT PROJECT**

**ROCKFORD, ILLINOIS**

**ISSUED FOR BID AND PERMIT 03-11-2016**



**ARCHITECT'S PROJECT #C1825**

**HAGNEY ARCHITECTS, LLC  
4615 E. STATE STREET, SUITE 206  
ROCKFORD, ILLINOIS 61108  
PH: 815/397-3330 FAX: 815/397-0243**

## SECTION 011000 - SUMMARY

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Project information.
  - 2. Work covered by Contract Documents.
  - 3. Phased construction.
  - 4. Work by Owner.
  - 5. Access to site.
  - 6. Coordination with occupants.
  - 7. Work restrictions.
  - 8. Specification and drawing conventions.
  - 9. Miscellaneous provisions.
- B. Related Requirements:
  - 1. Section 015000 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

#### 1.3 PROJECT INFORMATION

- A. Project Identification: RPS 205 - Boiler Replacement.
  - 1. Project Location: Kennedy Middle School, 520 Pierpont Ave., Rockford, IL 61101.
- B. Owner: RPS District 205.
  - 1. Owner's Representative: Todd Schmidt, Chief of Operations.
- C. Architect of Record: Hagney Architects, LLC, 4615 E. State St Ste 206, Rockford, IL 61108.
  - 1. Architect's Representative: Mark Kehely.
  - 2. Tel.: 815.397.3330.
  - 3. E-mail: MarkK@HagneyArchitects.com
- D. Architect's Consultants: The Architect has retained the following design professionals who have prepared designated portions of the Contract Documents:
  - 1. MEP Engineer:
    - a. OAS, LLC, 769 Heartland Dr., Unit A, Sugar Grove, IL 60554.
      - 1) Representative: Keith O'Higgins.
      - 2) Tel.: 630-538-1996.
      - 3) e-mail: KOhiggins@oasllc.net.

- E. Program Manager: Rockford Public Schools - James Dobyns.
  - 1. Program Manager has been engaged for this Project to serve as an advisor to Owner and to provide assistance in administering the Contract for Construction between Owner and Contractor, according to a separate contract between Owner and Program Manager.
- F. Project FTP Site: A project FTP site administered by Architect Program Manager Contractor will be used for purposes of managing communication and documents during the construction stage.
  - 1. See Section 013100 "Project Management and Coordination." for requirements for using the Project Web site.

#### 1.4 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of Project is defined by the Contract Documents and consists of the following:
  - 1. Boiler replacement, univent replacement at annex building, along with misc. electrical upgrades at Kennedy Middle School.
- B. Type of Contract:
  - 1. Project will be constructed under a single general contract.

#### 1.5 PERMITS

- A. General Building Permit will be obtained from the Regional Office of Education by RPS 205.
- B. Permits from ComEd and Nicor Gas will be obtained by RPS 205. Changes to fees required by ComEd and Nicor Gas will be paid for by RPS 205.

#### 1.6 TESTING

- A. Generally, material testing will be provided and paid for by RPS 205 and shall be performed as indicated in individual specification sections. Contractor shall coordinate and assist the testing process.
- B. Special Inspections required by Authority Having Jurisdiction will be provided and paid for by RPS 205. Contractor shall schedule, coordinate and assist the testing process.



- C. The Contractor shall complete the IC form and submit to the RRWRD along with payment of permit fee. RPS 205 will pay any connection fee if applicable.

#### 1.7 ACCESS TO SITE

- A. General: Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.
- B. Use of Site: Limit use of Project site to work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
1. Driveways, Walkways and Entrances: Keep driveways and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
    - a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
    - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
- C. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations.

#### 1.8 COORDINATION WITH OCCUPANTS

- A. Partial Owner Occupancy: Owner will occupy the premises during entire construction period, with the exception of areas under construction. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's operations. Maintain existing exits unless otherwise indicated.
1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and authorities having jurisdiction.
  2. Provide not less than 72 hours' notice to Owner of activities that will affect Owner's operations.
- B. Owner Limited Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed portions of the Work, prior to Substantial Completion of the Work, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and limited occupancy shall not constitute acceptance of the total Work.
1. Architect will prepare a Certificate of Substantial Completion for each specific portion of the Work to be occupied prior to Owner acceptance of the completed Work.
  2. Obtain a Certificate of Occupancy from authorities having jurisdiction before limited Owner occupancy.
  3. Before limited Owner occupancy, mechanical and electrical systems shall be fully operational, and required tests and inspections shall be successfully completed. On occupancy, Owner will operate and maintain mechanical and electrical systems serving occupied portions of Work.
  4. On occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of Work.

## 1.9 WORK RESTRICTIONS

- A. Work Restrictions, General: Comply with restrictions on construction operations.
  - 1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.
- B. On-Site Work Hours: Limit work in the existing building to normal business working hours of 7:00 a.m. to 4:00 p.m., Monday through Friday, unless otherwise indicated.
  - 1. Hours for Utility Shutdowns: Coordinate with Owner and Program Manager.
  - 2. Hours for Core Drilling: Coordinate with Owner and Program Manager.
- C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:
  - 1. Obtain Program Manager's or Owner's written permission before proceeding with utility interruptions.
- D. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.
  - 1. Obtain Program Manager's or Owner's written permission before proceeding with disruptive operations.
- E. Nonsmoking Building: Smoking is not permitted within the building or within 25 feet of entrances, operable windows, or outdoor-air intakes.
- F. Controlled Substances: Use of tobacco products and other controlled substances on Project site is not permitted.

## 1.10 SPECIFICATION AND DRAWING CONVENTIONS

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

3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000



## SECTION 012000 - PROJECT REQUIREMENTS

### PART 1 - GENERAL

#### 1.1 CONTRACTOR'S RESPONSIBILITIES

- A. The Contractor and all Subcontractors shall submit a schedule of work days and hours to and consistent with the specifications of the Program Manager prior to beginning and ending work each day.
- B. Provide shop drawings of all fabricated items.
- C. The General Contractor shall provide fences, barricades, guard lights, site security etc. as required to protect persons and property from injury in conjunction with this contract work both inside and outside school buildings.
- D. Protect existing work - repair damage to this contract work at no cost to Owner. Water damage to building, including the interior, caused by Contractor's failure to properly protect the work, shall be the responsibility of the Contractor to correct.
- E. Protect existing trees, shrubs, lawns, etc.
- F. Remove rubbish and debris daily.
- G. Remove excess materials and construction equipment from the site upon completion.
- H. Contractor is to guarantee all work for a period of one year after final acceptance.
- I. Provide all items, articles, materials, operations, or methods listed, mentioned, or scheduled on the drawings and/or herein, including all equipment, and incidentals necessary and required pertaining to the work of this contract.

#### 1.2 USE OF FACILITIES

- A. Construction personnel will NOT be allowed to use toilet facilities in existing buildings.
- B. Confine parking, site access, equipment and materials to areas on the site as designated by the Program Manager or directed by the Architect.
- C. The Contractor shall provide temporary electricity, natural gas and water as required for the work by extending proper feeders, switches, etc. from the Owner's existing system. Existing electric current, natural gas and water will be provided by Owner at no cost to Contractor upon the condition that connection strictly complies with specifications of the Architect and such use does not interrupt regular activities at school buildings. Contractor is responsible for the loss of use of electric service, natural gas and water due to excessive use and improper connection. Do not connect any equipment requiring more than **110 V** to Owner's system.
- D. Temporary water service required for the work will be available from Owner's existing system as directed by Owner. Owner will pay cost of water used.

1.3 SUBMITTALS

- A. Submit necessary shop drawings, product data and samples.

END SECTION 012000

## SECTION 012500 - SUBSTITUTION PROCEDURES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section includes administrative and procedural requirements for substitutions.
- B. Related Requirements:
  - 1. Section 016000 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

#### 1.3 DEFINITIONS

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

#### 1.4 ACTION SUBMITTALS

- A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
  - 1. Substitution Request Form: Use CSI Form 13.1A.
  - 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
    - a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
    - b. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
    - c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.



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

## 1.5 QUALITY ASSURANCE

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

## 1.6 PROCEDURES

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

## PART 2 - PRODUCTS

### 2.1 SUBSTITUTIONS

- A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.
1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
- a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
  - b. Substitution request is fully documented and properly submitted.
  - c. Requested substitution will not adversely affect Contractor's construction schedule.
  - d. Requested substitution has received necessary approvals of authorities having jurisdiction.
  - e. Requested substitution is compatible with other portions of the Work.
  - f. Requested substitution has been coordinated with other portions of the Work.
  - g. Requested substitution provides specified warranty.
  - h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
- B. Substitutions for Convenience: Not allowed.

## PART 3 - EXECUTION (Not Used)

END OF SECTION 012500

## SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes administrative and procedural requirements for handling and processing Contract modifications.
- B. Refer to "Change Order Procedure" document attached dated 04.30.13.

#### 1.2 MINOR CHANGES IN THE WORK

- A. Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710, "Architect's Supplemental Instructions." form included in Project Manual.

#### 1.3 PROPOSAL REQUESTS

- A. Owner-Initiated Proposal Requests: Architect or Program Manager will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
  - 1. Work Change Proposal Requests issued by Architect or Program Manager are not instructions either to stop work in progress or to execute the proposed change.
  - 2. Within time specified in Proposal Request or 20 days, when not otherwise specified, after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
    - a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
    - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
    - c. Include costs of labor and supervision directly attributable to the change.
    - d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
    - e. Quotation Form: Use forms provided by Owner. Sample copies are included in Project Manual. forms acceptable to Architect.
- B. Contractor-Initiated Work Change Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Program Manager.
  - 1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.



2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6. Comply with requirements in Section 012500 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
7. Work Change Proposal Request Form: Use form provided by Owner. Sample copy is included in Project Manual. form acceptable to Architect.

#### 1.4 ADMINISTRATIVE CHANGE ORDERS

- A. Unit-Price Adjustment: See Section 012200 "Unit Prices" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect measured scope of unit-price work.

#### 1.5 CHANGE ORDER PROCEDURES

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

#### 1.6 CONSTRUCTION CHANGE DIRECTIVE

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012600

## CHANGE ORDER PROCEDURES

In order to process change orders it is important that procedures are followed and documentation provided in a manner that allows timely processing.

Field Orders will be issued for all changes that occur on the project. Changes are typically associated with a response to a RFI, Bulletins, or Field Conditions.

This document contains information needed for Field Orders, processing changes from RFIs, Bulletins and Field Conditions. Requirements for Change Order Requests are also provided.

### **FIELD ORDERS**

A Field Order will be issued for all change conditions. It is a document that tracks changes to the project and will provide directions for processing.

The Field Order heading contains the following tracking information, it is important that this information is contained in all change order requests:

1. Field Order Number
2. RFQ Number
3. PCO Number

The Field Order provides direction on how to proceed.

1. You are authorized to proceed with the change, subject to the method of payment listed in the following section, or
2. You are directed not to proceed until you have submitted all cost and schedule information within 7 days and the costs have been approved by RPS.

There are 4 methods of payment listed.

1. No Cost
2. Lump Sum
3. Time and Materials
4. Submit Quotations

### **NO COST CHANGE**

If this box is selected, it means that the information that you have received is a clarification of information contained in your contract and will not require a change to your contract.

### **LUMP SUM**

If this box is selected, it means that an agreement exists on a lump sum amount for a contract modification. This is rarely used as a way to process contract changes.

## **CHANGE ORDER PROCEDURES**

### **TIME & MATERIALS**

If this box is selected, tickets will need to be submitted to Ragnar Benson on a daily basis. Tickets that are not submitted on a daily basis will be subject to rejection.

If a ticket is signed by a Ragnar Benson representative, it does not guarantee additional payment or acceptance of pricing. The signature is only to confirm that the time spent on a particular task has been accepted. The only authority that can accept, approve, and or modify changes to the contract is a RPS project representative. A RPS employee that is not a project representative is not authorized to commit the district for additional work. This would include but not be limited to school administrators, teachers, or maintenance personnel.

### **SUBMIT QUOTATIONS**

If this box is checked then you will need to submit a Change Order Request subject to the change order requirements listed in a subsequent section of this document.

Please note that you are not to proceed with any additional work unless you have a signed field order. If you proceed with extra work without a signed field order you do so at your own risk.

### **CHANGE CONDITIONS**

#### **RFI's**

All RFI's will be submitted by the general contractor to the Architect of Record with a copy sent to Ragnar Benson. The response will include a field order will direct you on how you are to proceed.

#### **BULLETINS**

When a Bulletin is issued, a Field Order will be included and it will direct you on how to proceed.

#### **FIELD CONDITIONS**

If you encounter unknown conditions and think that you are entitled to additional compensation, notify the Architect of Record and Ragnar Benson immediately and include all appropriate documentation. A Field Order will provide direction on how you are to proceed.

### **CHANGE ORDER REQUESTS**

To aid in the processing of change orders, we will need certain information included in each of the change order requests.

A detailed cost breakdown that includes quantities, man hours, labor and material costs needs to be included for each trade that is requesting additional compensation. Please use the Cost Proposal Worksheet that is included in this document.

Include all backup that is needed to evaluate the change order request. Examples of this would be quotes received from subcontractors , material suppliers, sketches that identify how quantities were calculated, worksheets, and pictures may also be appropriate for our analysis.



## **CHANGE ORDER PROCEDURES**

### **FEES**

The fees shall be calculated as a lump sum to all changes. The fees are to be calculated per the information provided below.

#### **GENERAL CONTRACTOR FEES**

12% allowed for self-performed work- this includes overhead, profit, bond and insurance.

5% allowed for subcontracted work - this includes overhead, profit, bond and insurance.

#### **SUBCONTRACTOR FEES**

12% allowed for self-performed work - this includes overhead, profit, bond and insurance.

Please see a sample change order request that is included with this attachment.



# FIELD ORDER

#: 4

**Project:** 10101- CSX - Worcester IMF Expansion  
**To:** David Marois  
**MAROIS BROS**  
 115 Blackstone River Road  
 Worcester, MA 01697  
**Phone:** 508-791-8134  
**Fax:** 508-754-4214  
**Email:** dmarois@maroisbrothers.com

**Date:** 11/07/2011  
**From:** Carl Zeigler  
**RAGNAR BENSON CONSTRUCTION LLC**  
 250 South Northwest Highway  
 Park Ridge, IL 60068  
**Phone:** 847-698-4900  
**Fax:** 847-692-9320  
**Email:** carl.zeigler@rbic.com  
**RBRFQ#:** 6 **PCO#:** 109

**CC:** Tim Brown - ARCADIS - Phone: 508-421-8307 - Fax: 508-421-8305,  
 Keith Goldberg - ARCADIS - Phone: 508-421-8307 - Fax: 508-421-8305,  
 Dennis Dunn - RAGNAR BENSON CONSTRUCTION LLC - Phone: 847-698-4900 - Fax: 847-692-9320,  
 Stephen Groh - RAGNAR BENSON CONSTRUCTION LLC - Phone: 847-698-4900 - Fax: 847-692-9320,  
 Fred Jewel - RAGNAR BENSON CONSTRUCTION LLC - Phone: 847-698-4900 - Fax: 847-692-9320,  
 Steven Kehm - RAGNAR BENSON CONSTRUCTION LLC - Phone: 847-698-4900 - Fax: 847-692-9320,  
 Knut Olberg - RAGNAR BENSON CONSTRUCTION LLC - Phone: 847-698-4900 - Fax: 847-692-9320,  
 Paul Paolini - RAGNAR BENSON CONSTRUCTION LLC - Phone: 847-698-4900 - Fax: 847-692-9320,  
 Randy Perdue - RAGNAR BENSON CONSTRUCTION LLC - Phone: 847-698-4900 - Fax: 847-692-9320,  
 Greg Stambaugh - RAGNAR BENSON CONSTRUCTION LLC - Phone: 847-698-4900 - Fax: 847-692-9320,  
 Chris Swanson - WILLIAM CHARLES CONSTRUCT COMPANY LLC - Phone: 815-654-4700 - Fax: 8156544736

**Description:** Foundation Removal at Franklin and Plastic Streets

- ☐ You are hereby authorized to proceed with the following terms of work on the above project. All work shall be performed in accordance with the requirements of the Contract Documents.
- ☒ Do not proceed with the modifications or clarifications. Please submit your proposal listing both schedule and cost impact of the modifications or clarifications with 7 days. If we do not receive a proposal within 7 days, we will assume there are no schedule or cost impacts associated with this work.

Item	PCO Description	Detail Notes:
2	WCC - Foundations found at underground detention pipes	
3	Marois - Foundations found at underground detention pipes	

**Notes:**

## Method of Payment:

- ☐ No Cost  
☐ Lump Sum  
☐ Time and materials
- ☒ Submit quotations promptly for the above described work. The cost of the work will be determined from the Subcontractor Proposal, subject to review, and will be resolved to be mutually agreeable.

**Schedule: The effect of this order on the contract completion date is as follows:**

- ☒ No Change.  
☐ Impact is unknown at this time.
- ☐ Completion Date is estimated at days.  
☐ Subcontractor to submit a revised schedule listing duration changes to specific activities.

250 SOUTH NORTHWEST HIGHWAY, PARK RIDGE, IL 60068 • PHONE: 847-698-4900 • FAX: 847-692-9320

Page 1 of 2

DOT 35.2.03-11

**FIELD ORDER**

# 4

		Date
David Marois	MAROIS BROS	11/07/2011
Carl Zeigler	RAGNAR BENSON CONSTRUCTION LLC	11/07/2011
Keith Goldberg	Arcadis	
In Scope Change N		



{ Contractor Name }	Change Order Request No.:	001
( Contractor Address )	PCO No.:	17
( Contractor City/State/Zip )	RBRFQ No.:	6
( Contractor Telephone No. )	Field Order No.:	21

## CHANGE ORDER REQUEST RECAP SHEET

COR No. 1 is submitted for changes associated with Bulletin No. 001.  
 Bulletin No. 001 added a new 30 foot retaining wall and changed the ceilings  
 in the Toilet Rooms from Lay 1 to Gypboard. All detailed backup for labor and  
 materials are on the attached work sheets.

### CONTRACTOR SELF PREFORMED WORK

Excavation and Backfill	\$ 7,000.00
Concrete	\$ 15,000.00
<b>Self Performed Work - NET COST:</b>	<b>\$ 22,000.00</b>
Overhead/Profit/Bond/Insurance @ 12%:	\$ 2,640.00
<b>CONTRACTOR'S SUB-TOTAL:</b>	<b>\$ 24,640.00</b>

### WORK - SUBCONTRACTOR

Gyp Board Ceilings	\$ 4,500.00
Lay in Ceilings - <b>Credit</b>	<b>\$ (1,500.00)</b>
<b>Subcontractor - NET COST:</b>	<b>\$ 3,000.00</b>
Contractor Overhead/Profit/Bonds/Insurance @ 5%:	\$ 150.00
<b>SUBCONTRACTOR'S SUB-TOTAL:</b>	<b>\$ 3,150.00</b>

CONTRACTOR'S SUB-TOTAL	\$ 24,640.00
SUBCONTRACTOR'S SUB-TOTAL	\$ 3,150.00
<b>TOTAL CHANGE ORDER REQUEST NO. 1</b>	<b>\$ 27,790.00</b>

Revision Date: 03/04/13

## **COST PROPOSAL WORKSHEET**

**Change Order Request No.:**

[illegible]

## SECTION 012900 - PAYMENT PROCEDURES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.
- B. Related Requirements:
  - 1. Section 012200 "Unit Prices" for administrative requirements governing the use of unit prices.
  - 2. Section 012600 "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
  - 3. Section 013200 "Construction Progress Documentation" for administrative requirements governing the preparation and submittal of the Contractor's construction schedule.

#### 1.2 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.
  - 1. Coordinate line items in the schedule of values with other required administrative forms and schedules, including the following:
    - a. Application for Payment forms with continuation sheets.
    - b. Submittal schedule.
    - c. Items required to be indicated as separate activities in Contractor's construction schedule.
  - 2. Submit the schedule of values to Architect through Program Manager at earliest possible date but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
  - 3. Subschedules for Phased Work: Where the Work is separated into phases requiring separately phased payments, provide subschedules showing values coordinated with each phase of payment.
- B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.
  - 1. Identification: Include the following Project identification on the schedule of values:
    - a. Project name and location.
    - b. Name of Architect.
    - c. Architect's project number.
    - d. Contractor's name and address.
    - e. Date of submittal.
  - 2. Arrange schedule of values consistent with format of AIA Document G703.
  - 3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with Project Manual table of contents. Provide multiple line items for principal subcontract amounts in excess of five percent of the Contract Sum.



- a. Include separate line items under Contractor and principal subcontracts for Project closeout requirements in an amount totaling five percent of the Contract Sum and subcontract amount.
4. Submit a wage rate schedule to Architect through Program Manager at earliest possible date, but no later than seven days before the date scheduled to submittal of initial Application for Payment. See "Wage Rate Schedule" example, attached. Include hourly wage rates and complete job titles for all personnel on site for the duration of the project.
  - a. The hourly labor rate disclosed shall be fully burdened rate to include the following:
    - 1) Wage, taxes, benefits package, insurance, FUTA, SUTA and workman's compensation. The hourly labor rate shall NOT include overhead cost nor mark up.
    - 2) Time and a Half and Double Time Rates will also need to be submitted and include the same breakdown as above.
5. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
6. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
7. Provide separate line items in the schedule of values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
8. Allowances: Provide a separate line item in the schedule of values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
9. Change Orders: Provide separate sub-line items in the schedule of values for each approved change order portion allocated to each main line item.
10. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
  - a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the schedule of values or distributed as general overhead expense, at Contractor's option.
11. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

### 1.3 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect and Program Manager and paid for by Owner.
  1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.
- B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.
- C. Application for Payment Forms: Use AIA Document G702/CMA and AIA Document G703.

- D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Program Manager will return incomplete applications without action.
1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
  2. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
  3. See attached AIA G703 for format requirements.
  4. Contractor shall provide an updated progress schedule with each pay application.
- E. Transmittal: Submit three signed and notarized original copies of each Application for Payment to Architect and Program Manager by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.
1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- F. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from entities lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment.
1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
  2. When an application shows completion of an item, submit conditional final or full waivers.
  3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
  4. Waiver Forms: Submit executed waivers of lien on forms acceptable to Owner.
- G. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
1. List of subcontractors.
  2. Schedule of values.
  3. Labor rate schedule (see attached).
  4. Contractor's construction schedule (preliminary if not final).
  5. Schedule of unit prices.
  6. Submittal schedule (preliminary if not final).
  7. List of Contractor's staff assignments.
  8. List of Contractor's principal consultants.
  9. Copies of building permits.
  10. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
  11. Initial progress report.
  12. Report of preconstruction conference.
  13. Certificates of insurance and insurance policies.
  14. Updated schedule shall be submitted with each monthly pay application.
- H. Application for Payment at Substantial Completion: After Architect issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.

2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- I. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
  1. Evidence of completion of Project closeout requirements.
  2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
  3. Updated final statement, accounting for final changes to the Contract Sum.
  4. AIA Document G706-1994, "Contractor's Affidavit of Payment of Debts and Claims."
  5. AIA Document G706A-1994, "Contractor's Affidavit of Release of Liens."
  6. AIA Document G707-1994, "Consent of Surety to Final Payment."
  7. Evidence that claims have been settled.
  8. Final liquidated damages settlement statement.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012900



## Kennedy Wage Rates

[illegible]

# CONTINUATION SHEET

AIA DOCUMENT G703

PAGE OF PAGES

AIA Document G702, APPLICATION AND CERTIFICATION FOR PAYMENT, containing Contractor's signed certification is attached.

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

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

APPLICATION NO:

APPLICATION DATE:

PERIOD TO:

ARCHITECT'S PROJECT NO:

A ITEM NO.	B DESCRIPTION OF WORK	C SCHEDULED VALUE	D WORK COMPLETED		F MATERIALS PRESENTLY STORED (NOT IN D OR E)	G		H BALANCE TO FINISH (C - G)	I RETAINAGE (IF VARIABLE RATE)
			FROM PREVIOUS APPLICATION (D + E)	THIS PERIOD		TOTAL COMPLETED AND STORED TO DATE (D+E+F)	% (G ÷ C)		
1	General Conditions								
2	Supervision								
3	Fee								
4	Sitework & Excavation								
5	Submittals								
6	Closeout Documents								
7	Site Utilities								
8	Submittals								
9	Closeout Documents								
10	Asphalt Paving								
11	Submittals								
12	Closeout Documents								
13	Site Concrete								
14	Submittals								
15	Closeout Documents								
16	Building Concrete								
17	Submittals								
18	Closeout Documents								
19	Renovation Concrete								
20	Building Masonry								
21	Submittals								
22	Closeout Documents								
23	Renovation Masonry								
	<b>GRAND TOTALS</b>	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00		\$0.00	

Users may obtain validation of this document by requesting of the license a completed AIA Document D401 - Certification of Document's Authenticity

## SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
  - 1. Coordination drawings.
  - 2. Requests for Information (RFIs).
  - 3. Project meetings.
- B. Related Requirements:
  - 1. Section 017300 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.

#### 1.2 DEFINITIONS

- A. RFI: Request from Owner, Program Manager, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Use CSI Form 1.5A. Include the following information in tabular form:
  - 1. Name, address, and telephone number of entity performing subcontract or supplying products.
  - 2. Number and title of related Specification Section(s) covered by subcontract.
  - 3. Drawing number and detail references, as appropriate, covered by subcontract.

#### 1.4 GENERAL COORDINATION PROCEDURES

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection, and operation.
  - 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
  - 2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
  - 3. Make adequate provisions to accommodate items scheduled for later installation.
- B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at

meetings.

1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
1. Preparation of Contractor's construction schedule.
  2. Preparation of the schedule of values.
  3. Installation and removal of temporary facilities and controls.
  4. Delivery and processing of submittals.
  5. Progress meetings.
  6. Preinstallation conferences.
  7. Project closeout activities.
  8. Startup and adjustment of systems.
- D. **The Contractor will be required to provide an online "cloud"-based collaborative, secure system for exchanging, reviewing, and archiving construction submittals, RFI's and other construction communications electronically. Basis of Design: "Submittal Exchange" or owner approved equivalent system.**

## 1.5 COORDINATION DRAWINGS

- A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.
1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
    - a. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
    - b. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
- B. Coordination Drawing Organization: Organize coordination drawings as follows:
1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid.
  2. Plenum Space: Indicate subframing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within ceiling plenum to accommodate layout of light fixtures indicated on Drawings.
  3. Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
  4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.



5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
6. Review: Architect will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility.

#### 1.6 REQUESTS FOR INFORMATION (RFIs)

- A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
  1. Architect will return RFIs submitted to Architect by other entities controlled by Contractor with no response.
  2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
  1. Project name.
  2. Project number.
  3. Date.
  4. Name of Contractor.
  5. Name of Architect and Program Manager.
  6. RFI number, numbered sequentially.
  7. RFI subject.
  8. Specification Section number and title and related paragraphs, as appropriate.
  9. Drawing number and detail references, as appropriate.
  10. Field dimensions and conditions, as appropriate.
  11. Contractor's suggested resolution. If Contractor's solution(s) impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
  12. Contractor's signature.
  13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
- C. RFI Forms: AIA Document G716.
- D. Architect's and Program Manager's Action: Architect and Program Manager will review each RFI, determine action required, and respond. Allow five working days for Architect's response for each RFI. RFIs received by Architect or Program Manager after 1:00 p.m. will be considered as received the following working day.
  1. The following RFIs will be returned without action:
    - a. Requests for approval of submittals.
    - b. Requests for approval of substitutions.
    - c. Requests for coordination information already indicated in the Contract Documents.
    - d. Requests for adjustments in the Contract Time or the Contract Sum.
    - e. Requests for interpretation of Architect's actions on submittals.
    - f. Incomplete RFIs or inaccurately prepared RFIs.

2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.
  3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 012600 "Contract Modification Procedures."
    - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect and Program Manager in writing within 10 days of receipt of the RFI response.
- E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly. Use CSI Log Form 13.2B.
1. Project name.
  2. Name and address of Contractor.
  3. Name and address of Architect and Program Manager.
  4. RFI number including RFIs that were dropped and not submitted.
  5. RFI description.
  6. Date the RFI was submitted.
  7. Date Architect's and Program Manager's response was received.
- F. On receipt of Architect's and Program Manager's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect and Program Manager within three days if Contractor disagrees with response.
1. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
  2. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.
- 1.7 PROJECT MEETINGS
- A. General: General Contractor will schedule and conduct meetings and conferences at Project site unless otherwise indicated.
1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
  2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
  3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner, Program Manager, and Architect, within three days of the meeting.
- B. Preconstruction Conference: Architect will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement.
1. Attendees: Authorized representatives of Owner, Program Manager, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
  2. Agenda: Discuss items of significance that could affect progress, including the following:
    - a. Tentative construction schedule.
    - b. Phasing.

- c. Critical work sequencing and long-lead items.
  - d. Designation of key personnel and their duties.
  - e. Procedures for processing field decisions and Change Orders.
  - f. Procedures for RFIs.
  - g. Procedures for testing and inspecting.
  - h. Procedures for processing Applications for Payment.
  - i. Distribution of the Contract Documents.
  - j. Submittal procedures.
  - k. Preparation of record documents.
  - l. Use of the premises and existing building.
  - m. Work restrictions.
  - n. Working hours.
  - o. Owner's occupancy requirements.
  - p. Responsibility for temporary facilities and controls.
  - q. Procedures for moisture and mold control.
  - r. Procedures for disruptions and shutdowns.
  - s. Construction waste management and recycling.
  - t. Parking availability.
  - u. Office, work, and storage areas.
  - v. Equipment deliveries and priorities.
  - w. First aid.
  - x. Security.
  - y. Progress cleaning.
3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
- C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.
- 1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect, Program Manager, and Owner's Commissioning Authority of scheduled meeting dates.
  - 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
    - a. Contract Documents.
    - b. Options.
    - c. Related RFIs.
    - d. Related Change Orders.
    - e. Purchases.
    - f. Deliveries.
    - g. Submittals.
    - h. Possible conflicts.
    - i. Compatibility problems.
    - j. Time schedules.
    - k. Weather limitations.
    - l. Manufacturer's written instructions.
    - m. Warranty requirements.
    - n. Compatibility of materials.
    - o. Acceptability of substrates.
    - p. Temporary facilities and controls.
    - q. Space and access limitations.
    - r. Regulations of authorities having jurisdiction.

- s. Testing and inspecting requirements.
  - t. Installation procedures.
  - u. Coordination with other work.
  - v. Required performance results.
  - w. Protection of adjacent work.
  - x. Protection of construction and personnel.
- 3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
  - 4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
  - 5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- D. Progress Meetings: General Contractor will conduct progress meetings at weekly intervals.
- 1. Attendees: Weekly progress review meetings with Owner, Architect, and Contractor are required. These meetings are to be limited to Owner, Architect, and General Contractor only. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
  - 2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
    - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
      - 1) Review schedule for next period.
    - b. Review present and future needs of each entity present, including the following:
      - 1) Interface requirements.
      - 2) Sequence of operations.
      - 3) Status of submittals.
      - 4) Deliveries.
      - 5) Off-site fabrication.
      - 6) Access.
      - 7) Site utilization.
      - 8) Temporary facilities and controls.
      - 9) Progress cleaning.
      - 10) Quality and work standards.
      - 11) Status of correction of deficient items.
      - 12) Field observations.
      - 13) Status of RFIs.
      - 14) Status of proposal requests.
      - 15) Pending changes.
      - 16) Status of Change Orders.
      - 17) Pending claims and disputes.
      - 18) Documentation of information for payment requests.
  - 3. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.
    - a. Schedule Updating: Revise Contractor's construction schedule after each progress



meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

## SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION

### PART 1 - GENERAL

#### 1.1 SUMMARY

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

#### 1.2 DEFINITIONS

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
  - 1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
  - 2. Predecessor Activity: An activity that precedes another activity in the network.
  - 3. Successor Activity: An activity that follows another activity in the network.
- B. Float: The measure of leeway in starting and completing an activity.
  - 1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Format for Submittals: Submit required submittals in the following format:
  - 1. Working electronic copy of schedule file, where indicated.
  - 2. PDF electronic format (11 x 17, if appropriate).
- B. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.
  - 1. Submit a working electronic copy of schedule, using software indicated, and labeled to comply with requirements for submittals. Include type of schedule (initial or updated) and date on label.
- C. Construction Schedule Updating Reports: Submit with Applications for Payment.
- D. Daily Construction Reports: Submit at weekly intervals.

#### 1.4 COORDINATION

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

### PART 2 - PRODUCTS

#### 2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- A. Time Frame: Extend schedule from date established for the Notice to Proceed to date of final completion.
  - 1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- B. Activities: Treat each story or separate area as a separate numbered activity for each main element of the Work. Comply with the following:
  - 1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Architect.
  - 2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
  - 3. Submittal Review Time: Include review and resubmittal times indicated in Section 013300 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
  - 4. Startup and Testing Time: Include no fewer than 15 days for startup and testing.
  - 5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's and Program Manager's administrative procedures necessary for certification of Substantial Completion.
  - 6. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and final completion.
- C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
  - 1. Phasing: Arrange list of activities on schedule by phase.
  - 2. Work under More Than One Contract: Include a separate activity for each contract.
  - 3. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
  - 4. Work Restrictions: Show the effect of the following items on the schedule:
    - a. Coordination with existing construction.
    - b. Limitations of continued occupancies.
    - c. Uninterruptible services.
    - d. Partial occupancy before Substantial Completion.
    - e. Use of premises restrictions.

- f. Provisions for future construction.
  - g. Seasonal variations.
  - h. Environmental control.
- 5. Work Stages: Indicate important stages of construction for each major portion of the Work.
- D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion.
- E. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
  - 1. Unresolved issues.
  - 2. Unanswered Requests for Information.
  - 3. Rejected or unreturned submittals.
  - 4. Notations on returned submittals.
  - 5. Pending modifications affecting the Work and Contract Time.
- F. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule.
- G. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.
  - 1. Use Microsoft Project, .

## 2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE (GANTT CHART)

- A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-type, Contractor's construction schedule within 30 days of date established for the Notice to Proceed.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.
  - 1. For construction activities that require three months or longer to complete, indicate an estimated completion percentage in 10 percent increments within time bar.

## 2.3 REPORTS

- A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
  - 1. List of subcontractors at Project site.
  - 2. List of separate contractors at Project site.
  - 3. Approximate count of personnel at Project site.
  - 4. Equipment at Project site.
  - 5. Material deliveries.
  - 6. High and low temperatures and general weather conditions, including presence of rain or snow.
  - 7. Accidents.
  - 8. Meetings and significant decisions.
  - 9. Unusual events.



10. Stoppages, delays, shortages, and losses.
  11. Meter readings and similar recordings.
  12. Emergency procedures.
  13. Orders and requests of authorities having jurisdiction.
  14. Change Orders received and implemented.
  15. Construction Change Directives received and implemented.
  16. Services connected and disconnected.
  17. Equipment or system tests and startups.
  18. Partial completions and occupancies.
  19. Substantial Completions authorized.
- B. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

### PART 3 - EXECUTION

#### 3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.
1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
  2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
  3. As the Work progresses, indicate final completion percentage for each activity.
  4. Project schedule shall be submitted with every pay request.
- B. Distribution: Distribute copies of approved schedule to Architect, Program Manager, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
1. Post copies in Project meeting rooms and temporary field offices.
  2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION 013200

## SECTION 013300 - SUBMITTAL PROCEDURES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.
- B. Related Requirements:
  - 1. Section 013200 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
  - 2. Section 017823 "Operation and Maintenance Data" for submitting operation and maintenance manuals.
  - 3. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
  - 4. Section 017900 "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.

#### 1.2 DEFINITIONS

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

#### 1.3 ACTION SUBMITTALS

- A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.
- B. Submit Submittal Schedule no later than thirty (3) days after contract date.
- C. ALL submittals to be completed sixty (60) days after contract date.

#### 1.4 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. All submittals shall be made in electronic format unless paper submittals have been previously authorized in writing by the Architect.
- B. Architect's Digital Data Files: Electronic copies of digital data files of the Contract Drawings will not be provided by Architect upon Contractor's request, Contractor's use in preparing submittals.

1. Architect will furnish Contractor one set of digital data drawing files of the Contract Drawings for use in preparing Shop Drawings and Project record drawings.
  - a. Architect makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.
  - b. Contractor shall execute a data licensing agreement in the form of Agreement included in Project Manual.
- C. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
  1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
  2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
    - a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- D. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
  1. Initial Review: Allow 10 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
  2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
  3. Resubmittal Review: Allow 10 days for review of each resubmittal.
- E. 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. Submittal number shall include a prefix indicating the number of the submittal, the six digit specification section and a sequential number indicating how many times the submittal has been submitted.
      - 1) Example: 098413-03-01, where, 098413 is the specification section number, 03 represents the third submittal under Section 098413, and 01 represents the number of times the submittal has been submitted, where 00 is the original submittal, 01 is the first re-submittal and so on.
  3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect.
  4. Transmittal Form for Electronic Submittals: Use electronic form acceptable to Owner, containing the following information:
    - a. Project name.
    - b. Date.
    - c. Name and address of Architect.
    - d. Name of Contractor.
    - e. Name of firm or entity that prepared submittal.

- f. Names of subcontractor, manufacturer, and supplier.
  - g. Category and type of submittal.
  - h. Submittal purpose and description.
  - i. Specification Section number and title.
  - j. Specification paragraph number or drawing designation and generic name for each of multiple items.
  - k. Drawing number and detail references, as appropriate.
  - l. Location(s) where product is to be installed, as appropriate.
  - m. Related physical samples submitted directly.
  - n. Indication of full or partial submittal.
  - o. Transmittal number, numbered consecutively.
  - p. Submittal and transmittal distribution record.
  - q. Other necessary identification.
  - r. Remarks.
- F. Options: Identify options requiring selection by Architect.
- G. Deviations: Identify deviations from the Contract Documents on submittals.
- H. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
- 1. Note date and content of previous submittal.
  - 2. Note date and content of revision in label or title block and clearly indicate extent of revision.
  - 3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.
- I. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- J. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

## PART 2 - PRODUCTS

### 2.1 SUBMITTAL PROCEDURES

- A. General Submittal Procedure Requirements:
- 1. Submit electronic submittals via email as PDF electronic files. Submit files to e-mail address to be identified by Architect, at pre-construction meeting.
    - a. Architect, will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
  - 2. Action Submittals: Submit three paper copies of each submittal unless otherwise indicated. Architect, will return one copy.
  - 3. Informational Submittals: Submit two paper copies of each submittal unless otherwise indicated. Architect will not return copies.
  - 4. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.



- a. Provide a digital signature with digital certificate on electronically-submitted certificates and certifications where indicated.
  - b. Provide a notarized statement on original paper copy certificates and certifications where indicated.
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
  1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
  2. Mark each copy of each submittal to show which products and options are applicable.
  3. Include the following information, as applicable:
    - a. Manufacturer's catalog cuts.
    - b. Manufacturer's product specifications.
    - c. Standard color charts.
    - d. Statement of compliance with specified referenced standards.
    - e. Testing by recognized testing agency.
    - f. Application of testing agency labels and seals.
    - g. Notation of coordination requirements.
    - h. Availability and delivery time information.
  4. For equipment, include the following in addition to the above, as applicable:
    - a. Wiring diagrams showing factory-installed wiring.
    - b. Printed performance curves.
    - c. Operational range diagrams.
    - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
  5. Submit Product Data before or concurrent with Samples.
  6. Submit Product Data in the following format:
    - a. PDF electronic file.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data, unless submittal based on Architect's digital data drawing files is otherwise permitted.
  1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
    - a. Identification of products.
    - b. Schedules.
    - c. Compliance with specified standards.
    - d. Notation of coordination requirements.
    - e. Notation of dimensions established by field measurement.
    - f. Relationship and attachment to adjoining construction clearly indicated.
    - g. Seal and signature of professional engineer if specified.
  2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches (215 by 280 mm), but no larger than 30 by 42 inches (750 by 1067 mm).
  3. Submit Shop Drawings in the following format:
    - a. PDF electronic file.
    - b. Two opaque (bond) copies of each submittal. Architect, will return one copy(ies).
- D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between sub-

mittal and actual component as delivered and installed.

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
  2. Identification: Attach label on unexposed side of Samples that includes the following:
    - a. Generic description of Sample.
    - b. Product name and name of manufacturer.
    - c. Sample source.
    - d. Number and title of applicable Specification Section.
  3. For projects where electronic submittals are required, provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.
  4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
    - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
    - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
  5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
    - a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect, will return submittal with options selected.
  6. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
    - a. Number of Samples: Submit three Insert number sets of Samples. Architect will retain two Sample sets; one will be returned. Mark up and retain one returned Sample set as a project record sample.
      - 1) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.
- E. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
1. Submit product schedule in the following format:
    - a. PDF electronic file.
    - b. Two paper copies of product schedule or list unless otherwise indicated. Architect, will return one copies.
- F. Coordination Drawings Submittals: Comply with requirements specified in Section 013100 "Project Management and Coordination."

- G. Contractor's Construction Schedule: Comply with requirements specified in Section 013200 "Construction Progress Documentation."
- H. Application for Payment and Schedule of Values: Comply with requirements specified in Section 012900 "Payment Procedures."
- I. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 014000 "Quality Requirements."
- J. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 017700 "Closeout Procedures."
- K. Maintenance Data: Comply with requirements specified in Section 017823 "Operation and Maintenance Data."
- L. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.
- M. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.
- N. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
- O. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- P. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- Q. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- R. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- S. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
- T. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project.
- U. Schedule of Tests and Inspections: Comply with requirements specified in Section 014000 "Quality Requirements."

- V. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
- W. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- X. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
- Y. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

## 2.2 DELEGATED-DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
  - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
- B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic file and three paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
  - 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

## PART 3 - EXECUTION

### 3.1 CONTRACTOR'S REVIEW

- A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.
- B. Project Closeout and Maintenance Material Submittals: See requirements in Section 017700 "Closeout Procedures."
- C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.



### 3.2 ARCHITECT'S ACTION

- A. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.
- B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action, as follows:
  - 1. Shop Drawing Review Stamp: The Architect will stamp each submittal with a uniform, shop drawing review stamp. The Architect will mark the stamp appropriately to indicate the action taken, as follows:
    - a. Final Unrestricted Release: When the Architect marks a submittal "**REVIEWED**" the Work covered by the submittal may proceed provided it complies with requirements of the Contract Documents. Final payment depends on that compliance.
    - b. Final-But-Restricted Release: When the Architect marks a submittal "**REVIEWED AS NOTED**", the Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents. Final payment depends on that compliance. In this option, the Architect may require a re-submittal by checking the "**REVISE AND RESUBMIT**" box or not by leaving the "**REVISE AND RESUBMIT**" box blank.
    - c. Returned Rejected: When the Architect marks a submittal "Resubmit" or "**REJECTED**" do not proceed with Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal according to the notations; resubmit without delay. Repeat if necessary to obtain different action mark.
    - d. Acknowledgement only: When the Architect marks a submittal "**INFORMATION ONLY**", the Architect acknowledges receipt. Submittal will be returned for record only.
- C. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
- D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
- E. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

END OF SECTION 013300



## SUBMITTAL TRANSMITTAL

Project: \_\_\_\_\_ Date: \_\_\_\_\_  
A/E Project Number: \_\_\_\_\_

**TRANSMITTAL** To (Contractor): \_\_\_\_\_ Date: \_\_\_\_\_ Submittal No. \_\_\_\_\_  
**A** From (Subcontractor): \_\_\_\_\_ By: \_\_\_\_\_ ☐ Resubmission

Qty.	Reference / Number	Title / Description / Manufacturer	Spec. Section Title and Paragraph / Drawing Detail Reference

- ☐ Submitted for review and approval  
☐ Resubmitted for review and approval  
☐ Complies with contract requirements  
☐ Will be available to meet construction schedule  
☐ A/E review time included in construction schedule

- ☐ Substitution involved - Substitution request attached  
☐ If substitution involved, submission includes point-by-point comparative data or preliminary details  
☐ Items included in submission will be ordered immediately upon receipt of approval

Other remarks on above submission: \_\_\_\_\_

☐ One copy retained by sender

**TRANSMITTAL** To (A/E): \_\_\_\_\_ Attn: \_\_\_\_\_ Date Rec'd by Contractor: \_\_\_\_\_  
**B** From (Contractor): \_\_\_\_\_ By: \_\_\_\_\_ Date Trnsmt'd by Contractor: \_\_\_\_\_

- ☐ Approved  
☐ Approved as noted

- ☐ Revise / Resubmit  
☐ Rejected / Resubmit

Other remarks on above submission: \_\_\_\_\_

☐ One copy retained by sender

**TRANSMITTAL** To (Contractor): \_\_\_\_\_ Attn: \_\_\_\_\_ Date Rec'd by A/E: \_\_\_\_\_  
**C** From (A/E): \_\_\_\_\_ ☐ Other By: \_\_\_\_\_ Date Trnsmt'd by A/E: \_\_\_\_\_

- ☐ Approved  
☐ Approved as noted  
☐ Not subject to review  
☐ No action required  
☐ Revise / Resubmit  
☐ Rejected / Resubmit  
☐ Approved as noted / Resubmit

- ☐ Provide file copy with corrections identified  
☐ Sepia copies only returned  
☐ Point-by-point comparative data required to complete approval process  
☐ Submission Incomplete / Resubmit

Other remarks on above submission: \_\_\_\_\_

☐ One copy retained by sender

**TRANSMITTAL** To (Subcontractor): \_\_\_\_\_ Attn: \_\_\_\_\_ Date Rec'd by Contractor: \_\_\_\_\_  
**D** From (Contractor): \_\_\_\_\_ By: \_\_\_\_\_ Date Trnsmt'd by Contractor: \_\_\_\_\_

Copies: ☐ Owner ☐ Consultants ☐ \_\_\_\_\_ ☐ \_\_\_\_\_ ☐ \_\_\_\_\_ ☐ One copy retained by sender

## SECTION 014000 - QUALITY REQUIREMENTS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
  - 1. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
  - 2. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, Program Manager, or authorities having jurisdiction are not limited by provisions of this Section.
  - 3. Specific test and inspection requirements are not specified in this Section.
  - 4. Unless more stringent requirements are indicated in individual sections testing and inspection program shall comply with the requirements of authorities having jurisdiction and the applicable building code IBC-2009.
    - a. See Section 014000A for the Statement of Special Inspection which is to be filed with the Authority having Jurisdiction as part of the permit application.
- C. Special 'Called Inspection' services are required by the Code Authority having jurisdiction at intervals during construction and at completion of construction. These inspections are required to be conducted by qualified Independent Inspectors. Contractor is required to schedule inspections and notify the Independent Inspector at appropriate time depending on construction activities.

#### 1.2 DEFINITIONS

- A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect or Program Manager.
- C. Mockups: Full-size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.
  - 1. Laboratory Mockups: Full-size physical assemblies constructed at testing facility to verify performance characteristics.

- D. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.
- E. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- F. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.
- G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
  - 1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).
- J. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.
- K. Called Inspection: A routine visit by a Qualified Inspector to check for compliance with applicable codes during construction.
  - 1. Called Inspection Record: A form used during a called inspection to document information regarding compliance or non-compliance, prepared by a qualified inspector.

### 1.3 CONFLICTING REQUIREMENTS

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



#### 1.4 INFORMATIONAL SUBMITTALS

- A. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility sent to authorities having jurisdiction before starting work on the following systems:
1. Seismic-force-resisting system, designated seismic system, or component listed in the designated seismic system quality-assurance plan prepared by Architect.
  2. Main wind-force-resisting system or a wind-resisting component listed in the wind-force-resisting system quality-assurance plan prepared by Architect.
  3. Qualified Inspector's credentials and indicating approval by Illinois State Board of Education (ISBE)

#### 1.5 REPORTS AND DOCUMENTS

- A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
1. Date of issue.
  2. Project title and number.
  3. Name, address, and telephone number of testing agency.
  4. Dates and locations of samples and tests or inspections.
  5. Names of individuals making tests and inspections.
  6. Description of the Work and test and inspection method.
  7. Identification of product and Specification Section.
  8. Complete test or inspection data.
  9. Test and inspection results and an interpretation of test results.
  10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
  11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
  12. Name and signature of laboratory inspector.
  13. Recommendations on retesting and reinspecting.
  14. Called Inspection Records: Submit two copies at appropriate time corresponding with construction activities.
- B. Manufacturer's Field Reports: Prepare written information documenting tests and inspections specified in other Sections. Include the following:
1. Name, address, and telephone number of representative making report.
  2. Statement on condition of substrates and their acceptability for installation of product.
  3. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
  4. Results of operational and other tests and a statement of whether observed performance complies with requirements.
  5. Other required items indicated in individual Specification Sections.
- C. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

## 1.6 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.
- F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
  - 1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.
- G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.
  - 1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
  - 2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
- H. Manufacturer's Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- I. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
  - 1. Contractor responsibilities include the following:
    - a. Provide test specimens representative of proposed products and construction.
    - b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
    - c. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
    - d. When testing is complete, remove test specimens, assemblies, and mockups, and laboratory mockups; do not reuse products on Project.

2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.
- J. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
  1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect.
  2. Notify Architect seven days in advance of dates and times when mockups will be constructed.
  3. Demonstrate the proposed range of aesthetic effects and workmanship.
  4. Obtain Architect's approval of mockups before starting work, fabrication, or construction.
    - a. Allow seven days for initial review and each re-review of each mockup.
  5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
  6. Demolish and remove mockups when directed unless otherwise indicated.
- K. Laboratory Mockups: Comply with requirements of preconstruction testing and those specified in individual Specification Sections.

#### 1.7 QUALITY CONTROL

- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
  1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
  2. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.
- B. Manufacturer's Field Services: Where indicated, engage a manufacturer's representative to observe and inspect the Work. Manufacturer's representative's services include examination of substrates and conditions, verification of materials, inspection of completed portions of the Work, and submittal of written reports.
- C. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- D. Testing Agency Responsibilities: Cooperate with Architect, and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
  1. Notify Architect, and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
  2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
  3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.

4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
  5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
  6. Do not perform any duties of Contractor.
- E. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
1. Access to the Work.
  2. Incidental labor and facilities necessary to facilitate tests and inspections.
  3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
  4. Facilities for storage and field curing of test samples.
  5. Delivery of samples to testing agencies.
  6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
  7. Security and protection for samples and for testing and inspecting equipment at Project site.
- F. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
1. Schedule times for tests, inspections, obtaining samples, and similar activities.

## 1.8 SPECIAL TESTS AND INSPECTIONS

- A. Special Tests and Inspections: Owner will engage Engage a qualified special inspector to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, as indicated in Statement of Special Inspections attached to this Section, and as follows:
1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviews the completeness and adequacy of those procedures to perform the Work.
  2. Notifying Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
  3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect with copy to Contractor and to authorities having jurisdiction.
  4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
  5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
  6. Retesting and reinspecting corrected work.
- B. Called Inspection Records: Provide called inspection records indicating inspections performed and certified by Qualified Inspectors. Perform all inspections required by International Building Code (IBC 2009), International Energy Conservation Code (IECC 2009), International Fire Code (IFC 2009), International Fuel Gas Code (IFGC 2006), and the International Mechanical Code (IMC 2009).
1. Unless otherwise requested by the Regional Office of Education, the following minimum



inspections shall be provided:

- a. See attachment Exhibit A.
2. The Inspection Records shall show the Qualified Inspector's signed authorization to proceed after each phase or milestone of construction.
3. Schedule called inspections required to be completed prior to covering up work.
4. Provide access for Qualified Inspector to perform inspection. Uncover work as required for proper inspection at no additional cost to the Owner

## PART 2 - PRODUCTS (Not Used)

## PART 3 - EXECUTION

### 3.1 TEST AND INSPECTION LOG

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

### 3.2 REPAIR AND PROTECTION

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

END OF SECTION 014000

## CONFIRMATION OF CALLED INSPECTION RECORDS

### ☐ 2009 International Building Code Called Inspection Records

	Called Inspection Type	Approval to Proceed Date	A/E or Qualified Inspector Signature	ISBE ID Number or A/E License Number
1.	Footing			
2.	Foundation			
3.	Concrete Slab / Under-floor			
4.	Lowest Floor Elevation			
5.	Framing			
6.	Lathe and Gypsum Board			
7.	Fire Resistant Penetrations			
8.	Energy Efficiency			
9.	Special Inspection			
10.	Final IBC			

### ☐ 2009 International Electrical Code (Appendix K) Called Inspection Records

	Called Inspection Type	Approval to Proceed Date	A/E or Qualified Inspector Signature	ISBE ID Number or A/E License Number
1.	Prefabricated Assembly Evaluation Report			
2.	Underground			
3.	Rough-in			
4.	Final IEC			

### ☐ 2009 International Energy Conservation Code Called Inspection Records

	Called Inspection Type	Approval to Proceed Date	A/E or Qualified Inspector Signature	ISBE ID Number or A/E License Number
1.	Foundation (thermal envelope)			
2.	Framing (thermal envelope)			
3.	Insulation (thermal envelope)			
4.	Rough-in "Okay to Cover" (mechanical, service water heating, electrical, lighting)			
5.	Final (mechanical, service water heating, electrical, lighting)			
6.	Final IECC			

### ☐ 2009 International Fire Code Called Inspection Records

	Called Inspection Type	Approval to Proceed Date	A/E or Qualified Inspector Signature	ISBE ID Number or A/E License Number
1.	Final IFC			

### ☐ 2009 International Mechanical and Fuel Gas Code Called Inspection Records

	Called Inspection Type	Approval to Proceed Date	A/E or Qualified Inspector Signature	ISBE ID Number or A/E License Number
1.	Prefabricated Assembly Evaluation Report			
2.	Underground Piping			
3.	Rough-in			
4.	Final IMC & IFGC			

## SECTION 014200 - REFERENCES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 DEFINITIONS

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.
- C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."
- D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."
- E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.
- F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
- H. "Provide": Furnish and install, complete and ready for the intended use.
- I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

#### 1.3 INDUSTRY STANDARDS

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

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

#### 1.4 ABBREVIATIONS AND ACRONYMS

- A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Thomson Gale's "Encyclopedia of Associations" or in Columbia Books' "National Trade & Professional Associations of the U.S."
- B. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 014200



## SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
- B. Related Requirements:
  - 1. Section 011000 "Summary" for work restrictions and limitations on utility interruptions.

#### 1.2 USE CHARGES

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

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.
- B. Erosion- and Sedimentation-Control Plan: Show compliance with requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.
- C. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire prevention program.

#### 1.4 QUALITY ASSURANCE

- A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

- B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.
- C. Accessible Temporary Egress: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

## 1.5 PROJECT CONDITIONS

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

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Portable Chain-Link Fencing: Minimum 2-inch (50-mm), 0.148-inch- (3.8-mm-) thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet (1.8 m) high with galvanized-steel pipe posts; minimum 2-3/8-inch- (60-mm-) OD line posts and 2-7/8-inch- (73-mm-) OD corner and pull posts. Provide galvanized-steel bases for supporting posts.

### 2.2 TEMPORARY FACILITIES

- A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.
- B. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.

### 2.3 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
  - 1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
  - 2. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
  - 1. Locate facilities to limit site disturbance as specified in Section 011000 "Summary."
- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

### 3.2 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.
  - 1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.
  - 1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.
- C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.
- D. Water Service: Connect to Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.
- E. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
  - 1. Toilets: Use of Owner's existing toilet facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.
- F. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.
- G. Electric Power Service: Connect to Owner's existing electric power service, but only up to 100A capacity. Maintain equipment in a condition acceptable to Owner.
- H. Electric Power Service: If more than 100A is needed, provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.
  - 1. Install electric power service overhead unless otherwise indicated.

2. Connect temporary service to Owner's existing power source, as directed by Owner.
- I. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
  1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
- J. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install one telephone line(s) for each field office.
  1. At each telephone, post a list of important telephone numbers.
    - a. Police and fire departments.
    - b. Ambulance service.
    - c. Contractor's home office.
    - d. Contractor's emergency after-hours telephone number.
    - e. Architect's office.
    - f. Engineers' offices.
    - g. Owner's office.
    - h. Principal subcontractors' field and home offices.
  2. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.

### 3.3 SUPPORT FACILITIES INSTALLATION

- A. General: Comply with the following:
  1. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet (9 m) of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.
  2. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.
- B. Traffic Controls: Comply with requirements of authorities having jurisdiction.
  1. Protect existing site improvements to remain including curbs, pavement, and utilities.
  2. Maintain access for fire-fighting equipment and access to fire hydrants.
- C. Parking: Use designated areas of Owner's existing parking areas for construction personnel.
- D. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
  1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
  2. Remove snow and ice as required to minimize accumulations.
- E. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.
  1. Identification Signs: Provide Project identification signs as indicated on Drawings.
  2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.
    - a. Provide temporary, directional signs for construction personnel and visitors.
  3. Maintain and touchup signs so they are legible at all times.



- F. Waste Disposal Facilities: Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."
- G. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
  - 1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.
- H. Existing Stair Usage: Use of Owner's existing stairs will be permitted, provided stairs are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore stairs to condition existing before initial use.
  - 1. Provide protective coverings, barriers, devices, signs, or other procedures to protect stairs and to maintain means of egress. If stairs become damaged, restore damaged areas so no evidence remains of correction work.
- I. Temporary Use of Permanent Stairs: Use of new stairs for construction traffic will be permitted, provided stairs are protected and finishes restored to new condition at time of Substantial Completion.

### 3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.
- B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
- C. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
- D. Tree and Plant Protection: Comply with requirements specified in Section 015639 "Temporary Tree and Plant Protection."
- E. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using environmentally safe materials.
- F. Site Enclosure Fence: Prior to commencing earthwork, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.
  - 1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.
  - 2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Furnish one set of keys to Owner.
- G. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each work day.

- H. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- I. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.
- J. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
  - 1. Where heating or cooling is needed and permanent enclosure is not complete, insulate temporary enclosures.
- K. Temporary Partitions: Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by Owner from fumes and noise.
  - 1. Construct dustproof partitions with gypsum wallboard with joints taped on occupied side, and fire-retardant-treated plywood on construction operations side.
  - 2. Construct dustproof partitions with two layers of 6-mil (0.14-mm) polyethylene sheet on each side. Cover floor with two layers of 6-mil (0.14-mm) polyethylene sheet, extending sheets 18 inches (460 mm) up the sidewalls. Overlap and tape full length of joints. Cover floor with fire-retardant-treated plywood.
    - a. Construct vestibule and airlock at each entrance through temporary partition with not less than 48 inches (1219 mm) between doors. Maintain water-dampened foot mats in vestibule.
  - 3. Where fire-resistance-rated temporary partitions are indicated or are required by authorities having jurisdiction, construct partitions according to the rated assemblies.
  - 4. Insulate partitions to control noise transmission to occupied areas.
  - 5. Seal joints and perimeter. Equip partitions with gasketed dustproof doors and security locks where openings are required.
  - 6. Protect air-handling equipment.
  - 7. Provide walk-off mats at each entrance through temporary partition.
- L. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire prevention program.
  - 1. Prohibit smoking in construction areas.
  - 2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
  - 3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
  - 4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

### 3.5 MOISTURE AND MOLD CONTROL

- A. Contractor's Moisture Protection Plan: Avoid trapping water in finished work. Document visible signs of mold that may appear during construction.

- B. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect materials from water damage and keep porous and organic materials from coming into prolonged contact with concrete.
- C. Partially Enclosed Construction Phase: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:
  - 1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
  - 2. Keep interior spaces reasonably clean and protected from water damage.
  - 3. Discard or replace water-damaged and wet material.
  - 4. Discard, replace, or clean stored or installed material that begins to grow mold.
  - 5. Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.
- D. Controlled Construction Phase of Construction: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:
  - 1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
  - 2. Remove materials that can not be completely restored to their manufactured moisture level within 48 hours.

### 3.6 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal.
  - 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
  - 1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
  - 2. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017700 "Closeout Procedures."

END OF SECTION 015000

## SECTION 016000 - PRODUCT REQUIREMENTS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.
- B. Related Requirements:
  - 1. Section 012500 "Substitution Procedures" for requests for substitutions.

#### 1.2 DEFINITIONS

- A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
  - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
  - 2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
  - 3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.
- C. Where a Basis of Design Product is specified, the project shall be assumed to have been designed to accommodate all the requirements of the Basis of Design Product. Should the acceptable alternate product be used, the Contractor shall bear the cost of modifications, which may be required to accommodate the alternate product.
  - 1. Modifications that may be required include but are not limited to:
    - a. Alterations due to physical size and weight of equipment.
    - a. Electrical power and grounding requirements
    - b. Cabling, auxiliary equipment, and controls.
    - c. Water and sanitation requirements.
    - d. Heating, air-conditioning and ventilation requirement.
  - 2. The cost of modifications shall include the cost of re-engineering and revisions to drawings and specifications, as required. These costs shall be paid directly from the Contractor.



tor to the Architect.

### 1.3 ACTION SUBMITTALS

- A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
- B. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 013300 "Submittal Procedures." Show compliance with requirements.

### 1.4 QUALITY ASSURANCE

- A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.
- B. Asbestos Containing Materials (ACM): Products containing any Asbestos Containing Materials, shall not be used on this project. Contractor shall certify in writing, as part of Closeout requirements, that ACM containing products have not been used in the project.
- C. Paint containing lead may shall not be used on this project. Contractor shall certify in writing, as part of Closeout requirements, that Lead containing paints have not been used in the project.

### 1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.
- B. Delivery and Handling:
  - 1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
  - 2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
  - 3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
  - 4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.
- C. Storage:
  - 1. Store products to allow for inspection and measurement of quantity or counting of units.
  - 2. Store materials in a manner that will not endanger Project structure.
  - 3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
  - 4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.

5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.

## 1.6 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
  1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
  2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.
- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
  1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
  2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
  3. Refer to other Sections for specific content requirements and particular requirements for submitting special warranties.
- C. Submittal Time: Comply with requirements in Section 017700 "Closeout Procedures."

## PART 2 - PRODUCTS

### 2.1 PRODUCT SELECTION PROCEDURES

- A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
  1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
  2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
  3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
  4. Where products are accompanied by the term "as selected," Architect will make selection.
  5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
- B. Product Selection Procedures:
  1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.

2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
  3. Products:
    - a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
    - b. Nonrestricted List: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product.
  4. Manufacturers:
    - a. Restricted List: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
    - b. Nonrestricted List: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.
  5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.
- C. Visual Matching Specification: Where Specifications require "match Architect's sample", provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.
1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 012500 "Substitution Procedures" for proposal of product.
- D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.
- ## 2.2 COMPARABLE PRODUCTS
- A. Conditions for Consideration: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:
1. Evidence that the proposed product does not require revisions to the Contract Documents,

- that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
  3. Evidence that proposed product provides specified warranty.
  4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
  5. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION 016000



## SECTION 017300 - EXECUTION

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:
  - 1. Construction layout.
  - 2. Field engineering and surveying.
  - 3. Installation of the Work.
  - 4. Cutting and patching.
  - 5. Coordination of Owner-installed products.
  - 6. Progress cleaning.
  - 7. Starting and adjusting.
  - 8. Protection of installed construction.
  - 9. Correction of the Work.
- B. Related Requirements:
  - 1. Section 011000 "Summary" for limits on use of Project site.
  - 2. Section 013300 "Submittal Procedures" for submitting surveys.
  - 3. Section 017700 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.
  - 4. Section 024119 "Selective Structure Demolition" for demolition and removal of selected portions of the building.
  - 5. Section 078413 "Penetration Firestopping" for patching penetrations in fire-rated construction.

#### 1.3 DEFINITIONS

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

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For land surveyor professional engineer.

- B. Certificates: Submit certificate signed by land surveyor professional engineer certifying that location and elevation of improvements comply with requirements.
- C. Cutting and Patching Plan: Submit plan describing procedures at least 10 days prior to the time cutting and patching will be performed. Include the following information:
  - 1. Extent: Describe reason for and extent of each occurrence of cutting and patching.
  - 2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
  - 3. Products: List products to be used for patching and firms or entities that will perform patching work.
  - 4. Dates: Indicate when cutting and patching will be performed.
  - 5. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be re-located and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted.
    - a. Include description of provisions for temporary services and systems during interruption of permanent services and systems.
- D. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.
- E. Certified Surveys: Submit two copies signed by land surveyor professional engineer.
- F. Final Property Survey: Submit 10 copies showing the Work performed and record survey data.

## 1.5 QUALITY ASSURANCE

- A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.
- B. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
  - 1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection
  - 2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operational elements include the following:
    - a. Primary operational systems and equipment.
    - b. Fire separation assemblies.
    - c. Air or smoke barriers.
    - d. Fire-suppression systems.
    - e. Mechanical systems piping and ducts.
    - f. Control systems.
    - g. Communication systems.
    - h. Fire-detection and -alarm systems.

- i. Conveying systems.
    - j. Electrical wiring systems.
    - k. Operating systems of special construction.
  - 3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Other construction elements include but are not limited to the following:
    - a. Water, moisture, or vapor barriers.
    - b. Membranes and flashings.
    - c. Exterior curtain-wall construction.
    - d. Sprayed fire-resistive material.
    - e. Equipment supports.
    - f. Piping, ductwork, vessels, and equipment.
    - g. Noise- and vibration-control elements and systems.
  - 4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- C. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.
- D. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

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

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.

1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services, and other utilities.
  2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
  2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
  3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
- C. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
1. Description of the Work.
  2. List of detrimental conditions, including substrates.
  3. List of unacceptable installation tolerances.
  4. Recommended corrections.
- D. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

### 3.2 PREPARATION

- A. Existing Utility Information: Furnish information to Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Section 013100 "Project Management and Coordination."



### 3.3 CONSTRUCTION LAYOUT

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

### 3.4 FIELD ENGINEERING

- A. Identification: Owner will identify existing benchmarks, control points, and property corners.
- B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
  - 1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect or Program Manager. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect and Program Manager before proceeding.
  - 2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.
- C. Benchmarks: Establish and maintain a minimum of [two] <Insert number> permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.
  - 1. Record benchmark locations, with horizontal and vertical data, on Project Record Docu-

- ments.
- 2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
- 3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.

### 3.5 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
  - 1. Make vertical work plumb and make horizontal work level.
  - 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
  - 3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
  - 4. Maintain minimum headroom clearance of **96 inches (2440 mm)** in occupied spaces and **90 inches (2300 mm)** in unoccupied spaces.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.
- F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
  - 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
  - 2. Allow for building movement, including thermal expansion and contraction.
  - 3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

- J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

### 3.6 CUTTING AND PATCHING

- A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
  - 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.
- C. Temporary Support: Provide temporary support of work to be cut.
- D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 011000 "Summary."
- F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.
- G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
  - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
  - 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
  - 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
  - 4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
  - 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
  - 6. Proceed with patching after construction operations requiring cutting are complete.
- H. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.
  - 1. Inspection: Where feasible, test and inspect patched areas after completion to demon-

- strate physical integrity of installation.
  - 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
    - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
    - b. Restore damaged pipe covering to its original condition.
  - 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
    - a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
  - 4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
  - 5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.
- I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

### 3.7 OWNER-INSTALLED PRODUCTS

- A. Site Access: Provide access to Project site for Owner's construction personnel.
- B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction personnel.
  - 1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.
  - 2. Preinstallation Conferences: Include Owner's construction personnel at preinstallation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction personnel if portions of the Work depend on Owner's construction.

### 3.8 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
  - 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
  - 2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F (27 deg C).
  - 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

- a. Use containers intended for holding waste materials of type to be stored.
4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
  1. Remove liquid spills promptly.
  2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 015000 "Temporary Facilities and Controls."
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

### 3.9 STARTING AND ADJUSTING

- A. Coordinate startup and adjusting of equipment and operating components with requirements in Section 019113 "General Commissioning Requirements."
- B. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- C. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.
- D. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.



- E. Manufacturer's Field Service: Comply with qualification requirements in Section 014000 "Quality Requirements."

3.10 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION 017300



## 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

## SECTION 017329 - CUTTING AND PATCHING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This Section includes procedural requirements for cutting and patching.
- B. See Divisions 2 through 16 Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.

#### 1.2 SUBMITTALS

- A. Cutting and Patching Proposal: Submit a proposal describing procedures at least **10** days before the time cutting and patching will be performed, requesting approval to proceed. Include the following information:
  - 1. Extent: Describe cutting and patching, show how they will be performed, and indicate why they cannot be avoided.
  - 2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building's appearance and other significant visual elements.
  - 3. Products: List products to be used and firms or entities that will perform the Work.
  - 4. Dates: Indicate when cutting and patching will be performed.

#### 1.3 QUALITY ASSURANCE

- A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.
- B. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.
- C. Miscellaneous Elements: Do not cut and patch miscellaneous elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.
- D. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

#### 1.4 WARRANTY

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

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

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

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.
  - 1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with in-place finishes or primers.
  - 2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

#### 3.2 PREPARATION

- A. Temporary Support: Provide temporary support of Work to be cut.
- B. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- D. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to **prevent** interruption to occupied areas.

#### 3.3 PERFORMANCE

- A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
  2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
  3. Stone Sill: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
  4. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
  5. Proceed with patching after construction operations requiring cutting are complete.
- C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections.
1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
  2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
  3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
  4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
  5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.
- D. Cleaning: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.

END OF SECTION 017329



## SECTION 017700 - CLOSEOUT PROCEDURES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
  - 1. Substantial Completion procedures.
  - 2. Final completion procedures.
  - 3. Warranties.
  - 4. Final cleaning.
  - 5. Repair of the Work.
  - 6. Electronic Document Closeout.
- B. Related Requirements:
  - 1. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.
  - 2. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
  - 3. Section 017900 "Demonstration and Training" for requirements for instructing Owner's personnel.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For cleaning agents.
- B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.
- C. Certified List of Incomplete Items: Final submittal at Final Completion.

#### 1.3 CLOSEOUT SUBMITTALS

- A. Certificates of Release: From authorities having jurisdiction.
- B. Certificate of Insurance: For continuing coverage.
- C. Field Report: For pest control inspection.

#### 1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

## 1.5 SUBSTANTIAL COMPLETION PROCEDURES

- A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.
- B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
  - 1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
  - 2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
  - 3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
  - 4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Program Manager. Label with manufacturer's name and model number where applicable.
    - a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Program Manager's signature for receipt of submittals.
  - 5. Submit test/adjust/balance records.
  - 6. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
- C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
  - 1. Advise Owner of pending insurance changeover requirements.
  - 2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
  - 3. Complete startup and testing of systems and equipment.
  - 4. Perform preventive maintenance on equipment used prior to Substantial Completion.
  - 5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 017900 "Demonstration and Training."
  - 6. Advise Owner of changeover in heat and other utilities.
  - 7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
  - 8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
  - 9. Complete final cleaning requirements, including touchup painting.
  - 10. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
- D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the work will be completed and ready for final inspection and

tests. On receipt of request, Architect and Program Manager will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for final completion.
1. Number of Inspections: The Architect will perform one substantial completion inspection and one substantial completion re-inspection at no cost to the contractor. If additional re-inspections are required, the Contractor shall reimburse the Architect on a per diem basis based on the Architect's Project Manager rate.
2. Submit Called Inspection Records.

E. Occupancy Inspection: When the Architect and Program Manager deem that the Project is substantially complete, the Architect or Program Manager will notify the Regional Office of Education and request an Occupancy Permit.

1. Documentation required prior to Occupancy Inspection:
  - a. Application for Occupancy Permit prepared by Architect and signed by the District's Superintendent and the President of the Board of Education.
  - a. Architect's and Program Manager's list of items to be completed and corrected (punch list).
  - b. Copies of Called Inspections Record for all disciplines.
2. Upon receipt of Occupancy Permit the Architect will prepare the Certificate of Substantial Completion or will notify the Contractor of items either on Contractor's list or additional items identified by Architect, Program Manager and ROE, that must be completed or corrected before certificate will be issued.
3. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
4. Results of completed inspection will form the basis of requirements for Final Completion.

## 1.6 FINAL COMPLETION PROCEDURES

A. Preliminary Procedures: Before requesting final inspection for determining final completion, complete the following:

1. Submit a final Application for Payment according to Section 012900 "Payment Procedures."
2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Submit pest-control final inspection report and warranty.
5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.

B. Inspection: Submit a written request for final inspection to determine acceptance. On receipt of request, Architect and Program Manager will either proceed with inspection or notify Con-

tractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Number of Inspections: The Architect will perform one final completion inspection and one final completion re-inspection at no cost to the contractor. If additional re-inspections are required, the Contractor shall reimburse the Architect on a per diem basis based on the Architect's Project Manager rate.

#### 1.7 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

- A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction. Use CSI Form 14.1A.
  1. Organize list of spaces in sequential order, starting with exterior areas first .
  2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
  3. Submit list of incomplete items in the following format:
    - a. MS Excel electronic file. Architect, through Program Manager, will return annotated copy.
    - b. PDF electronic file. Architect, through Program Manager, will return annotated copy.
    - c. paper copies unless otherwise indicated. Architect, through Program Manager, will return two copies.

#### 1.8 SUBMITTAL OF PROJECT WARRANTIES

- A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner's rights under warranty.
- B. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.
  1. Bind warranties and bonds in (2) heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch (215-by-280-mm) paper.
  2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
  3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
  4. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.
- C. Provide additional copies of each warranty to include in operation and maintenance manuals.

## 1.9 CERTIFICATIONS

- A. General: Provide certification on each Contractor's letter head and signed and sealed by Firm's authorized legal representative, stating the following:
  - 1. No asbestos containing materials (ACM) have been incorporated into the project and that all products installed in the project have been manufactured without ACM components.
  - 2. No lead containing materials have been incorporated into the project and that all products installed in the project have been manufactured without lead components.

## 1.10 ELECTRONIC CLOSEOUT DOCUMENTATION

- A. General: Provide a complete project closeout documentation package in electronic format. This package shall include:
  - 1. Project Record Documents.
  - 2. Approved Submittals.
  - 3. Operation and Maintenance Manuals.
  - 4. Warranties.
  - 5. Owner training DVD's.
  - 6. Project Contact Directory.
- B. The Electronic Closeout Documentation shall be prepared by Digital Revolution Inc./BHFX LLC Contact TJ Hurckes at 847-899-3414 or [tj.hurckes@bhfx.net](mailto:tj.hurckes@bhfx.net).
- C. In order to facilitate the Electronic Closeout Documentation process, comply with the following procedures:
  - 1. Contact Digital Revolution, Inc. a minimum of three months prior to the date of Substantial Completion to schedule a pre-closeout meeting. Review the following:
    - a. Format of documents: PDF electronic format for all documents.
    - b. Folder structure for storage and transfer of files.
    - c. Schedule for collection and turn-over of closeout documentation.
    - d. Record Document format procedures: Provide clean and accurate paper copies of the marked-up Record Documents (Drawings and Specifications) for scanning.
    - e. Provide contact information for the individual responsible for the collection and transfer of the electronic closeout Documentation package contents.
    - f. Review a complete listing of closeout documentation package contents.
  - 2. Provide all Documentation to Digital Revolution, Inc. for processing no later than 30 days after the date of Substantial Completion.
  - 3. Schedule a training conference with the Owner's Representative, Architect, Program Manager and Digital Revolution, Inc. to present the completed Electronic Closeout Documentation Package.
  - 4. Cost of this service will be paid by RPS 205 directly to BHFX.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.



1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

## PART 3 - EXECUTION

### 3.1 FINAL CLEANING

- A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
  1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:
    - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
    - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
    - c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
    - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
    - e. Remove snow and ice to provide safe access to building.
    - f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
    - g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
    - h. Sweep concrete floors broom clean in unoccupied spaces.
    - i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
    - j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
    - k. Remove labels that are not permanent.
    - l. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
    - m. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
    - n. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
    - o. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
    - p. Leave Project clean and ready for occupancy.
- C. Pest Control: Comply with pest control requirements in Section 015000 "Temporary Facilities and Controls." Prepare written report.

### 3.2 REPAIR OF THE WORK

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

END OF SECTION 017700



## PUNCH LIST

Project: \_\_\_\_\_  
\_\_\_\_\_

From (A/E): \_\_\_\_\_

Site Visit Date: \_\_\_\_\_

To (Contractor): \_\_\_\_\_  
\_\_\_\_\_

A/E Project Number: \_\_\_\_\_

Contract For: \_\_\_\_\_

The following items require the attention of the Contractor for completion or correction. This list may not be all-inclusive, and the failure to include any items on this list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

Item Number	Room Number	Location (Area)	Description	Correction/Completion Date	Verification A/E Check
----------------	----------------	--------------------	-------------	-------------------------------	---------------------------

☐ Attachments

Signed by: \_\_\_\_\_ Date: \_\_\_\_\_

Copies: ☐ Owner ☐ Consultants ☐ \_\_\_\_\_ ☐ \_\_\_\_\_ ☐ \_\_\_\_\_ ☐ \_\_\_\_\_ ☐ \_\_\_\_\_ ☐ \_\_\_\_\_ ☐ \_\_\_\_\_ ☐ File

## SECTION 017823 - OPERATION AND MAINTENANCE DATA

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
  - 1. Operation and maintenance documentation directory.
  - 2. Emergency manuals.
  - 3. Operation manuals for systems, subsystems, and equipment.
  - 4. Product maintenance manuals.
  - 5. Systems and equipment maintenance manuals.

#### 1.2 CLOSEOUT SUBMITTALS

- A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
  - 1. Architect will comment on whether content of operations and maintenance submittals are acceptable.
  - 2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.
- B. Format: Submit operations and maintenance manuals in the following format:
- C. Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Architect will return copy with comments.
  - 1. Correct or revise each manual to comply with Architect's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's comments and prior to commencing demonstration and training.

### PART 2 - PRODUCTS

#### 2.1 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

- A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information.
- B. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
  - 1. Title page.
  - 2. Table of contents.

3. Manual contents.
- C. Title Page: Include the following information:
1. Subject matter included in manual.
  2. Name and address of Project.
  3. Name and address of Owner.
  4. Date of submittal.
  5. Name and contact information for Contractor.
  6. Name and contact information for Program Manager.
  7. Name and contact information for Architect.
  8. Name and contact information for Commissioning Authority.
  9. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
  10. Cross-reference to related systems in other operation and maintenance manuals.
- D. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
- E. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
- F. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.
1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
  2. File Names and Bookmarks: Enable bookmarking of individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.
- G. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.
1. Binders: (2) Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch (215-by-280-mm) paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
    - a. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents, and indicate Specification Section number on bottom of spine. Indicate volume number for multiple-volume sets.
  2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
  3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.



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

## 2.2 EMERGENCY MANUALS

- A. Content: Organize manual into a separate section for each of the following:
  1. Type of emergency.
  2. Emergency instructions.
  3. Emergency procedures.
- B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:
  1. Fire.
  2. Flood.
  3. Gas leak.
  4. Water leak.
  5. Power failure.
  6. Water outage.
  7. System, subsystem, or equipment failure.
  8. Chemical release or spill.
- C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.
- D. Emergency Procedures: Include the following, as applicable:
  1. Instructions on stopping.
  2. Shutdown instructions for each type of emergency.
  3. Operating instructions for conditions outside normal operating limits.
  4. Required sequences for electric or electronic systems.
  5. Special operating instructions and procedures.

## 2.3 OPERATION MANUALS

- A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
  1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
  2. Performance and design criteria if Contractor is delegated design responsibility.
  3. Operating standards.
  4. Operating procedures.
  5. Operating logs.
  6. Wiring diagrams.
  7. Control diagrams.

8. Piped system diagrams.
9. Precautions against improper use.
10. License requirements including inspection and renewal dates.

B. Descriptions: Include the following:

1. Product name and model number. Use designations for products indicated on Contract Documents.
2. Manufacturer's name.
3. Equipment identification with serial number of each component.
4. Equipment function.
5. Operating characteristics.
6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.
9. Complete nomenclature and number of replacement parts.

C. Operating Procedures: Include the following, as applicable:

1. Startup procedures.
2. Equipment or system break-in procedures.
3. Routine and normal operating instructions.
4. Regulation and control procedures.
5. Instructions on stopping.
6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

## 2.4 PRODUCT MAINTENANCE MANUALS

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

C. Product Information: Include the following, as applicable:

1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.
4. Material and chemical composition.
5. Reordering information for specially manufactured products.

- D. Maintenance Procedures: Include manufacturer's written recommendations and the following:
  - 1. Inspection procedures.
  - 2. Types of cleaning agents to be used and methods of cleaning.
  - 3. List of cleaning agents and methods of cleaning detrimental to product.
  - 4. Schedule for routine cleaning and maintenance.
  - 5. Repair instructions.
- E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

## 2.5 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

- A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.
- B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.
- C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
  - 1. Standard maintenance instructions and bulletins.
  - 2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
  - 3. Identification and nomenclature of parts and components.
  - 4. List of items recommended to be stocked as spare parts.
- D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
  - 1. Test and inspection instructions.
  - 2. Troubleshooting guide.
  - 3. Precautions against improper maintenance.
  - 4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
  - 5. Aligning, adjusting, and checking instructions.
  - 6. Demonstration and training video recording, if available.
- E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
- F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

- G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.
- H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

### PART 3 - EXECUTION

#### 3.1 MANUAL PREPARATION

- A. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.
- B. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- C. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
- D. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
- E. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.
  - 1. Do not use original project record documents as part of operation and maintenance manuals.
- F. Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 017823

## SECTION 017839 - PROJECT RECORD DOCUMENTS

### PART 1 - GENERAL

#### 1.1 SUMMARY

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

#### 1.2 CLOSEOUT SUBMITTALS

- A. Record Drawings: Comply with the following:
  - 1. Number of Copies: Submit one set of marked-up record prints.
- B. Record Specifications: Submit one paper copy of Project's Specifications, including addenda and contract modifications.
- C. Record Product Data: Submit one paper copy of each submittal.

### PART 2 - PRODUCTS

#### 2.1 RECORD DRAWINGS

- A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised Drawings as modifications are issued.
  - 1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.
    - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
    - b. Record data as soon as possible after obtaining it.
    - c. Record and check the markup before enclosing concealed installations.
  - 2. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
  - 3. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.



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

## 2.2 RECORD SPECIFICATIONS

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

## 2.3 RECORD PRODUCT DATA

- A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
  1. Give particular attention to information on concealed products and installations that can-

- not be readily identified and recorded later.
- 2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
- 3. Note related Change Orders, record Specifications, and record Drawings where applicable.

- B. Format: Submit record Product Data as annotated PDF electronic file paper copyscanned PDF electronic file(s) of marked-up paper copy of Product Data.

## 2.4 MISCELLANEOUS RECORD SUBMITTALS

- A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.
- B. Format: Submit miscellaneous record submittals as PDF electronic file paper copyscanned PDF electronic file(s) of marked-up miscellaneous record submittals.

## PART 3 - EXECUTION

### 3.1 RECORDING AND MAINTENANCE

- A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.
- B. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect's and Program Manager's reference during normal working hours.

END OF SECTION 017839

## SECTION 017900 - DEMONSTRATION AND TRAINING

### PART 1 - GENERAL

#### 1.1 SUMMARY

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

#### 1.2 INFORMATIONAL SUBMITTALS

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

#### 1.3 QUALITY ASSURANCE

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

#### 1.4 COORDINATION

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

## PART 2 - PRODUCTS

### 2.1 INSTRUCTION PROGRAM

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

- m. Special operating instructions and procedures.
- 5. Adjustments: Include the following:
  - a. Alignments.
  - b. Checking adjustments.
  - c. Noise and vibration adjustments.
  - d. Economy and efficiency adjustments.
- 6. Troubleshooting: Include the following:
  - a. Diagnostic instructions.
  - b. Test and inspection procedures.
- 7. Maintenance: Include the following:
  - a. Inspection procedures.
  - b. Types of cleaning agents to be used and methods of cleaning.
  - c. List of cleaning agents and methods of cleaning detrimental to product.
  - d. Procedures for routine cleaning
  - e. Procedures for preventive maintenance.
  - f. Procedures for routine maintenance.
  - g. Instruction on use of special tools.
- 8. Repairs: Include the following:
  - a. Diagnosis instructions.
  - b. Repair instructions.
  - c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
  - d. Instructions for identifying parts and components.
  - e. Review of spare parts needed for operation and maintenance.

### PART 3 - EXECUTION

#### 3.1 PREPARATION

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

#### 3.2 INSTRUCTION

- A. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
  - 1. Architect will furnish an instructor to describe basis of system design, operational requirements, criteria, and regulatory requirements.
  - 2. Owner will furnish an instructor to describe Owner's operational philosophy.
  - 3. Owner will furnish Contractor with names and positions of participants.
- B. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
  - 1. Schedule training with Owner, through Program Manager, with at least seven days' advance notice.



- C. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.
- D. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of a written performance-based test.

END OF SECTION 017900

## SECTION 096519 - RESILIENT TILE FLOORING

### PART 1 - GENERAL

#### 1.1 SUMMARY

##### A. Section Includes:

1. Vinyl composition floor tile; patching of new VCT around new univent equipment.

#### 1.2 ACTION SUBMITTALS

##### A. Product Data: For each type of product.

##### B. Shop Drawings: For each type of floor tile. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.

1. Show details of special patterns.

##### C. Samples: Full-size units of each color and pattern of floor tile required.

#### 1.3 CLOSEOUT SUBMITTALS

##### A. Maintenance data.

### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

##### A. Fire-Test-Response Characteristics: For resilient tile flooring, as determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

#### 2.2 VINYL COMPOSITION FLOOR TILE

##### A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. American Biltrite.
2. Armstrong World Industries, Inc.
3. Congoleum Corporation.
4. Mannington Mills, Inc.

##### B. Tile Standard: ASTM F 1066, Class 2, through-pattern tile.

##### C. Wearing Surface: Smooth.

##### D. Thickness: 0.125 inch (3.2 mm).

- E. Size: 12 by 12 inches (305 by 305 mm).
- F. Colors and Patterns: As selected by Architect from full range of industry colors.

## 2.3 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by floor tile manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by floor tile and adhesive manufacturers to suit floor tile and substrate conditions indicated.
- C. Floor Polish: Provide protective, liquid floor-polish products recommended by floor tile manufacturer.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Prepare substrates according to floor tile manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates: Prepare according to ASTM F 710.
  - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
  - 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by floor tile manufacturer. Do not use solvents.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- D. Do not install floor tiles until they are the same temperature as the space where they are to be installed.
- E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient floor tile.

### 3.2 FLOOR TILE INSTALLATION

- A. Comply with manufacturer's written instructions for installing floor tile.
- B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.
  - 1. Lay tiles square with room axis.

- C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.
  - 1. Lay tiles with grain direction alternating in adjacent tiles (basket-weave pattern).
- D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
- E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent marking device.
- G. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in finished floor areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.
- H. Adhere floor tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

### 3.3 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting floor tile.
- B. Cover floor tile until Substantial Completion.

END OF SECTION 096519

## SECTION 099120 - PAINTING (PROFESSIONAL LINE PRODUCTS)

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This Section includes surface preparation and field painting of interior items and surfaces for touch up work as per plans.

#### 1.2 SUBMITTALS

- A. Product Data: For each product indicated.
- B. Samples: For each type of finish-coat material indicated.

#### 1.3 QUALITY ASSURANCE

- A. Benchmark Samples (Mockups): Provide a full-coat benchmark finish sample for each type of coating and substrate required. Comply with procedures specified in PDCA P5.
  - 1. Wall Surfaces: Provide samples on at least 100 sq. ft. (9 sq. m).
  - 2. Small Areas and Items: Architect will designate items or areas required.
  - 3. Final approval of colors will be from benchmark samples.

#### 1.4 PROJECT CONDITIONS

- A. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F (7 deg C). Maintain storage containers in a clean condition, free of foreign materials and residue.
- B. Apply waterborne paints only when temperatures of surfaces to be painted and surrounding air are between 50 and 90 deg F (10 and 32 deg C).
- C. Apply solvent-thinned paints only when temperatures of surfaces to be painted and surrounding air are between 45 and 95 deg F (7 and 35 deg C).
- D. Do not apply paint in snow, rain, fog, or mist; or when relative humidity exceeds 85 percent; or at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

#### 1.5 EXTRA MATERIALS

- A. Furnish extra paint materials from the same production run as the materials applied and in the quantities described below. Package with protective covering for storage and identify with labels describing contents. Deliver extra materials to Owner.
  - 1. Quantity: 3 percent, but not less than 1 gal. (3.8 L) or 1 case, as appropriate, of each material and color applied.



## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products listed in other Part 2 articles.
- B. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles.
- C. Manufacturers' Names: Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles:
  - 1. Benjamin Moore & Co. (Benjamin Moore).
  - 2. Kelly-Moore Paint Co. (Kelly-Moore).
  - 3. PPG Industries, Inc. (Pittsburgh Paints).
  - 4. Sherwin-Williams Co. (Sherwin-Williams).

### 2.2 PAINT MATERIALS, GENERAL

- A. Material Compatibility: Provide block fillers, primers, and finish-coat materials that are compatible with one another and with the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
- B. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified that are factory formulated and recommended by manufacturer for application indicated. Paint-material containers not displaying manufacturer's product identification will not be acceptable.
- C. Chemical Components of Interior Paints and Coatings: Provide products that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24) and the following chemical restrictions:
  - 1. Flat Paints and Coatings: VOC not more than 50 g/L.
  - 2. Non-Flat Paints and Coatings: VOC not more than 150 g/L.
  - 3. Anticorrosive Coatings: VOC not more than 250 g/L.
  - 4. Varnishes and Sanding Sealers: VOC not more than 350 g/L.
  - 5. Stains: VOC not more than 250 g/L.
  - 6. Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).
  - 7. Restricted Components: Paints and coatings shall not contain acrolein; acrylonitrile; antimony; benzene; butyl benzyl phthalate; cadmium; di (2-ethylhexyl) phthalate; di-n-butyl phthalate; di-n-octyl phthalate; 1,2-dichlorobenzene; diethyl phthalate; dimethyl phthalate; ethylbenzene; formaldehyde; hexavalent chromium; isophorone; lead; mercury; methyl ethyl ketone; methyl isobutyl ketone; methylene chloride; naphthalene; toluene (methylbenzene); 1,1,1-trichloroethane; or vinyl chloride.
- D. Colors: As selected from manufacturer's full range.

## 2.3 PREPARATORY COATS

- A. Concrete Unit Masonry Block Filler: High-performance latex block filler of finish coat manufacturer and recommended in writing by manufacturer for use with finish coat and on substrate indicated.
- B. Interior Primer: Interior latex-based or alkyd primer of finish coat manufacturer and recommended in writing by manufacturer for use with finish coat and on substrate indicated.
  - 1. Ferrous-Metal Substrates: Quick drying, rust-inhibitive metal primer.
  - 2. Zinc-Coated Metal Substrates: Galvanized metal primer.
  - 3. Where manufacturer does not recommend a separate primer formulation on substrate indicated, use paint specified for finish coat.

## 2.4 INTERIOR FINISH COATS

- A. Interior Low-Luster Acrylic Enamel:
  - 1. Benjamin Moore; Moorcraft Super Spec Latex Eggshell Enamel No. 274.
  - 2. Kelly-Moore; 1610 Sat-N-Sheen Interior Latex Low Sheen Wall and Trim Finish.
  - 3. Kelly-Moore; 1686 Dura-Poxy Eggshell Acrylic Enamel.
  - 4. Pittsburgh Paints; 6-400 Series SpeedHide Eggshell Acrylic Latex Enamel.
  - 5. Sherwin-Williams; ProMar 200 Interior Latex Egg-Shell Enamel B20W200 Series.
- B. Interior Semigloss Acrylic Enamel:
  - 1. Benjamin Moore; Moorcraft Super Spec Latex Semi-Gloss Enamel No. 276.
  - 2. Kelly-Moore; 1649 Acrylic-Latex Semi-Gloss Enamel.
  - 3. Kelly-Moore; 1685 Dura-Poxy Semi-Gloss Acrylic Enamel.
  - 4. Pittsburgh Paints; 6-500 Series SpeedHide Interior Semi-Gloss Latex.
  - 5. Sherwin-Williams; ProMar 200 Interior Latex Semi-Gloss Enamel B31W200 Series.

## PART 3 - EXECUTION

### 3.1 APPLICATION

- A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for paint application.
- B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.
- C. Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of size or weight of the item, provide surface-applied protection before surface preparation and painting.
  - 1. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.
- D. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified.

1. Provide barrier coats over incompatible primers or remove and reprime.
  2. Cementitious Materials: Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.
  3. Wood: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sand surfaces exposed to view smooth and dust off.
    - a. Scrape and clean small, dry, seasoned knots, and apply a thin coat of white shellac or other recommended knot sealer before applying primer. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dried.
    - b. Prime, stain, or seal wood to be painted immediately on delivery. Prime edges, ends, faces, undersides, and back sides of wood, including cabinets, counters, cases, and paneling.
    - c. If transparent finish is required, backprime with spar varnish.
    - d. Backprime paneling on interior partitions where masonry, plaster, or other wet wall construction occurs on back side.
    - e. Seal tops, bottoms, and cutouts of unprimed wood doors with a heavy coat of varnish or sealer immediately on delivery.
  4. Ferrous Metals: Clean ungalvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with SSPC's recommendations.
    - a. Blast steel surfaces clean as recommended by paint system manufacturer and according to SSPC-SP 6/NACE No. 3.
    - b. Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming.
    - c. Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by paint manufacturer, and touch up with same primer as the shop coat.
- E. Material Preparation:
1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
  2. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.
- F. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.
- G. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate. Provide total dry film thickness of the entire system as recommended by manufacturer.
- H. Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to items exposed in equipment rooms and occupied spaces.
- I. Block Fillers: Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled.

- J. Prime Coats: Before applying finish coats, apply a prime coat, as recommended by manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn-through or other defects due to insufficient sealing.
- K. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.
- L. Stipple Enamel Finish: Roll and redistribute paint to an even and fine texture. Leave no evidence of rolling, such as laps, irregularity in texture, skid marks, or other surface imperfections.

### 3.2 CLEANING AND PROTECTING

- A. At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from Project site.
- B. Protect work of other trades, whether being painted or not, against damage from painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by Architect.
- C. Provide "Wet Paint" signs to protect newly painted finishes. After completing painting operations, remove temporary protective wrappings provided by others to protect their work.
  - 1. After work of other trades is complete, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

### 3.3 INTERIOR PAINT SCHEDULE

- A. Concrete Unit Masonry:
  - 1. Acrylic Finish: Two finish coats over a block filler.
    - a. Block Filler: Concrete unit masonry block filler.
    - b. Finish Coats: Interior semigloss acrylic enamel.

END OF SECTION 099120

## SECTION 220503 - PLUMBING PIPING

### PART 1 – GENERAL

#### 1.1 WORK INCLUDES

- A. Section includes piping, valves, fittings, and connections for the following piping systems:
  - 1. Sanitary Sewer.
  - 2. Domestic Water.

#### 1.2 RELATED WORK

- A. Section 224001 - Plumbing Specialties.
- B. Section 230529 - Supports and Anchors.
- C. Section 230553 - Mechanical Identification.
- D. Section 230701 - Piping Insulation.

#### 1.3 REFERENCES

- A. ASME B13 - Malleable Iron Threaded Fittings.
- B. ASME B16.1 - Cast Iron Pipe Flanges and Flanged Fittings Class 25, 125, 250 and 800.
- C. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.
- D. ASME B16.22 - Wrought Copper and Bronze Solder Joint Pressure Fittings.
- E. ASME B16.26 - Cast Bronze Fittings for Flared Copper Tubes.
- F. ASME B31.9 - Building Service Piping.
- G. ASME B123 - Cast Copper Alloy Solder Joint Drainage Fittings - DWV.
- H. ASME B129 - Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings - DWV.
- I. ASTM A53 - Pipe, Steel, Black and Hot-Dipped Zinc Coated, Welded and Seamless.
- J. ASTM A518-92e1 Standard Specification for Corrosion-Resistant High Silicon Iron Castings.
- K. ASTM A861-94e1 Standard Specification for Corrosion-Resistant High Silicon Iron Castings.



- L. ASTM B32 - Solder Metal.
- M. ASTM B42 - Seamless Copper Pipe.
- N. ASTM B88 - Seamless Copper Tube.
- O. ASTM B306 - Copper Drainage Tube (DWV).
- P. ASTM C564 - Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
- Q. ASTM C1053-95e1 - Standard Specification for Borosilicate Glass Pipe and fittings for Drain, Waste, and Vent (DWV) Applications.
- R. ASTM D2000-96 - Standard Classification System for Rubber Products in Automotive Applications (Grade 'E' EPDM Gasket Materials).
- S. ASTM E814 - Fire Tests of Through-Penetration Fire Stops.
- T. ASTM F477 - Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
- U. ASTM F708 - Design and Installation of Rigid Pipe Hangers.
- V. AWS A5.8 - Brazing Filler Metal.
- W. AWWA C105 - Polyethylene Encasement for Ductile Iron Piping for Water and Other Liquids.
- X. AWWA C110 - Ductile - Iron and Gray - Iron Fittings 3 in. through 48 in., for Water and Other Liquids.
- Y. AWWA C111 - Rubber-Gasket Joints for Ductile Iron and Gray-Iron Pressure Pipe and Fittings.
- Z. AWWA C151 - Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for Water or Other Liquids.
- AA.AWWA C651 - Disinfecting Water Mains.
- BB.CISPI 301 - Cast Iron Soil Pipe and Fittings for Hubless Cast Iron Sanitary Systems.
- CC.CISPI 310 - Joints for Hubless Cast Iron Sanitary Systems.
- DD.MSS SP58 (Manufacturers Standardization Society of the Valve and Fittings Industry) - Pipe Hangers and Supports - Materials, Design and Manufacturer.
- EE. MSS SP69 - Pipe Hangers and Supports - Selection and Application.

FF. MSS SP89 - Pipe Hangers and Supports - Fabrication and Installation Practices.

GG.UL 1479 - Fire Tests of Through-Penetration Firestops.

HH.ASHRAE 90A - Energy Conservation in New Building.

#### 1.4 SUBMITTALS

- A. Submit product data under provisions of Division 01 Specification Sections.
- B. Product Data: Provide data on pipe materials; pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.
- C. Manufacturer's Installation Instructions: Submit installation instructions for pumps, valves and accessories.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Submit preliminary valve chart indicating naming/location conventions along with piping shop drawings for preliminary approval.
- F. Piping Shop Drawings:
  - 1. Submit 1/8 inch scale drawings for the piping systems, showing the pipe sizes, pipe material, location, elevations, invert elevations, slopes of horizontal runs, ejector basins, manholes, cleanouts, fittings, accessories, piping expansion devices, valves, meters, gauges, offsets, rises, drops, coordination amongst other trade contractors and connections.
  - 2. Piping Shop drawings shall be prepared with building architectural layout in the background.
  - 3. REPRODUCTIONS OF THE CONTRACT DOCUMENTS BY ANY MEANS (ELECTRONIC, MAGNETIC STORAGE MEDIA, PHOTOGRAPHIC, ETC.) WILL NOT BE ACCEPTED FOR REVIEW.
  - 4. CAD (Computer Aided Design) drawing files in AutoCAD Release 2010 \*.DWG file format, will be made available to the Awarded Plumbing Contractor for a nominal processing fee of \$250.00. This is to cover Metro Design Associates, Inc.'s administrative processing costs of making such files available to the Plumbing Contractor. The Contractor must agree to sign an indemnity waiver eliminating Metro Design Associates, Inc. from any inaccuracies or harm caused by using these files. This service does not fall under the restrictions of Paragraph No. 3, above.
  - 5. CONTRACTOR SHALL REVIEW ALL SUBMITTALS PRIOR TO SUBMITTING THEM FOR THE ARCHITECT/ENGINEER'S REVIEW. CONTRACTOR SHALL STAMP EACH DRAWING AND EACH PIECE OF PRODUCT DATA TO CERTIFY THAT HE HAS REVIEWED IT. ARCHITECT/ENGINEER WILL NOT REVIEW ANY SUBMITTAL THAT CONTRACTOR HAS NOT STAMPED WITH HIS REVIEW CERTIFICATION.
  - 6. Submit preliminary valve chart indicating naming/location conventions along with piping shop drawings for preliminary approval.

1.5 CLOSEOUT SUBMITTALS

- A. Division 01 Specification Sections - Execution Requirements, Closeout procedures.
- B. Project Record Documents: Record actual locations and sizes of piping, valves, equipment, cleanouts, backflow preventers, drains, wall hydrants etc. Submit final valve chart. Comply with Section 230553: Mechanical Identification and identification details on the drawings.
- C. Operation and Maintenance Data: Submit spare parts list, exploded assembly views and recommended maintenance intervals.

1.6 QUALITY ASSURANCE

- A. Perform Work in accordance with State of Illinois Plumbing Code (2014).
- B. Valves: Manufacturer's name and pressure rating marked on valve body.
- C. Welding Materials and Procedures: Conform to ASME SEC IX and applicable state labor regulations.
- D. Welders Certification: In accordance with ASME SEC IX or ANSI/AWS D1.1
- E. Identify pipe with marking including size, ASTM material classification, ASTM specification, potable water certification and water pressure rating.
- F. Maintain one copy of each document on site

1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum five (5) years of documented experience.
- B. Installer: Company specializing in performing Work of this section with minimum five (5) years documented experience.

1.8 PRE-INSTALLATION MEETING

- A. Division 01 Specification Sections - Administrative Requirements, Pre-installation meetings.
- B. Convene minimum one week prior to commencing Work of this section or as required by Construction Manager.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Division 01 Specification Sections - Product Requirements, Product storage and handling requirements.
- B. Accept valves and equipment on site in shipping containers with labeling in place. Inspect for damage.
- C. Provide temporary protective coating on cast iron and steel valves.
- D. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- E. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

1.10 ENVIRONMENTAL REQUIREMENTS

- A. Division 01 Specification Sections - Product Requirements.
- B. Do not install underground piping when bedding is wet or frozen.

1.11 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

1.12 WARRANTY

- A. Division 01 Specification Sections - Execution Requirements: Product warranties and product bonds.
- B. Provide three (3) year manufacturer warranty for domestic water piping.

PART 2 - PRODUCTS

2.1 SANITARY SEWER AND VENT PIPING, BURIED

- A. Cast Iron Pipe: ASTM A74 service weight.
  - 1. Fittings: Cast iron.
  - 2. Joints: Hub-and-spigot with ASTM C564 neoprene gaskets or lead and oakum.

B. Copper Tube: ASTM B306, DWV.

1. Fittings: ASME B123, cast bronze, or ASME B129 wrought copper.
2. Joints: ASTM B32, solder, Grade 50B.

2.2 SANITARY SEWER AND VENT PIPING, ABOVE GRADE

A. Cast Iron Pipe: ASTM A74, service weight.

1. Fittings: Cast iron.
2. Joints: Hub-and-Spigot, with ASTM C564, neoprene gasket system or lead and oakum.

B. Cast Iron Pipe: CISPI 301, hub-less, service weight.

1. Fittings: Cast iron.
2. Joints: CISPI 310, neoprene gaskets and stainless steel clamp-and-shield assemblies.

C. Copper Tube: ASTM B306, DWV.

1. Fittings: ASME B123, cast bronze, or ASME B129, wrought copper.
2. Joints: ASTM B32, solder, Grade 50B.

D. Steel Pipe: ASTM A53 Schedule 40, galvanized.

1. Malleable Iron Fittings: ASME B13, screwed type.

2.3 WATER PIPING, ABOVE GRADE

A. Copper Tubing: ASTM B88, Type L, hard drawn.

1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
2. Contractor may utilize mechanically formed tee and coupling.
3. Joints: ASTM B32, solder, Grade 95TA, or AWS 5.8, BCuP silver braze for mechanically formed tee connections.

B. Copper Tubing: ASTM B88, L, hard drawn.

1. Fittings: ASME B16.22, grooved wrought copper/
2. Joints: Rigid (0-deflection) grooved mechanical couplings with ASTM D-2000, Grade 'E' - EPDM gaskets approved for potable water service.
3. Flanges: Ductile iron grooved type with ANSI bolt pattern for Class 125 or Class 150 flanged components. Provide metal adapter inserts to accept rubber faced surfaces, and wafer/lug design valves.



## 2.4 FLANGES, UNIONS, AND COUPLINGS

### A. Pipe Size 3 inches and Under:

1. Ferrous pipe: Class 150 malleable iron threaded unions.
2. Copper tube and pipe: Class 150 bronze unions with soldered joints.

### B. Pipe Size Over 3 inches:

1. Ferrous pipe: Class 150 forged steel slip-on flanges.
2. Copper tube and pipe: Rigid (0-deflection) Class 150 ductile iron mechanical couplings and flanges for copper piping. Gaskets, ASTM D-2000, Grade 'E' - EPDM gaskets approved for potable water service.

### C. Pipe Size Over 1 inch:

1. Ferrous pipe: Class 150 malleable iron threaded or forged steel slip-on flanges; preformed neoprene gaskets.
2. Copper tube and pipe: Class 150 slip-on bronze flanges; preformed neoprene gaskets.

### D. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

## 2.5 PIPE HANGERS AND SUPPORTS

### A. Refer to Section 230529: Pipe Hangers & Supports.

## 2.6 GATE VALVES (GV)

### A. Manufacturers - (2-1/2 Inches and Larger):

1. Hammond Valve - Model IR-1140.
2. Milwaukee Valve - Model F-2885.
3. Nibco Valve – Model F-617-0
4. Stockham - Model G-623.
5. Kitz Corporation – Model 72.
6. Substitutions: Not Permitted.

### B. Construction:

1. MSS SP-70, Class 150, 200 PSI WOG, iron body, bronze trim, outside screw and yoke, hand wheel, solid wedge disc, flanged ends.

2.7 BALL VALVES (BV)

A. Manufacturers (Up to and including 2 Inches):

1. Hammond Valve - Model 8513.
2. Milwaukee Valve - Model BA-150S.
3. Nibco Valve - Model S-585-70-66.
4. Kitz Corporation – Model 68.
5. Jomar – Model T100NE
6. Substitutions: Not Permitted.

B. Construction:

1. MSS SP-110, Class 150, 600 PSI WOG, bronze, two piece body, stainless steel ball, full port, teflon seats and stuffing box ring, blow-out proof stem, lever handle with soldered ends.

2.8 BALANCING FITTINGS (BF)

A. Up to and Including 2 Inches:

1. Manufacturers:

- a. Armstrong Pump Co - Model CBV-I.
- b. Bell & Gossett/ITT - Model CB.
- c. Flow Design, Inc. - Model Flowset.

B. Construction: 125 psi WOG (minimum), bronze body with bronze disc calibrated and readable balance fittings with readout ports fitted with integral check valves to prevent loss of fluid when attaching monitoring kit.

C. Calibration: Integral pointer indicating degree of valve opening with positive shut-off and memory stop.

D. Accessories: Preformed polyurethane insulation.

2.9 SEALANTS: FIRE STOPPING SYSTEMS, WATER AND THERMAL SEALS

A. Manufacturers:

1. Dow Corning - Model Fire Stop.
2. Nelson - Model Flameseal.
3. T & B - Model Flamesafe.
4. 3M Co. - Model Fire Barrier.
5. Substitutions: Refer to Division 01 Specification Sections.

- B. General Purpose Fire Stopping Sealant: Water based, non-slumping, premixed sealant with intumescent properties, rated for 3 hours per ASTM E814 and UL 1479.
- C. General Purpose Vibration Resistant Fire Stopping Sealant: Silicone based, non-slumping, premixed sealant with intumescent properties, vibration and moisture resistant, rated for 3 hours per ASTM E814 and UL 1479.
- D. Fire Seal:
  - 1. Seal Penetrations of fire-rated walls, floors or ceilings at piping penetrations for compliance with NEC 300-21.
  - 2. Fill void around exterior of pipe between sleeve with fiberglass or other fire-proof material approved by Architect/Engineer.
  - 3. Sleeves: Schedule 40 steel pipe sleeve, anchored to building construction and finished plumb with wall, ceiling to floor line.
  - 4. Seal remaining void at each end of the pipe penetration through sleeve between pipe and sleeve with fire sealant compound. Seal flush with wall or partition.
  - 5. Provide chrome plated escutcheon plate at all exposed pipe penetrations.
- E. Thermal Seal:
  - 1. Seal penetrations of thermally insulated equipment or rooms to prevent heat transfer.
  - 2. Fill void around exterior of raceway between sleeve with fiberglass or other material approved by Architect/Engineer.
  - 3. Seal interior of raceway with duct sealing compound at entry to equipment or room
  - 4. Provide chrome plated escutcheon plate at all exposed pipe penetrations
- F. Water Seal
  - 1. Seal penetrations of perimeter walls or floor below grade to prevent entry of water; use materials compatible with wall or floor construction and approved by Architect/Engineer.
  - 2. Seal Penetrations of Room: Sealed with flashings compatible with roof design and approved by roofing system manufacturer and Architect/Engineer.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Division 01 Specification Sections - Administrative Requirements, Coordination and project conditions.
- B. Verify that excavations are to required grade, dry, and do not over-excavate.

### 3.2 PREPARATION

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

### 3.3 INSTALLATION

- A. Install Work in accordance with State of Illinois Plumbing Code (2014).
- B. Provide non-conducting dielectric connections wherever jointing dissimilar metals (i.e. copper to steel/iron pipe or flange connections).
- C. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
- D. Install piping to maintain headroom and to conserve ceiling space without interfering with use of spaces.
- E. Group piping whenever practical at common elevations.
- F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- G. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.
- H. Provide access where valves and fittings are not exposed. Coordinate size and location of access doors.
- I. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.
- J. Prepare exposed, unfinished pipe, fittings, supports, and accessories ready for finish painting.
- K. Install bell and spigot pipe with bell end upstream
- L. Refer to Section 224001 - Plumbing Specialties for product requirements, placement and size requirements for cleanouts.
- M. Install valves with stems upright or horizontal, not inverted.

- N. Install water piping to ASME B31.9.
- O. Sleeve pipes passing through partitions, walls and floors. Provide chrome plated escutcheon plates at all exposed pipe penetrations.
- P. Sizing:
  - 1. Unless otherwise indicated, install all supply piping, including shut-off valves, strainers and accessory fixtures to pumps, fixtures and other equipment at line size with reduction in size being made only at inlet to control valve, fixture or pump.
- Q. Install supply piping from outlet of control valve at full size connection to equipment served.
- R. Make reduction in water pipes with eccentric reducing fittings installed to provide drainage and venting
- S. Branch Take-Offs:
  - 1. Liquids: From top, bottom or side of mains or headers at either 45 degrees or 90 degrees from horizontal plane.
  - 2. Do not project branch pipes inside main pipe.
- T. Pipe Drainage Provision:
  - 1. Slope water piping 1 inch in 40 feet and arrange to drain at low points.
- U. Underground Pipe:
  - 1. Lay in dry trenches maintained free of accumulated water.
  - 2. Provide and operate sufficient pumping equipment to maintain excavations, trenches and pits free of water.
  - 3. Dispose of pumped water so operation areas and other facilities are not flooded.
  - 4. Pipe laying follows excavating close as possible
- V. Interior Sanitary Soil Waste and Vent:
  - 1. Connect underground sewers to site utilities at point 5 feet outside building walls.
  - 2. Pitch sewers and branches as follows, unless otherwise indicated on drawings.
    - a. Pipe, 3 Inches and smaller: Minimum 1/4 inch per foot.
    - b. Pipe, 4 Inches and larger: Minimum 1/8 inch per foot, but no less than 1%.
  - 3. Continuously bed underground or on-ground piping on minimum 3 inch compacted sand or gravel, with depressions for hubs.
  - 4. Compact backfilling for 6 inches, sides and tops; and 3 inches under pipe to 95% proctor.
  - 5. Complete backfilling to existing grade or to elevation indicated on Drawings, compacted to 95% proctor.



W. Mechanically Formed Tee Connections:

1. Mechanically extracted collars formed in continuous operation, consisting of drilling a pilot hole and drawing out tube surface to form a branch pipe collar having height of not less than a minimum of three (3) times the tube wall thickness.
  - a. Collaring Device: Fully adjustable to ensure proper tolerance and complete uniformity of joint.
2. Branch: Double notched to conform with inner curve of run tube and mechanically dimpled to ensure penetration of branch tube into collar is of sufficient depth for brazing and that branch tube does not obstruct flow in main tube run.
3. All joints brazed in accordance with Copper Development Association Copper Tube Handbook using BCuP Series filler material.
  - a. Soft soldered joints will not be permitted.

X. Contractor to clean and flush all faucet aerators and strainers at final completion of project.

Y. Pipe Hangers and Supports:

1. Install in accordance with ASTM B31.9 and MSS SP89. Refer to Section 230529: Supports and Anchors for additional requirements.
  2. Support horizontal piping as schedule
  3. Install hangers to provide minimum ½ inch space between finished covering and adjacent work.
  4. Place hangers within 12 inches of each horizontal elbow.
  5. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
  6. Support vertical piping at every floor. Support riser piping independently of connected horizontal piping.
  7. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
  8. Prime coat exposed steel hangers and supports. Refer to Painting Section.
  9. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered expose
  10. Provide hangers adjacent to motor driven equipment with vibration isolation.
- Z. Install air chambers on hot and cold water supply piping to each fixture or group of fixtures (each washroom). Fabricate same size as supply pipe or ¾-inch minimum, and minimum 18 inches long. Air chambers are to be fully insulated per piping insulation specifications.

AA. Install heat traps on hot water heater installation as required by IECC 2012.

3.4 INTERFACE WITH OTHER PRODUCTS(APPLICATION)

- A. Install unions downstream of valves and at equipment or apparatus connections.
- B. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.
- C. Install valve types as designated on plans for shut-off and to isolate equipment, part of systems, or vertical risers. All valves to be full line size of piping.

3.5 FIELD TOLERANCES

- A. Division 01 Specification Sections - Quality Requirements: Tolerances.
- B. Slope water piping minimum 0.25 percent and arrange to drain at low points.

3.6 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

- A. Division 01 Specification Sections - Execution Requirements: Final cleaning.
- B. Prior to starting work, verify system is complete, flushed and clean.
- C. Ensure pH of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda or soda ash) or acid (hydrochloric).
- D. Inject disinfectant, free chlorine in liquid, powder and tablet or gas form, throughout system to obtain a residual from 50 to 80 mg/L.
- E. Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15 percent of outlets.
- F. Maintain disinfectant in system for 24 hours.
- G. If final disinfectant residual tests less than 25 mg/L, repeat treatment.
- H. Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L.

3.7 PIPE TESTING

- A. Before final acceptance of piping, test all systems scheduled and prove to be free of leaks.
  - 1. Perform tests under observation of Architect/Engineer.
  - 2. Remove, replace or satisfactorily repair defective work revealed by tests.
  - 3. Make piping repairs with new materials; caulking of screwed joints or pin holes not permitted.
  - 4. Underground systems tested before backfilling.

5. Furnish test equipment and material for tests.
6. Owner furnished water for testing and flushing.

B. Testing Medium:

1. Hydrostatic Testing Medium: Clean pure water.
2. Pressure Testing Gauges: ANSI B40.1; Grade AA; minimum 6 inch -diameter dial with scale divisions equal or less than maximum allowable pressure drop.

C. Waste and Vent System Piping: Test with water and air before fixtures are set. TESTS SHALL TAKE PLACE PRIOR TO POURING CONCRETE FLOOR.

1. After plumbing fixtures have been set and traps filled with water, subject entire waste and vent systems to final test with smoke or peppermint.

D. Water Test:

1. Apply to drainage and vent system in accordance or in entirety.
2. When entire system is tested, tightly close all openings in pipes except highest opening and fill system with water to overflow point.
3. When system is tested in sections, tightly plug each opening except highest open, fill each section with water and test each section with minimum 10 foot head of water; test each preceding section until entire system has been tested with minimum 10 foot of water, except uppermost 10 feet of system.
4. Keep water in system, or in portion under test, for minimum 30 minutes before inspection.
5. System must be tight at all joints.

E. Air Test:

1. When tests are made with air, apply minimum 5 psi with force pump and maintain minimum 1 hour with no leakage apparent.
2. Use mercury-column gauge in making test.

F. Domestic Water System:

1. When rough-in is complete and before fixtures are set, test entire hot and cold water piping systems as scheduled and prove tight.
2. Where portion of water piping system is concealed before completion, test that portion separately as specified for entire system.

G. Testing Requirements:

1. Hydrostatic tests apply to piping indicated in Schedule in Paragraph G. below.
2. Raise pressure gradually to given value; then block off source.
3. Allowable Pressure Drop: Maximum amount scheduled during corresponding minimum time interval.
4. Visually examine all joints during test.
5. Upon successful completion and test approval, relieve piping of pressure, drain, put into normal operation except for potable water to be sterilized before placing in service.

H. Hydrostatic Testing Schedule:

Service	Normal Work Pres. psig	Hydrostatic Test Pressure psig	Max. Pressure Drop psi	Min. Time Hours
1. Domestic Water				
Potable Water	To 125	175	2	2

END OF SECTION 220503

## SECTION 223400 - PLUMBING EQUIPMENT

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDED

- A. Domestic gas hot water heaters.
- B. Expansion tanks.
- C. Circulator pumps.
- D. Sanitary Ejector Pump(s).

#### 1.2 RELATED SECTIONS

- A. Section 220503 - Plumbing Piping.
- B. Section 230529- Anchors and Supports.
- C. Section 230553 - Mechanical Identification.
- D. Section 230701 - Piping Insulation.
- E. Section 260925 - Equipment Wiring Systems: Electrical characteristics and wiring connections.

#### 1.3 REFERENCES

- A. IECC – 2015.
- B. ASHRAE 90A - Energy Conservation in New Building Design.
- C. ASME Section 8D - Pressure Vessels.
- D. NFPA 54 - National Fuel Gas Code.
- E. NFPA 70 – National Electric Code.



#### 1.4 SUBMITTALS

- A. Submit under provisions of Division 01 Specification Sections.
- B. Product Data:
  - 1. Provide dimension drawings of water heaters, pumps, storage tanks, etc. indicating components and connections to other equipment and piping.
  - 2. Indicate equipment's capacity, connection sizes and power requirements.
  - 3. Provide certified pump curves showing pump performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable.
  - 4. Provide manufacturer piping diagrams for review and/or modification by the Engineer. Compensate other trades due to system deviations from equipment scheduled.
  - 5. Provide electrical characteristics, connection requirements and wiring diagrams.
- C. Shop Drawings:
  - 1. Indicate location and dimensions of saddles, manways, lining methods, anchors, attachments, lifting points, tapings, and drains.
  - 2. CONTRACTOR SHALL REVIEW ALL SUBMITTALS PRIOR TO SUBMITTING THEM FOR THE ARCHITECT/ENGINEER'S REVIEW. CONTRACTOR SHALL STAMP EACH DRAWING AND EACH PIECE OF PRODUCT DATA TO CERTIFY THAT HE HAS REVIEWED IT. ARCHITECT/ENGINEER WILL NOT REVIEW ANY SUBMITTAL THAT CONTRACTOR HAS NOT STAMPED WITH HIS REVIEW CERTIFICATION.
- D. Submit manufacturer's installation instructions in accordance with Division 01 Specification Sections.
- E. Submit manufacturer's certificate that pressure vessels meet or exceed specified requirements in accordance with Division 01 Specification Sections.

#### 1.5 PROJECT RECORD DOCUMENTS

- A. Submit project record documents under provisions of Division 01 Specification Sections.
- B. Project Record Documents: Record actual locations of components and equipment.
- C. Submit under provisions of Division 01 Specification Sections - Operation and Maintenance Data: Include operation, maintenance, and inspection data, replacement part numbers and availability, and service depot location and telephone number.
- D. Submit under provisions of Division 01 Specification Sections - Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.
- E. Submit ASME certifications for all pressure vessels completed and registered in Owners name.

#### 1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum five years documented experience.
- B. Provide pumps with manufacturer's name, model number, and rating/capacity identified.
- C. Ensure products and installation of specified products are in conformance with recommendations and requirements of the following organizations:
  - 1. American Gas Association (AGA).
  - 2. National Sanitation Foundation (NSF).
  - 3. American Society of Mechanical Engineers (ASME).
  - 4. National Electrical Manufacturers' Association (NEMA).
  - 5. Underwriters Laboratories (UL).
- D. Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, operate within 25 percent of midpoint of published maximum efficiency curve.
- E. Submit certification of start-up of systems by manufacturer's authorized agent in accordance with Division 01 Specification Sections.

#### 1.7 REGULATORY REQUIREMENTS

- A. Conform to AGA and NFPA 54 requirements for water heaters.
- B. Conform to ASME Section 8D for tanks.
- C. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

#### 1.8 DELIVERY, STORAGE, AND PROTECTION

- A. Transport, handle, store and protect products to site under provisions of Division 01 Specification Sections.
- B. Provide temporary inlet and outlet caps. Maintain caps in place until installation.
- C. Contractor shall store all materials shipped to the site in a protected area. If material is stored outside of the building, it must be stored off the ground a minimum of six inches set on 6 x 6 planks and/or wood pallets. All material must be completely covered with waterproof tarps or visquin. All piping and duct openings will have the ends closed to keep out dirt and other debris. No equipment will be allowed to be stored on the site unless it is setting on wood planks and is completely protected with weatherproof covers.

1.9 WARRANTY

- A. Submit under provisions of Division 01 Specification Sections.
- B. Provide five year manufacturer warranty against leakage for all ASME constructed domestic water tanks and expansion tanks.
- C. Provide manufacturer's standard warranty on all other equipment.

PART 2 - PRODUCTS

2.1 DOMESTIC GAS HOT WATER HEATERS

- A. Acceptable Manufacturer:
  - 1. A.O. Smith
  - 2. Lochinvar Co.
  - 3. Laars Co.
  - 4. Approved Equal.
- B. Direct spark ignition, low NOx, natural gas-fired fully modulating sealed combustion, direct vent, high efficiency (95% efficient) boiler, controls piping and valving, 160 psig maximum working pressure, stainless steel heat exchanger with steel jacket.
- C. Brass water connections and dip tube, drain valve, high-density magnesium anode and ASME rated temperature / pressure relief and vacuum relief valves, integral condensate charcoal acid dilution basin.
- D. Automatic water thermostat with temperature range adjustable from 120 to 180 degrees F., gas pressure regulator, burner, 100 percent safety shut-off pilot and thermocouple.
- E. Refer to schedule on drawings for sizes and capacities.

2.2 EXPANSION TANKS

- A. Acceptable Manufacturers:
  - 1. Amtrol, Inc.
  - 2. Bell & Gossett/ITT.
  - 3. Richmond Engineering (Reco).
  - 4. Wessells co.
- B. Construction: Welded steel, tested and stamped in accordance with Section 8D of ASME Code; supplied with National Board Form U-1, rated for working pressure of 150 psig, with flexible EPDM diaphragm approved for potable water sealed into tank, and steel base.

C. Accessories: Air-charging fitting, tank drain; precharge to 65 psig.

D. Size: Refer to Schedule on drawings.

## 2.3 IN-LINE CIRCULATOR PUMPS

A. Acceptable Manufacturers:

1. Armstrong Pump Co.
2. Bell & Gossett/ITT.
3. Taco.
4. Grundfoss.

B. Casing: Bronze, rated for 125 psig working pressure, with stainless steel rotor assembly.

C. Impeller: Bronze.

D. Shaft: Alloy steel with integral thrust collar and two oil lubricated bronze sleeve bearings.

E. Seal: Carbon rotating against a stationary ceramic seat.

F. Drive: Flexible coupling.

G. Performance: Refer to Schedule on drawings.

## 2.4 EJECTOR PUMPS (SUBMERSIBLE TYPE)

A. Acceptable Manufacturers:

1. Hydromatic Co.
2. Barnes Co.
3. Weil Pump Co.
4. Zoeller Co.

B. Type: Vertical centrifugal, direct connected, completely submersible with oil or air filled motors.

C. Casing: Cast iron volute with radial clearance around impeller.

D. Impeller: Cast iron; keyed to corrosion resistant alloy steel or stainless steel shaft.

E. Sump Cover (Type-A): Same as Article 2.07, Paragraph C.

F. Sump Cover (Type-B): Perforated steel cover plate with proper pipe and wire openings loose set into pump basins cover cup flange.

G. Controls (Simplex): Mercury float switch with piggy-back power cord, insulated cord and plug.

## 2.5 EJECTOR PUMPS (SELF-PRIMING TYPE)

### A. Acceptable Manufacturers:

1. Gorman-Rupp Co.
2. Metropolitan Pump Co.

### B. Type: Cast iron impeller, self-priming pump. Pump to have removable elbow and rotating assembly for easy access to impeller. Mechanical seal to have carbon ceramic faces to resist wear, and shaft shall be sleeved with stainless steel. Pump shall be mounted on steel cover.

### C. Performance: Refer to schedule on drawings.

### D. Control(Duplex): UL listed and labeled NEMA 1 enclosure factory wired complete with numbered terminal wiring strip, (2) full voltage non-reversing magnetic starters, (2) disconnect switches, (2) T-O-A selector switches, (2) control circuit transformers with circuit breakers, (4) mercury float switches mounted on independent 1 inch steel pipe secured to basin cover, pilot lights for pump on indicating red light and 4 inch audible bell mounted on cabinet with silencing switch for high water alarm. Provide additional set of dry contacts for monitoring pump running and high water alarm.

### E. Basin: Refer to Article 2.07, below.

## 2.6 PUMP BASINS

### A. Acceptable Manufacturers:

1. A-K Industries.
2. Fiberbasin, Inc.
3. Top Basin Co.

### B. Type: Fiberglass basins constructed with 1-piece mono-lithic syntactic foam center core, using hollow glass spheres and resin material, with fiberglass inner and outer layers.

1. Syntactic foam core must be covalently bonded chemically within inner and outer layers, provided on continuous wall and preventing any transfer of liquid through basin walls and bottom; sizes listed on Pump Schedule.
2. Basins with integral concrete anchor flanges and cover cup flange. Encase sumps with 8 inch minimum concrete.

### C. Pump Covers: Solid steel cover bolted to basin with inspection opening, floor plates, flanged pipe connection, openings and tapings for electrical control accessories.

1. Air-tight with gas-tight sealing material used between pump basin and cover.

### D. See Schedule on drawings for sizes.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install water heaters in accordance with manufacturer's instructions and to AGA and NFPA 54 requirements.
  - 1. Provide support on 4 inch high concrete equipment pad, independent of building structural framing members.
  - 2. Provide manufacturer approved/authorized start-up and certification. Submit start-up report to Construction Manager in accordance with Division 01 Specification Sections.
- B. Coordinate all equipment with plumbing piping and related fuel piping, gas venting and electrical work to achieve proper operating system.
- C. Domestic Hot Water Expansion Tanks:
  - 1. Provide support on 4 inch high concrete equipment pad, or hung off building structural framing members.
  - 2. Clean and flush after installation. Seal until pipe connections are made.
  - 3. Provide manufacturer approved/authorized start-up and certification. Submit start-up report to Construction Manager in accordance with Division 01 Specification Sections.
- D. In-Line Circulator Pumps:
  - 1. Provide line sized isolating valve and strainer on suction and line sized soft seated check valve and globe valve on discharge.
  - 2. Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, and operate within 25 percent of midpoint of published maximum efficiency curve.
  - 3. Provide hydronic indicator gauges.
  - 4. Provide manufacturer approved/authorized start-up and certification. Submit start-up report to Construction Manager in accordance with Division 01 Specification Sections.
- E. Storm and Sewage Ejector Pumps:
  - 1. Provide line size full port gate or ball valve and check valve on discharge to each pump.
  - 2. Pipe in accordance with manufacturer's installation instructions.
  - 3. Provide manufacturer approved/authorized start-up and certification.



### 3.2 OWNER TRAINING BY INSTALLING CONTRACTOR

- A. At the completion of the project, the Installing Contractor shall provide training for all the plumbing equipment for the Owner's staff. Training shall consist of two parts. Part One is a classroom situation which describes the equipment's operation, maintenance and repair requirements. Part Two will be on-site (hands-on) training which will show the location of all devices and the operation and maintenance of all controls, devices, motors, etc. This training will be in addition to other training specified in the contract. Prior to commencement of training, Contractor shall provide Architect/Engineer with a schedule of dates, times and agenda for each training session. This Contractor shall provide a minimum of eight (8) hours of training for work installed under this section of the contract. Contractor shall furnish a minimum of six (6) equipment manuals, maintenance manuals and repair parts list for all equipment and systems reviewed.
- B. Submit Certification of Completion in accordance with Division 01 Specification Sections.

END OF SECTION 223400

## SECTION 224001 - PLUMBING SPECIALTIES

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Floor drains.
- B. Cleanouts.
- C. Floor sinks.
- D. Water hammer arrestors and air chambers.

#### 1.2 RELATED WORK

- A. Section 220503 - Plumbing Piping.
- B. Section 230553 - Mechanical Identification: Product requirements for pipe identification for placement by this section.
- C. Section 230701 - Piping Insulation.

#### 1.3 REFERENCES

- A. ANSI/ASSE 1011 - Hose Connection Vacuum Breakers.
- B. ANSI/ASSE 1019 - Wall Hydrants, Frost Proof Automatic Draining Anti-Backflow Types.
- B. ANSI A112.21.1 - Floor Drains.
- C. ANSI A112.26.1 - Water Hammer Arresters.
- D. PDI WH-201 Water Hammer Arresters.

#### 1.4 REGULATORY REQUIREMENTS

- A. Conform to State of Illinois Plumbing Code (2014).

1.5 SUBMITTALS

- A. Submit under provisions of Division 01 General Requirements.
- B. Shop Drawings: Indicate dimensions, weights and placement of openings and holes.
- C. Product Data: Provide component sizes, rough-in requirements, service sizes and finishes.
- D. Manufacturer's Installation Instructions: Indicate assembly and support requirements.
- E. CONTRACTOR SHALL REVIEW ALL SUBMITTALS PRIOR TO SUBMITTING THEM FOR THE ARCHITECT/ENGINEER'S REVIEW. CONTRACTOR SHALL STAMP EACH DRAWING AND EACH PIECE OF PRODUCT DATA TO CERTIFY THAT HE HAS REVIEWED IT. ARCHITECT/ENGINEER WILL NOT REVIEW ANY SUBMITTAL THAT CONTRACTOR HAS NOT STAMPED WITH HIS REVIEW CERTIFICATION.

1.6 PROJECT RECORD DOCUMENTS

- A. Submit under provisions of Division 01 General Requirements.
- B. Record actual locations of equipment, cleanouts, backflow preventers and other devices.

1.7 OPERATION AND MAINTENANCE DATA

- A. Submit under provisions of Division 01 General Requirements.
- B. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.

1.8 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Division 01 General Requirements.
- B. Accept specialties on site in original factory packaging. Inspect for damage.

1.9 EXTRA MATERIALS

- A. Deliver to maintenance department prior to project completion. Submit written verification to Architect/Engineer.

## PART 2 – PRODUCTS

### 2.1 ACCEPTABLE MANUFACTURER - PLUMBING SPECIALTIES

- A. Mi Fab. Company
- B. Josam Co.
- C. J.R. Smith
- D. Tyler/Wade Co.
- E. Zurn Co.
- F. Owner Approved Equal.

### 2.2 FLOOR DRAINS AND AREA DRAINS

- A. FD-1: ANSI A112.21.1; lacquered cast iron two piece body with double drainage flange, 6 inch diameter heavy-duty nickel bronze secured square hole strainer, sediment bucket, vandal resistant fasteners and not flashed; Model 2010-A-6-NB manufactured by J.R. Smith.
  - 1. Provide square tops in quality tile kitchen areas
- B. FD-2: Lacquered cast iron body, 12 inch diameter adjustable ductile iron grate and sediment bucket, not flashed; Model 2360-M manufactured by J.R. Smith.
- C. FS-1: 12 x 12 x 8 inches deep cast iron body, acid resistant coated interior floor sink, nickel bronze hinged half grate and sediment bucket with rubber feet; Model 3151-12-rubber feet manufactured by J.R. Smith Co.

### 2.3 CLEANOUTS

- A. Exterior Areas (YCO): Round ductile iron access frame and non-skid gasketed cover; Model 4250-M manufactured by J.R. Smith.
- B. Interior Finished Floor Areas (FCO): Lacquered cast iron, two piece body with double drainage flange, brass gasketed plug and adjustable nickel-bronze round vandal-proof scoriated cover in unfinished areas and round with depressed cover to accept floor finish or with carpet markers in carpeted floor area; Model 4021-U manufactured by J.R. Smith.
  - 1. Provide square tops in quarry tile kitchen areas.

- C. Interior Finished Wall Areas (WCO): Line type with lacquered cast iron body and round brass gasketed plug and round stainless steel access cover secured with vandal-proof fastener; Model 4532-U manufactured by J.R. Smith.
- D. Interior Unfinished Accessible Areas (CO): Cast iron cleanout ferrule with brass tapered plug; Model 4425 manufactured by J.R. Smith.

#### 2.4 WATER HAMMER ARRESTORS AND AIR CHAMBERS

- A. Fit water supply to each fixture with air chamber; air chamber same size as supply line or 3/4 inch minimum and minimum 18 inches long.

### PART 3 - EXECUTION

#### 3.1 PREPARATION

- A. Coordinate cutting and forming of roof and floor construction to receive drains to required invert elevations.

#### 3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Ensure clearance cleanout for rodding of drainage system.
- C. Encase exterior cleanouts in concrete flush with grade.
- D. Coordinate floor cleanout cover types and styles with Construction Manager's floor finish schedule.
- E. Install each fixture, HVAC make-up water connection, cooling tower make-up water connection and other devices with air chambers (minimum 3/4 inch x 18 inches long) or water hammer arrestor; size in accordance with PDI WH-201 Standards.
- F. Install pre-charged water hammer arrestors complete with accessible isolation ball valve.
- G. Provide deep seal P-traps for all slab-on grade floor drains.

END OF SECTION 224001

## SECTION 230500 - BASIC MECHANICAL REQUIREMENTS

### PART 1 GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and General Requirement Specification Sections, apply to this and the other sections of Division 22 and Division 23.

#### 1.2 SUMMARY

- A. This Section includes general administrative and procedural requirements for mechanical installations. The following administrative and procedural requirements are included in this Section to expand the requirements specified in the General Requirements:
  - 1. Submittals.
  - 2. Coordination drawings.
  - 3. Record documents.
  - 4. Maintenance manuals.
  - 5. Rough-ins.
  - 6. Mechanical installations.
  - 7. Cutting and patching.

#### 1.3 DEFINITIONS

- A. Furnish: To purchase; fabricate, as applicable; and deliver to designated location on job site.
- B. Install: To locate and make all necessary connections for complete and operating system. Installing contractor shall provide all necessary labor and miscellaneous piping, fittings, connectors, ductwork, etc. as required for installation and startup. Installing contractor shall also be responsible for all warranties, including the coordination and implementation of all factory warranties, regardless of whether or not the installing contractor has furnished the equipment.
- C. Provide: To furnish and install.

#### 1.4 CODES AND STANDARDS

- A. Code Compliance: Comply with all applicable codes pertaining to product materials and installations.



- B. All product materials and work shall comply to all local codes, including but not limited to the following codes and standards as applicable, in addition to any codes and standards referenced within individual specification sections. These codes and standards shall apply to all Division 22 and 23 Sections as applicable.
1. Americans with Disabilities Act (ADA).
  2. American Gas Association (AGA).
  3. American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE).
  4. American Society of Mechanical Engineers (ASME).
  5. Air Moving and Conditioning Associates (AMCA).
  6. American Society for Testing and Materials (ASTM).
  7. American Society of Plumbing Engineers (ASPE).
  8. American National Standard Institute (ANSI).
  9. Air Conditioning and Refrigeration Institute (ARI).
  10. International Building Code.
  11. International Mechanical Code.
  12. Factory Mutual.
  13. Illinois Administrative Code, including, but not limited to:
    - a. Illinois State Plumbing Code (2014)
    - b. Illinois Accessibility Code.
  14. National Electric Code (NEC).
  15. National Electric Manufacturers' Association (NEMA).
  16. All applicable sections of National Fire Protection Association (NFPA).
  17. Underwriters' Laboratories (UL).
  18. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA).
  19. International Fuel Gas Code.
  20. International Fire Code.
  21. International Energy Conservation Code (2015).

#### 1.5 SUBMITTALS

- A. General: Follow the procedures specified in the General Requirements, and additional defined below.
- B. Increase by one copy the number of mechanical related shop drawings, product data, and samples submitted. This copy will be retained by the Consulting Engineer.
- C. Additional copies may be required by individual sections of these Specifications.
- D. Highlight, encircle, or otherwise indicate deviations from the Contract Documents. Deviations included within shop drawings shall not be acceptable unless they are clearly identified as deviations. Deviations from the Contract Documents shall only be acceptable subsequent to the deviation being specifically submitted in writing, and responded to by the architect and engineer.

## 1.6 COORDINATION DRAWINGS

- A. Each trade shall prepare original coordination drawings in accordance with the General Requirements, other Division 22 and 23 Sections and as additionally defined below. Provide individual drawings for each trade, including (1) reproducible copy. Provide original drawings meeting the requirements as described in this section. Marked up copies of the design documents are not acceptable.
- B. Drawings shall include the latest architectural floor plan with column lines identified. These drawings shall detail all elements, components, and systems of the applicable mechanical, plumbing, or fire protection trade. Drawings shall also indicate the locations of other trades and indicate their relationship in all areas where limited space requires detailed coordination. All system components of trade being presented shall appear dark and be easily distinguished from architectural information or other system information included for coordination purposes. All information included that is not a part of the system being presented shall be indicated light or half tone. Indicate locations where space is limited for installation and access and where sequencing and coordination of installations are of importance to the efficient flow of the Work, including (but not necessarily limited to) the following:
1. Indicate the proposed locations of piping, ductwork, equipment, and materials. Include the following:
    - a. Ductwork mains and branches, size and location, for both exterior and interior; locations of dampers and other control devices; filters, boxes, and terminal units requiring periodic maintenance or repair.
    - b. Mains and branches of all piping systems, with valves and control devices located and numbered, concealed unions located, and with items requiring maintenance located (i.e., air separators, strainers, expansion compensators, tanks, etc.). Indicate actual inverts and horizontal locations of underground piping.
    - c. Equipment locations (exposed and concealed), dimensioned from prominent building lines.
    - d. Clearances for installing and maintaining insulation.
    - e. Clearances for servicing and maintaining equipment, including tube removal, filter removal, and space for equipment disassembly required for periodic maintenance.
    - f. Equipment connections and support details.
    - g. Exterior wall and foundation penetrations.
    - h. Fire-rated wall and floor penetrations.
    - i. Sizes and location of required concrete pads and bases.
    - j. Valve stem movement.
    - k. Indicate location of all equipment, ductwork, plumbing fixtures, piping etc., with dimensions from prominent building lines; and elevations above corresponding floors, roofs or grade as applicable.
  2. Indicate scheduling, sequencing, movement, and positioning of large equipment into the building during construction.
  3. Prepare floor plans, elevations, and details to indicate penetrations in floors, walls, and ceilings and their relationship to other penetrations and installations.

4. Prepare reflected ceiling plans to coordinate and integrate installations, air outlets and inlets, light fixtures, communication systems components, sprinklers, and other ceiling-mounted items. Dimension all items from prominent building lines except for those located in modular type ceilings.
5. Submit all coordination drawings and/or shop drawings prior to purchase, fabrication, or installation of any equipment. Any work started or equipment purchased prior to the review of submitted drawings by the design engineer is done at the contractor's risk. The offending contractor shall be entirely responsible for all changes, modifications, and/or extra services required resulting from the improper coordination and/or improper submittal procedures.
6. Encircle or bubble any revisions made on drawings being submitted more than one time. Indicate all revisions or changes made subsequent to the previous submittal reviewed by the engineer.

C. See front end documents for additional coordination requirements.

#### 1.7 RECORD DOCUMENTS

- A. Prepare record documents in accordance with the requirements in the General Requirements and other Division 22 and 23 Sections. In addition to the requirements specified indicate the following installed conditions:
  1. Provide one (1) digital copy (CD) and one (1) full size paper copy of "as-built" drawings with all information and meeting the requirements as described under "Coordination Drawings" in this section. Marked up copies of the design documents are not acceptable.
  2. Approved substitutions, Contract Modifications, and actual equipment and materials installed.
  3. The as-built drawings shall indicate the electrical installations as "installed" and required as described under "Coordination Drawings" and "Record Drawings".
  4. As-built drawings shall be complete on contractors own "Title Block".

#### 1.8 MAINTENANCE MANUALS

- A. Prepare maintenance manuals in accordance with the General Requirements. In addition to the requirements, include the following information for equipment items:
  1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of replacement parts.
  2. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.
  3. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
  4. Servicing instructions and lubrication charts and schedules.

## 1.9 WARRANTIES

- A. The Contractor shall warrant all Mechanical Work to be free of faults and defects in accordance with the General Conditions and Supplementary Conditions for a minimum period of one (1) year from final acceptance of the work. This shall include all materials and labor. Extended warranties shall be provided as indicated in other sections of these Specifications.
- B. The Contractor shall submit signed warranties for installations, equipment and fixtures required by this section and other sections of these Specifications.

## 1.10 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to the project properly identified with names, model numbers, types, grades, compliance labels, and other information needed for identification.
- B. Store and protect products under provisions of the General Requirements.
- C. Deliver and store material in shipping containers with labeling in place.
- D. Contractor shall store all materials shipped to this site in a protected area. If material is stored outside of the building, it must be stored off the ground a minimum of six inches set on 6 x 6 planks and/or wood pallets. All material must be completely covered with waterproof tarps or visquin. All piping will have the ends closed to keep out dirt and other debris. No equipment will be allowed to be stored on the site unless it is sitting on wood planks and is completely protected with weatherproof covers.

## PART 2 PRODUCTS

(Not Applicable)

## PART 3 EXECUTION

### 3.1 ROUGH-IN

- A. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.

### 3.2 MECHANICAL INSTALLATIONS

- A. General: Sequence, coordinate, and integrate the various elements of mechanical systems, materials, and equipment. Comply with the following requirements:
1. Coordinate mechanical systems, equipment, and materials installation with other building components.
  2. Verify all dimensions by field measurements.
  3. Confirm and arrange for chases, slots, and openings in other building components during progress of construction, to allow for mechanical installations.
  4. Coordinate the installation of required supporting devices and sleeves to be set in poured-in-place concrete and other structural components, as they are constructed.
  5. Sequence, coordinate, and integrate installations of mechanical materials and equipment for efficient flow of the Work. Give particular attention to large equipment requiring positioning prior to closing in the building.
  6. Where mounting heights are not detailed or dimensioned, install systems, materials, and equipment to provide the maximum headroom possible.
  7. Coordinate connection of mechanical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.
  8. Install systems, materials, and equipment to conform with approved submittal data, including coordination drawings, to greatest extent possible. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the Work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, refer conflict to the Architect.
  9. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components.
  10. Install mechanical equipment to facilitate servicing, maintenance, and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations. Extend grease fittings to an accessible location and purge all extended hoses with grease. Use extreme pressure grease to match District standards.
  11. Install access panel or doors where units are concealed behind finished surfaces. Access panels and doors are specified in Division 23 Section - Ductwork Accessories.
  12. Indicate locations and sizes for all access panels or doors where required for service of mechanical devices. Provide this information to the mason and/or drywall contractor before construction of corresponding partition.
  13. Access doors shall be required for service of any concealed device such as fire dampers, valves, VAV boxes, fans, controls, and coils. As much as practical, locate these devices in readily accessible locations.
  14. Install systems, materials, and equipment giving right-of-way priority to systems required to be installed at a specified slope.

15. General Locations and Arrangements: Drawings (plans, schematics, and diagrams) indicate the general location and arrangement of the systems in a diagrammatic form only. Location and arrangement of pipe, duct, and equipment lay-out shall take into consideration pipe/duct sizing and pressure loss, expansion, pump/fan sizing, and other design considerations. So far as practical, install system as indicated. Refer to individual system specifications for requirements for coordination drawing submittals. Adjust routing and provide all offsets, fittings, etc., as required for coordination with building and all other systems at no additional cost to the owner. All deviations from the design drawings shall be reflected on the shop drawings for review by the architect and engineer before proceeding with fabrication or installation.
16. Where drawings, specifications or notes conflict one another the contractor shall immediately advise the architect of such conflicts. For purposes of bidding and pending written receipt of any direction to the contrary, the contractor shall include in his proposal the more expensive alternate described.

### 3.3 CUTTING AND PATCHING

- A. General: Perform cutting and patching in accordance with the General Requirements. In addition to the requirements specified in the General Requirements, the following requirements apply:
  1. Protection of Installed Work: During cutting and patching operations, protect adjacent installations.
- B. Perform cutting, fitting, and patching of mechanical equipment and materials required to:
  1. Uncover Work to provide for installation of ill-timed Work.
  2. Remove and replace defective Work.
  3. Remove and replace Work not conforming to requirements of the Contract Documents.
  4. Remove samples of installed Work as specified for testing.
  5. Upon written instructions from the Architect, uncover and restore Work to provide for Architect/Engineer observation of concealed Work.
- C. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.
  1. Patch finished surfaces and building components using new materials specified for the original installation and experienced Installers. Installers' qualifications refer to the materials and methods required for the surface and building components being patched.
- D. All piping penetrations to be by contractor including sleeves and patching. Use coring whenever possible through concrete and masonry.
- E. Contractor to fire safe and seal all wall penetrations for ductwork, piping, conduits, etc. in new and existing walls or floors.

END OF SECTION 230500



## SECTION 230501 - MECHANICAL DEMOLITION

### PART 1 GENERAL

#### 1.1 REQUIREMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and the General Requirements apply to this Section.

#### 1.2 DESCRIPTION OF WORK

- A. Contractor shall provide all labor, materials, tools, equipment and services for the complete demolition, removal, and legal disposal of existing abandoned equipment; chillers, cooling towers, air cooled condensing units, refrigerant, piping, boilers, tanks, concrete pads, pumps, ductwork, associated controls, associated structural supports, hangers, rods, supports, anchors, miscellaneous hardware, miscellaneous equipment, removal of appurtenant equipment and materials, and lawfully dispose of all equipment, and materials rendered obsolete off the premises.
  - 1. Recover and dispose of legally, all refrigerants in equipment being demolished, removed or modified. Prior to the disposal of any refrigerant, give the owner the option of salvaging. Reclaim of refrigerant shall be performed by personnel certified in refrigerant reclaim by the State of Illinois.
  - 2. Drain down entire piping system, flush and fill.
  - 3. Disconnect, remove, transport, properly and lawfully dispose of all incidental and miscellaneous materials, hardware, equipment associated with the above items.
  - 4. Maintain temporary fences, warning signage, barricades, yellow protection tape, warning lights, and other similar items around any areas that create a hazard during the demolition process.
  - 5. Remove indicated piping including all associated hangers, rods, supports, channels, trapeze and anchors, and patching of existing walls, floors, slabs and ceilings to match existing conditions in all respects.
  - 6. Remove concrete housekeeping pads for existing chillers, cooling towers, boilers, pumps, strainers and miscellaneous equipment scheduled for demolition. Repair floors to match existing conditions, in all respects.
  - 7. Where disturbed by demolition of mechanical equipment, patch existing walls, ceilings, floor surfaces with materials and workmanship to match existing conditions. Where surfaces are painted and components are removed, walls shall be painted to match existing conditions by this contractor.
  - 8. Coordinate all demolition with Division 26 contractor for shut down of electrical power. Do not proceed with mechanical demolition until all electrical power has been safely disconnected from equipment to be demolished.

### 1.3 REQUIREMENTS

- A. Contractor shall provide caution and warning signs at all hazardous areas and at all door entries to construction rooms and areas during the entire construction period per IEPA law and regulations.

### 1.4 MAINTAIN CONTINUITY OF SERVICE

- A. Any downtime time periods shall be at the convenience of the Owner and approved by the Architect. Contractor shall give a minimum of 30 days prior written notice to the Architect in advance of any desired shutdown. Prior written notice shall include a schedule for downtime, work to be performed, complete with detailed drawings indicating all temporary wiring and equipment. All downtime periods shall be on weekends or off hours with exact time period approved in advance in writing by the Architect. Coordinate an overall schedule that is to be submitted and approved by the Architect.
- B. An electrician shall be on the premises when any trade is working in close proximity to live equipment or within electric rooms during renovations by any trade.
- C. All premium time, overtime, labor, material and equipment costs required to accomplish the above shall be included in the Contractor's bid proposal.

### 1.5 PROTECTION

- A. Perform removal of equipment and related components, in such manner as to eliminate hazards to persons and property; to minimize interference with use of adjacent areas, utilities and structures or interruption of use of such utilities; and to provide free passage to and from such adjacent areas of structures.
- B. Provide safeguards, including warning signs, barricades, temporary fences, warning lights, and other similar items that are required for protection of all personnel during demolition and removal operations.
  - 1. Wherever a cutting torch or other equipment that might cause a fire is used, provide and maintain fire extinguishers nearby ready for immediate use. All possible users shall be instructed in use of fire extinguishers. For each area in which a cutting torch or welding apparatus is used, a designated fire watchman shall be appointed.
  - 2. Contractor shall notify the Architect in writing of the time and location that cutting torches or welding equipment is used. The notice shall be turned in to the Architect prior to commencing work. Due to this being an occupied building, protect adjacent areas from cutting torch flame.
- C. Contractor to employ the services of a GPR (ground penetrating radar) specialist prior to major concrete floor saw cutting to assist in the location of underground/poured in concrete utilities and or services.

## PART 2 PRODUCTS

Not Used

## PART 3 EXECUTION

### 3.1 DEMOLITION

- A. Verify existing conditions and locations in field prior to submitting proposal. Failure to do so shall not relieve this contractor from performing the work required under this contract.
- B. Remove all piping indicated to be demolished back to associated main, terminating with branch capped as short as possible.
- C. All equipment and materials shall be removed from the premises. Materials and equipment becomes the property of the contractor and shall be legally disposed of.
- D. Provide all cutting, coring and patching and fire sealing as required for demolition work.
- E. The demolition drawings may be helpful in determining existing conditions, however they are based on original contract drawings and not "AS-BUILT". They do not show modifications made after the original construction.
- F. Maintain continuity of all existing systems for all buildings at all times.
- G. All demolition of the HVAC system as called for on the demolition drawings shall be under the mechanical (HVAC) contractors work.
- H. Mechanical contractor shall visit the building, before submitting his bid, to verify the existing conditions which will affect his work.
- I. Before starting any demolition on HVAC equipment which has an electrical connection. The mechanical contractor shall meet with the electrical contractor to identify all such equipment. The electrical contractor will disconnect the power to each unit, remove conduit, wiring, disconnect switches, and starters under his contract. Mechanical contractor will remove all equipment, electrical temperature control wiring, disconnect switches and starters under his contract. Mechanical contractor will remove all equipment, electrical temperature control wiring and conduit under this contract.
- J. Mechanical contractor shall verify size of all existing openings, doors, etc. for getting equipment and material out of building. Mechanical contractor shall provide any new or enlarged openings in existing building construction required to facilitate exiting of his equipment/material and restore such openings to their original state after completion.
- K. Mechanical contractor shall be responsible for his own clean-up throughout the course of the demolition work.

- L. All equipment, material, etc. that is being demolished will become the property of the mechanical contractor. All such items will be removed from the building site by the mechanical contractor. No item which is being removed under the demolition contract may be reused under the new work contract.
- M. Sequence of all demolition work shall be in strict accordance with the specifications, drawings and/or as directed by Engineer.
- N. The contractor performing the demolition work shall remove no more than 8" of building material around each device being demolished.
- O. Remove all abandoned ductwork not being reused under the new construction. Field verify all conditions.

### 3.2 FLOOR AND WALL OPENINGS

- A. Openings through floors and walls where piping or equipment has been removed shall be sealed to maintain any fire ratings and to seal off cold, smoke and toxic fumes.

### 3.3 DAMAGE TO OTHER WORK

- A. The Contractor shall be held responsible for any damage caused to existing installations not pertinent to the Contract. The cost of repairs to such damaged work shall be charged against the Contractor.

### 3.4 CLEAN-UP

- A. On completion of work of this section and after removal of all debris, site shall be left in clean condition satisfactory to the Architect. Clean up shall include off the premises disposal of all items and materials not required to remain the property of the Contractor as well as all debris and rubbish resulting from demolition operations.
- B. Debris, including brick, asphalt, concrete, stone, and similar materials shall become property of Contractor and shall be disposed of by the Contractor, off the property. Remove concrete foundations, conduits, anchor bolts, and all appurtenances.

END OF SECTION 230501

## SECTION 230502 - GAGES AND METERS

### PART 1 GENERAL

#### 1.1 WORK INCLUDED

- A. Pressure gages and Pressure gage taps.
- B. Thermometers and thermometer wells.
- C. Static pressure gages.
- D. Filter gages.

#### 1.2 RELATED SECTIONS

- A. Section 22 05 03 - Plumbing Piping.
- B. Section 23 09 13 – Instrumentation and Controls.
- C. Section 23 09 93 – Sequence of Operation.
- D. Section 23 11 26 - Fuel Piping.

#### 1.3 REFERENCES

- A. ASME - B40.1 - Gages - Pressure Indicating Dial Type - Elastic Element.
- B. ASTM E1 - Specification for ASTM Thermometers.
- C. ASTM E77 - Verification and Calibration of Liquid-in-Glass Thermometers.
- D. AWWA C700 - Cold Water Meters - Displacement Type.
- E. UL 393 - Indicating Pressure Gages for Fire and Protection Services.

#### 1.4 SUBMITTALS FOR REVIEW

- A. Product Data: Provide list, which indicates use, operating range, total range and location for manufactured components.
- B. Submit under provisions of the General Requirements.

1.5 SUBMITTALS AT PROJECT CLOSEOUT

- A. Project Record Documents: Record actual locations of components and instrumentation.
- B. Submit under provision of the General Requirements.

1.6 INSTALLATION OF CONTROL PRODUCTS

- A. Install valves, temperature and pressure sensors and other instrumentation in the locations directed by the BAS contractor.
- B. Install BAS valves and sensors in the locations shown on the plans.
- C. Failure of this contractor to adequately coordinate his work with the BAS contractor shall not be justification for any request for additional payment.
- D. This contractor shall include the cost of coordinating and installing related BAS components in his bid.

PART 2 PRODUCTS

2.1 PRESSURE GAGES

- A. Manufacturers:
  - 1. Terice.
  - 2. Owner approved equal.
- B. Gage: ASME B40.1, stainless steel or cast aluminum case, phosphor bronze bourdon tube, rotary brass movement, brass socket, with adjustable pointer, black scale on white background.
  - 1. Case: Stainless steel or cast aluminum with brass bourdon tube.
  - 2. Size: 4-1/2 inch diameter (minimum).
  - 3. Mid Scale Accuracy: One percent full scale.
  - 4. Scale: Psi.

2.2 PRESSURE GAGE TAPPINGS

- A. Gage Cock: Tee or lever handle, brass for maximum 150 psig.
- B. Needle Valve: Brass, 1/4 inch NPT for minimum 150 psig.
- C. Pulsation Damper: Pressure snubber, brass with 1/4 inch connections.
- D. Syphon: Steel, Schedule 40, 1/4 inch angle or straight pattern.



## 2.3 STEM TYPE THERMOMETERS

### A. Manufacturers:

1. Miljoco.
2. Weiss.
3. Owner approved equal.

### B. Thermometer: ASTM E1, adjustable angle, blue organic, lens front tube, cast aluminum case with enamel finish, cast aluminum adjustable joint with positive locking device.

1. Size: 9 inch scale.
2. Window: Clear Lexan.
3. Stem:  $\frac{3}{4}$  inch NPT brass.
4. Accuracy: One scale division.
5. Calibration: Degrees F.

## 2.4 THERMOMETER SUPPORTS

### A. Socket: Brass separable sockets for thermometer stems with or without extensions as required, and with cap and chain.

### B. Flange: 3 inch outside diameter reversible flange, designed to fasten to sheet metal air ducts, with brass perforated stem.

## 2.5 TEST PLUGS

### A. Test Plug: 1/4 inch or 2 inch brass fitting and cap for receiving 1/8 inch outside diameter pressure or temperature probe with neoprene core for temperatures up to 210 degrees F.

### B. Test Kit: Carrying case, internally padded and fitted containing one 2-1/2 inch diameter pressure gages, one gage adapters with 1/8 inch probes, two one inch dial thermometers.

## 2.6 STATIC PRESSURE GAGES

### A. Inclined manometer, red liquid on white background with black figures, front recalibration adjustment, 3 percent of full scale accuracy.

### B. Accessories: Static pressure tips with compression fittings for bulkhead mounting, 1/4 inch diameter tubing.

## PART 3 EXECUTION

### 3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install pressure gages with pulsation dampers. Provide gage cock to isolate each gage.
- C. Install thermometers in piping systems in sockets in short couplings. Enlarge pipes smaller than 2-1/2 inch for installation of thermometer sockets. Ensure sockets allow clearance from insulation.
- D. Install thermometer sockets and pressure taps as directed by BAS contractor adjacent to controls systems transmitter, or sensor sockets and as required.
- E. Coil and conceal excess capillary on remote element instruments.
- F. Provide instruments with scale ranges selected according to service with largest appropriate scale.
- G. Install gages and thermometers in locations where they are easily read from normal operating level. Install vertical to 45 degrees off vertical.
- H. Adjust gages and thermometers to final angle, clean windows and lenses, and calibrate to zero.
- I. Locate test plugs adjacent thermometers and thermometer sockets and adjacent to pressure gages and pressure gage taps.
- J. Install all gauges and meters.

### 3.2 SCHEDULES

- A. Pressure Gage Schedule  
LOCATION  
Pumps  
Pressure reducing valves  
Pressure Tanks  
Boiler(s)  
Boiler Header  
Vacuum Receiver  
Boiler feedwater pumps
- B. Pressure Gage Tapping Schedule  
LOCATION  
Pumps  
Control pressure-sensing locations

- C. Stem Type Thermometer Schedule  
LOCATION  
Headers to central equipment  
After major coils  
Water zone supply and return  
Domestic hot water supply and recirculation
- D. Thermometer Socket Schedule  
LOCATION  
Control temperature-sensing locations
- E. Static Pressure and Filter Gage Schedule  
LOCATION  
Unitary filter sections

END OF SECTION 230502

## SECTION 230503 - TESTING OF HVAC AND GAS PIPING

### PART 1 GENERAL

#### 1.1 WORK INCLUDED

- A. Natural gas piping.
- B. Heating hot water piping.
- C. Chemical feed piping.
- D. Steam and condensate piping.

#### 1.2 RELATED SECTIONS

- A. Section 23 11 26 - Fuel Piping.
- B. Section 23 21 13 – Hydronic Piping.
- C. Section 23 22 20 – Steam and Condensate Piping.
- D. Section 23 25 00 – Chemical Water Treatment.

#### 1.3 REFERENCES

- A. NFPA.
- B. ARI.
- C. International Mechanical Code 2012.

#### 1.4 REGULATORY REQUIREMENTS

- A. Conform to International Mechanical Code 2012.

### PART 2 PRODUCTS

Not Used.

## PART 3 EXECUTION

### 3.1 GENERAL

- A. Before final acceptance of all HVAC and gas piping systems, all systems must be tested in accordance with the schedule and prove to be free of leaks.
  - 1. Perform tests under observation of Architect/ Engineer.
  - 2. Remove, replace or satisfactorily repair defective work revealed by tests.
  - 3. Make piping repairs with new materials; caulking of screwed joints or pin holes is not permitted.
  - 4. Furnish all test equipment and materials for testing.
  - 5. Owner to furnish water for testing and flushing.

### 3.2 TESTING MATERIAL

- A. Testing Medium:
  - 1. Hydrostatic Testing Medium: Clean water.
  - 2. Pneumatic Testing Medium: Clean compressed air.
- B. Pressure Testing Gauges: ANSI B40.1, Grade AA; minimum 6 inch diameter dial with scale divisions equal or less than maximum allowable pressure drop.

### 3.3 TESTING SYSTEMS

- A. All plumbing and fire protection piping to be tested as called for in Section 22 05 03.
- B. HVAC and Gas System Piping:
  - 1. Test with water and air.
  - 2. Water Test:
    - a. When entire system is tested, tightly close all openings in pipes except highest opening and fill system with water to overflow point.
    - b. When system is tested in sections, tightly plug each opening except highest opening, fill each section with water and test each section with minimum 10 foot head of water; test each preceding section until entire system has been tested with minimum 10 foot head of water, except uppermost 10 feet of system.
    - c. Keep water in system or in portion under test, for minimum 30 minutes before inspection.
    - d. System must be tight at all joints.

3. Air Test:

- a. When tests are made with air, apply minimum 30 psi with force pump and maintain for period of time indicated in Paragraph D with no leakage apparent.
- b. Use mercury-column in making test.

C. Hydrostatic and Pneumatic Testing Requirements:

1. Hydrostatic and pneumatic tests apply to piping indicate as scheduled is Paragraph D.
2. Pressure to be raised gradually to given value; then block off tight at source.
3. Allowable Pressure Drop: Maximum amount scheduled during corresponding minimum time interval.
  - a. Visually examine all joints during test.
4. Upon successful completion and test approval, relieve piping of pressure, drain, put into normal operation except for potable water to be sterilized before placing in service.

D. Hydrostatic and Pneumatic Testing Schedule:

Service	Normal Hydrostatic Work Pressure psig	Pneumatic Test Pressure psig	Maximum Allowable Test Pressure psig	Minimum Pressure Drop psi	Test Time Hours
1. Fuel					
Natural Gas	To 5	---	30	0	8
2. Miscellaneous					
Chemical Feed	To 60	---	30	0	4
3. Hot Water	To 60	150	30	2	8
4. Steam and Condensate	To 125	250	100	0	8

3.4 CLEANING AND ADJUSTING

A. Cleaning: Thoroughly clean all parts of the piping installation at completion of work.

1. Remove grease, metal cutting and sludge from all equipment, pipes, valves all fittings.
2. Repair all stoppages, discoloration or other damage to finish, furnishings or parts of building that are due to Contractor's failure to properly clean piping system.
3. Remove and clean all flow control devices.



B. Adjusting:

1. Adjust all valves and other parts of work for quiet operation.
2. Adjust control devices for proper operation.
3. Demonstrate to Architect/Engineer satisfactory operation following adjustment.
4. Readjust or replace all items not functioning properly.

END OF SECTION 230503

## SECTION 230513 - MOTORS

### PART 1 GENERAL

#### 1.1 WORK INCLUDED

- A. Single phase electric motors.
- B. Three phase electric motors.

#### 1.2 REFERENCES

- A. AFBMA 9 - Load Ratings and Fatigue Life for Ball Bearings.
- B. AFBMA 11 - Load Ratings and Fatigue Life for Roller Bearings.
- C. IEEE 112 - Test Procedure for Polyphase Induction Motors and Generators.
- D. NEMA MG 1 - Motors and Generators.
- E. NFPA 70 - National Electrical Code.

#### 1.3 SUBMITTALS

- A. Submit under provisions of the General Requirements.
- B. Product Data: Provide wiring diagrams with electrical characteristics and connection requirements.
- C. Manufacturer's Installation Instructions: Indicate setting, mechanical connections, lubrication, and wiring instructions.

#### 1.4 OPERATION AND MAINTENANCE DATA

- A. Submit under provisions of the General Requirements.
- B. Operation Data: Include instructions for safe operating procedures.
- C. Maintenance Data: Include assembly drawings, bearing data including replacement sizes, and lubrication instructions.

1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacture of electric motors for commercial use, and their accessories, with minimum three (3) years documented product development, testing, and manufacturing experience.

1.6 REGULATORY REQUIREMENTS

- A. Conform to NFPA 70 and ANSI.
- B. Products Requiring Electrical Connection: Listed and classified by Underwriters' Laboratories, Inc., as suitable for the purpose specified and indicated.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of the General Requirements.
- B. Protect motors stored on site from weather and moisture by maintaining factory covers and suitable weather-proof covering.

1.8 WARRANTY

- A. Provide five (5) year warranty under provisions of the General Requirements.
- B. Warranty: Include coverage for motors larger than 5 horsepower.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Century E + 3 High Efficiency.
- B. Lincoln.
- C. Reliance.
- D. Dayton.
- E. General Electric.
- F. Owner approved equal.

## 2.2 GENERAL CONSTRUCTION AND REQUIREMENTS

- A. Motors Less Than 250 Watts, for Intermittent Service: Equipment manufacturer's standard and need not conform to these specifications.
- B. Electrical Service:
  - 1. Motors 1/2 HP and Smaller: 120 volts, single phase, 60 Hz.
  - 2. Motors Larger than 3/4 Horsepower: 208 volts, three phase, 60 Hz.
- C. Type:
  - 1. Open drip-proof except where specifically noted otherwise.
  - 2. Motors: Design for continuous operation in 40 degrees C environment.
  - 3. Design for temperature rise in accordance with NEMA MG 1 limits for insulation class, service factor, and motor enclosure type.
  - 4. Motors with frame sizes 184T and larger: Energy Efficient Type equal to Century E + 3.
- D. Visible Nameplate: Indicating motor horsepower, voltage, phase, cycles, RPM, full load amps, locked rotor amps, frame size, manufacturer's name and model number, service factor, power factor, efficiency.
- E. Wiring Terminations:
  - 1. Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70, threaded for conduit.
  - 2. For fractional horsepower motors where connection is made directly, provide threaded conduit connection in end frame.

## 2.3 SINGLE PHASE POWER - SPLIT PHASE MOTORS

- A. Starting Torque: Less than 150 percent of full load torque.
- B. Starting Current: Up to seven times full load current.
- C. Breakdown Torque: Approximately 200 percent of full load torque.
- D. Drip-proof Enclosure: Class A insulation, NEMA Service Factor, prelubricated sleeve or ball bearings.
- E. Enclosed Motors: Class A insulation, 1.0 Service Factor, prelubricated ball bearings.

2.4 SINGLE PHASE POWER - PERMANENT-SPLIT CAPACITOR MOTORS

- A. Starting Torque: Exceeding one fourth of full load torque.
- B. Starting Current: Up to six times full load current.
- C. Multiple Speed: Through tapped windings.
- D. Open Drip-proof or Enclosed Air Over Enclosure: Class A insulation, minimum 1.0 Service Factor, prelubricated sleeve or ball bearings, automatic reset overload protector.

2.5 SINGLE PHASE POWER - CAPACITOR START MOTORS

- A. Starting Torque: Three times full load torque.
- B. Starting Current: Less than five times full load current.
- C. Pull-up Torque: Up to 350 percent of full load torque.
- D. Breakdown Torque: Approximately 250 percent of full load torque.
- E. Motors: Capacitor in series with starting winding; provide capacitor-start/capacitor-run motors with two capacitors in parallel with run capacitor remaining in circuit at operating speeds.
- F. Drip-proof Enclosure: Class A insulation, NEMA Service Factor, prelubricated sleeve bearings.
- G. Enclosed Motors: Class A insulation, 1.0 Service Factor, prelubricated ball bearings.

2.6 THREE PHASE POWER - SQUIRREL CAGE MOTORS

- A. Starting Torque: Between 1 and 1-1/2 times full load torque.
- B. Starting Current: Six times full load current.
- C. Power Output, Locked Rotor Torque, Breakdown or Pull Out Torque: NEMA Design B characteristics.
- D. Design, Construction, Testing, and Performance: Conform to NEMA MG 1 for Design B motors.
- E. Insulation System: NEMA Class B or better.
- F. Testing Procedure: In accordance with IEEE 112. Load test motors to determine free from electrical or mechanical defects in compliance with performance data.
- G. Motor Frames: NEMA Standard T-Frames of steel, aluminum, or cast iron with end brackets of cast iron or aluminum with steel inserts.

- H. Thermistor System Motor Frame Sizes 254T and Larger: Three PTC thermistors imbedded in motor windings and epoxy encapsulated solid state control relay for wiring into motor starter.
- I. Bearings: Grease lubricated anti-friction ball bearings with housings equipped with plugged provision for relubrication, rated for minimum AFBMA 9, L-10 life of 20,000 hours. Calculate bearing load with NEMA minimum V-belt pulley with belt center line at end of NEMA standard shaft extension. Stamp bearing sizes on nameplate. Replace plugs at completion of project and provide grease fittings.
- J. Sound Power Levels: To NEMA MG 1.
- K. Part Winding Start Above 254T Frame Size: Use part of winding to reduce locked rotor starting current to approximately 60 percent of full winding locked rotor current while providing approximately 50 percent of full winding locked rotor torque.
- L. Weatherproof Epoxy Sealed Motors: Epoxy seal windings using vacuum and pressure with rotor and starter surfaces protected with epoxy enamel; bearings double shielded with waterproof non-washing grease.
- M. Nominal Efficiency: As scheduled at full load and rated voltage when tested in accordance with IEEE 112.
- N. Nominal Power Factor: As scheduled at full load and rated voltage when tested in accordance with IEEE 112.

### PART 3 EXECUTION

#### 3.1 APPLICATION

- A. Single phase motors for shaft mounted fans: Split phase type.
- B. Single phase motors for shaft mounted fans or blowers: Permanent split capacitor type.
- C. Motors located in exterior locations, air cooled condensers explosion proof environments and dust collection systems shall be: Totally enclosed type.

#### 3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install securely on firm foundation. Mount ball bearing motors with shaft in any position.
- C. Check line voltage and phase and ensure agreement with nameplate.
- D. Replace bearing plugs with grease fittings at project completion.



### 3.3 NEMA OPEN MOTOR SERVICE FACTOR SCHEDULE

HP	1800 RPM
1/6-1/3	1.35
2	1.25
3/4	1.25
1	1.15
1.5-75	1.15

### 3.4 PERFORMANCE SCHEDULE: THREE PHASE - ENERGY EFFICIENT, OPEN DRIP-PROOF

HP	RPM (Syn)	NEMA Frame	Minimum Percent Efficiency	Minimum Percent Power Factor
1	1800	143T	82	84
1-1/2	1800	145T	84	85
2	1800	145T	84	85
3	1800	182T	86	86
5	1800	184T	87	87
7-1/2	1800	213T	88	86
10	1800	215T	89	85
15	1800	256T	91	85
20	1800	256T	91	86
25	1800	284T	91	85
30	1800	286T	92	88

### 3.5 PERFORMANCE SCHEDULE: THREE PHASE-ENERGY EFFICIENT (E+3) TOTALLY ENCLOSED, FAN COOLED

HP	RPM (Syn)	NEMA Frame	Minimum Percent Efficiency	Minimum Percent Power Factor
1	1800	143T	82	84
1-1/2	1800	145T	84	85
2	1800	145T	84	85
3	1800	182T	87	83
5	1800	184T	88	83
7-1/2	1800	213T	89	85
10	1800	215T	90	84
15	1800	254T	91	86
20	1800	256T	91	85
25	1800	284T	92	84
30	1800	286T	93	86

END OF SECTION 230513

## SECTION 230516 - PIPING EXPANSION COMPENSATION

### PART 1 GENERAL

#### 1.1 WORK INCLUDED

- A. Flexible pipe connectors.
- B. Pipe loops, offsets, and swing joints.
- C. Steel and copper pipe guides and anchors.

#### 1.2 RELATED SECTIONS

- A. Section 22 05 03 - Plumbing Piping.
- B. Section 23 25 29 - Supports and Anchors.
- C. Section 23 21 13 – Hydronic Piping.
- D. Section 23 21 15 – Steam and Condensate Piping.

#### 1.3 REFERENCES

- A. Conform to Standards of Expansion Joint Manufacturers Association Selection Guide.
- B. ASHRAE Chapter 23, Pipes Tubes and Fittings.

#### 1.4 PERFORMANCE REQUIREMENTS

- A. Provide structural work and equipment required to control expansion and contraction of piping. Verify that anchors, guides, and expansion joints provided, adequately protect system.
- B. Expansion Calculations:
  - 1. Installation Temperature: 40 degrees F.
  - 2. Hot Water Heating and Condensate: 210 degrees F.
  - 3. Domestic Hot Water: 140 degrees F.
  - 4. Steam and Condensate Piping: 230 degrees F.
  - 5. Safety Factor: 30 percent.

## 1.5 SUBMITTALS

- A. Submit under provisions of the General Requirements.
- B. Product Data:
  - 1. Flexible Pipe Connectors: Indicate maximum temperature and pressure rating, face-to-face length, live length, hose wall thickness, hose convolutions per foot (meter) and per assembly, fundamental frequency of assembly, braid structure, and total number of wires in braid.
  - 2. Expansion Joints: Indicate maximum temperature and pressure rating, and maximum expansion compensation.
- C. Design Data: Indicate selection calculations.
- D. Manufacturer's Installation Instructions: Indicate special procedures, and external controls.

## 1.6 PROJECT RECORD DOCUMENTS

- A. Submit under provisions of the General Requirements.
- B. Record actual locations of flexible pipe connectors, expansion joints, anchors, and guides.

## 1.7 OPERATION AND MAINTENANCE DATA

- A. Submit under provisions of the General Requirements.
- B. Maintenance Data: Include adjustment instructions.

## 1.8 QUALIFICATIONS

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

## 1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of the General Requirements.
- B. Accept expansion joints on site in factory packing with shipping bars and positioning devices intact. Inspect for damage.
- C. Protect equipment from exposure by leaving factory coverings, pipe end protection, and packaging in place until installation.

1.10 WARRANTY

- A. Provide five year warranty under provisions of the General Requirements.
- B. Warranty: Include coverage for leak free performance of packed expansion joints.

PART 2 PRODUCTS

2.1 FLEXIBLE PIPE CONNECTORS

- A. Manufacturers:
  - 1. Mason Industries - Model BSS.
  - 2. MetraFlex - Model Mini.
  - 3. Hyspan Precision - Model 4500.
  - 4. General Rubber Corporation.
  - 5. Victaulic Engineered Assemblies.
  - 6. Owner approved equal.
- B. Inner Hose: Stainless Steel.
- C. Exterior Sleeve: Double braided, bronze.
- D. Pressure Rating: 200 psi WOG and 250 degrees F maximum temperature.
- E. Joint: Flanged.
- F. Maximum offset: 1 inch on each side of installed center line.

2.2 ACCESSORIES

- A. Pipe Alignment Guides:
  - 1. Two piece welded steel with enamel paint, bolted, with spider to fit standard pipe, frame with four mounting holes, clearance for minimum 1 inch thick insulation, minimum 3 inch travel.

## PART 3 EXECUTION

### 3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Construct spool pieces to exact size of flexible connection for future insertion.
- C. Install flexible pipe connectors on pipes connected to equipment supported by vibration isolation. Provide line size flexible connectors.
- D. Install flexible connectors at right angles to displacement. Install one end immediately adjacent to isolated equipment and anchor other end. Install in horizontal plane unless indicated otherwise.
- E. Rigidly anchor pipe to building structure where necessary. Provide pipe guides so movement is directed along axis of pipe only. Erect piping such that strain and weight is not on cast connections or apparatus.
- F. Provide support and equipment required to control expansion and contraction of piping. Provide loops, pipe offsets or expansion joints where required.
- G. Provide expansion loops as required on drawings or as required by field conditions. Engineered expansion compensators shall be used in lieu of expansion loops if clearance is limited.

END OF SECTION 230516

## SECTION 230529 - SUPPORTS AND ANCHORS

### PART 1 GENERAL

#### 1.1 WORK INCLUDED

- A. Pipe and equipment hangers and supports.
- B. Inserts.
- C. Equipment bases and supports.
- D. Sleeves and seals.
- E. Flashing and sealing equipment and pipe stacks.

#### 1.2 RELATED SECTIONS

- A. Section 22 05 03 - Plumbing Piping.
- B. Section 23 07 01 - Piping Insulation.
- C. Section 23 11 26 - Fuel Piping.
- D. Section 23 21 13 – Hydronic Piping.
- E. Section 23 21 15 – Steam and Condensate Piping.

#### 1.3 REFERENCES

- A. American Society of Mechanical Engineers:
  - 1. ASME B31.1 – Power Piping.
  - 2. ASME B31.2 – Fuel Gas Piping.
  - 3. ASME B31.9 – Building Services Piping.
- B. ASTM International:
  - 1. ASTM E119 – Standard Test Methods for Fire Tests of Building Construction and Materials.
  - 2. ASTM E814 – Standard Test Method for Fire Tests of Through Penetration Fire Stops.
  - 3. ASTM F708 – Standard Practice for Design and Installation of Rigid Pipe Hangers.
  - 4. ASTM E1966 – Standard Test Method for Fire-Resistive Joint Systems.



C. American Welding Society:

1. AWS D1.1 – Structural Welding Code – Steel.

D. FM Global:

1. FM – Approved Guide, A Guide to Equipment, Materials & Services Approved by Factory Mutual Research for Property Conservation.

E. Underwriters Laboratories, Inc.

1. UL 263 – Fire Tests of Building Construction and Materials.
2. UL 723 – Tests for Surface Building Characteristics of Building Materials.
3. UL 1479 – Fire Tests of Through-Penetration Firestops.
4. UL 2079 – Tests for Fire Resistance of Building Joint Systems.
5. UL – Fire Resistance Directory.

1.4 DEFINITIONS

- A. Firestopping (Through-Penetration Protection System): Sealing or stuffing material or assembly placed in spaces between and penetrations through building materials to arrest movement of fire, smoke, heat, and hot gases through fire rated construction.

1.5 SUBMITTALS

- A. Submit under provisions of the General Requirements.
- B. Shop Drawings: Indicate system layout with location and detail of trapeze hangers.
- C. Product Data: Provide manufacturers catalog data including load capacity.
- D. Design Data: Indicate load carrying capacity of trapeze, multiple pipe, and riser support hangers.
- E. Manufacturer's Installation Instructions: Indicate special procedures and assembly of components.

1.6 REGULATORY REQUIREMENTS

- A. Conform to International Mechanical Code for support of plumbing.

## PART 2 PRODUCTS

### 2.1 PIPE HANGERS AND SUPPORTS

#### A. Plumbing Piping - DWV:

1. Conform to ASME B31.9, ASTM F708.
2. Hangers for Pipe Sizes 2 to 1-1/2 Inch: Malleable iron, adjustable swivel, split ring.
3. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
4. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
5. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
6. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
7. Vertical Support: Steel riser clamp.
8. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
9. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

#### B. Plumbing Piping - Water:

1. Conform to ASME B31.9, ASTM F708.
2. Hangers for Pipe Sizes 2 to 1-1/2 Inch: Malleable iron, adjustable swivel, split ring.
3. Hangers for Cold Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
4. Hangers for Hot Pipe Sizes 2 to 4 Inches: Carbon steel, adjustable, clevis.
5. Hangers for Hot Pipe Sizes 6 Inches and Over: Adjustable steel yoke, cast iron roll, double hanger.
6. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
7. Multiple or Trapeze Hangers for Hot Pipe Sizes 6 Inches and Over: Steel channels with welded spacers and hanger rods, cast iron roll.
8. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
9. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
10. Wall Support for Hot Pipe Sizes 6 Inches and Over: Welded steel bracket and wrought steel clamp with adjustable steel yoke and cast iron roll.
11. Vertical Support: Steel riser clamp.
12. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
13. Floor Support for Hot Pipe Sizes to 4 Inches: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
14. Floor Support for Hot Pipe Sizes 6 Inches and Over: Adjustable cast iron roll and stand, steel screws, and concrete pier or steel support.
15. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

C. Fuel Gas Piping:

1. Conform to ASME B31.2, ASTM F708.
2. Hangers for Pipe Sizes 2 to 1-1/2 Inch: Malleable iron, adjustable swivel, split ring.
3. Hangers for Hot Pipe Sizes 2 to 4 Inches: Carbon steel, adjustable, clevis.
4. Hangers for Hot Pipe Sizes 6 Inches and Over: Adjustable steel yoke, cast iron roll, double hanger.
5. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
6. Multiple or Trapeze Hangers for Hot Pipe Sizes 6 Inches and Over: Steel channels with welded spacers and hanger rods, cast iron roll.
7. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
8. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
9. Wall Support for Hot Pipe Sizes 6 Inches and Over: Welded steel bracket and wrought steel clamp with adjustable steel yoke and cast iron roll.
10. Vertical Support: Steel riser clamp.
11. Floor Support for Hot Pipe Sizes to 4 Inches: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
12. Floor Support for Hot Pipe Sizes 6 Inches and Over: Adjustable cast iron roll and stand, steel screws, and concrete pier or steel support.
13. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

D. Hydronic Piping:

1. Conform to ASME B31.9, ASTM F708.
2. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch: Malleable iron, adjustable swivel, split ring.
3. Hangers for Hot Pipe Sizes 2 to 4 Inches: Carbon steel, adjustable, clevis.
4. Hangers for Hot Pipe Sizes 6 Inches and Over: Adjustable steel yoke, cast iron yoke, cast iron roll, double hanger.
5. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
6. Multiple or Trapeze Hangers for Hot Pipe Sizes 6 Inches and Over: Steel channels with welded spacers and hanger rods, cast iron roll.
7. Wall support for Pipe Sizes to 3 Inches: Cast iron hook.
8. Wall support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
9. Wall Support for Hot Pipe Sizes 6 Inches and Over: Welded steel bracket and wrought steel clamp with adjustable steel yoke and cast iron roll.
10. Vertical Support: Steel riser clamp.
11. Floor Support for Hot Pipe Sizes to 4 Inches: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
12. Floor Support for Hot Pipe Sizes 6 Inches and Over: Adjustable cast iron roll and stand, steel screws, and concrete pier or steel support.
13. Copper Pipe Support; Carbon steel ring, adjustable, copper plated.

E. Steam and Condensate Piping

1. Conform to ASME B31.9, ASTM F708.
2. Hangers for Pipe Sizes 2 to 1-1/2 Inch: Malleable iron, adjustable swivel, split ring.
3. Hangers for Hot Pipe Sizes 2 to 4 Inches: Carbon steel, adjustable, clevis.
4. Hangers for Hot Pipe Sizes 6 Inches and Over: Adjustable steel yoke, cast iron yoke, cast iron roll, double hanger.
5. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
6. Multiple or Trapeze Hangers for Hot Pipe Sizes 6 Inches and Over: Steel channels with welded spacers and hanger rods, cast iron roll.
7. Wall support for Pipe Sizes to 3 Inches: Cast iron hook.
8. Wall support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
9. Wall Support for Hot Pipe Sizes 6 Inches and Over: Welded steel bracket and wrought steel clamp with adjustable steel yoke and cast iron roll.
10. Vertical Support: Steel riser clamp.
11. Floor Support for Hot Pipe Sizes to 4 Inches: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
12. Floor Support for Hot Pipe Sizes 6 Inches and Over: Adjustable cast iron roll and stand, steel screws, and concrete pier or steel support.
13. Copper Pipe Support; Carbon steel ring, adjustable, copper plated.

2.2 ACCESSORIES

- A. Hanger Rods: Mild steel threaded both ends, threaded one end, or continuous threaded.

2.3 INSERTS

- A. Inserts: Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

2.4 FLASHING

- A. Metal Flashing: 26 gage galvanized steel.
- B. Metal Counterflashing: 22 gage galvanized steel.
- C. Lead Flashing:
1. Waterproofing: 5 lb/sq ft sheet lead.
  2. Soundproofing: 1 lb/sq ft sheet lead.
- D. Flexible Flashing: 47 mil thick sheet compatible with roofing.
- E. Caps: Steel, 22 gage minimum; 16 gage at fire resistant elements.

## 2.5 EQUIPMENT CURBS

### A. Manufacturers:

1. Thycurb.
2. Pate.
3. Owner approved equal.

### B. Fabrication: Welded 18 gage galvanized steel shell and base, mitered 3 inch cant, 1-1/2 inch thick insulation, factory installed wood nailer, 18 inches high, see architectural drawings for additional information.

## 2.6 SLEEVES

### A. Sleeves for Pipes Through Non-fire Rated Floors: 18 gage galvanized steel.

### B. Sleeves for Pipes Through Non-fire Rated Beams, Walls, Footings, and Potentially Wet Floors: Steel pipe or 18 gage galvanized steel.

### C. Sleeves for Pipes Through Fire Rated and Fire Resistive Floors and Walls, and Fire Proofing: Prefabricated fire rated sleeves including seals, UL listed.

### D. Sleeves for Round Ductwork: Galvanized steel.

### E. Sleeves for Rectangular Ductwork: Galvanized steel.

### F. Firestopping Insulation: Glass fiber type, non-combustible.

### G. Sealant: Acrylic.

## 2.7 MECHANICAL SLEEVE SEALS

### A. Product Description: Modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between object and sleeve, connected with bolts and pressure plates causing rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation.

## 2.8 FORMED STEEL CHANNEL

### A. Product Description: Galvanized 12-gauge thick steel. With holes 1-1/2 inches on center.

## PART 3 EXECUTION

### 3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.

### 3.2 INSERTS

- A. Provide inserts for placement in concrete formwork.
- B. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
- C. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
- D. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.

### 3.3 PIPE HANGERS AND SUPPORTS

- A. Support horizontal piping as scheduled.
- B. Install hangers to provide minimum 2 inch space between finished covering and adjacent work.
- C. Place hangers within 12 inches of each horizontal elbow.
- D. Use hangers with 1-1/2 inch minimum vertical adjustment.
- E. Support horizontal cast iron pipe adjacent to each hub, with 5 feet maximum spacing between hangers.
- F. Support vertical piping at every floor. Support vertical cast iron pipe at each floor at hub.
- G. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
- H. Support riser piping independently of connected horizontal piping.
- I. Provide copper plated hangers and supports for copper piping.
- J. Design hangers for pipe movement without disengagement of supported pipe.



### 3.4 EQUIPMENT BASES AND SUPPORTS

- A. Provide housekeeping pads of concrete, minimum 4 inches thick and extending 6 inches beyond supported equipment.
- B. Provide templates, anchor bolts, and accessories for mounting and anchoring equipment.
- C. Construct supports of steel members. Brace and fasten with flanges bolted to structure.
- D. Provide rigid anchors for pipes after vibration isolation components are installed.

### 3.5 FLASHING

- A. Provide flexible flashing and metal counterflashing where piping and ductwork penetrate weather or waterproofed walls, floors, and roofs.
- B. Flash vent and soil pipes projecting 3 inches minimum above finished roof surface with lead worked one inch minimum into hub, 8 inches minimum clear on sides with 24 x 24 inches sheet size. For pipes through outside walls, turn flanges back into wall and calk, metal counterflash, and seal.
- C. Flash floor drains in floors with topping over finished areas with lead, 10 inches clear on sides with minimum 36 x 36 inch sheet size. Fasten flashing to drain clamp device.
- D. Seal floor, shower and mop sink drains watertight to adjacent materials.
- E. Provide curbs for mechanical roof installations 18 inches minimum high above roofing surface. Flash and counterflash with sheet metal; seal watertight. Attach counterflashing mechanical equipment and lap base flashing on roof curbs. Flatten and solder joints. Roof curbs shall match roof pitch.
- F. Adjust storm collars tight to pipe with bolts; caulk around top edge. Use storm collars above roof jacks. Screw vertical flange section to face of curb.

### 3.6 SLEEVES

- A. Set sleeves in position in formwork. Provide reinforcing around sleeves.
- B. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.
- C. Extend sleeves through floors 1-1/2 inch above finished floor level. Caulk sleeves.
- D. Where piping or ductwork penetrates floor, ceiling, or wall, close off space between pipe or duct and adjacent work with fire stopping insulation and calk air tight. Provide close fitting metal collar or escutcheon covers at both sides of penetration.
- E. Install chrome plated steel escutcheons at finished surfaces.

## 3.7 SCHEDULES

## A. Copper and Steel Pipe Hanger Spacing:

PIPE SIZE Inches	COPPER TUBING MAXIMUM HANGER SPACING Feet	STEEL PIPE MAXIMUM HANGER SPACING Feet	COPPER TUBING HANGER ROD DIAMETER Inches	STEEL PIPE HANGER ROD DIAMETER Inches
1/2	5	7	3/8	3/8
3/4	5	7	3/8	3/8
1	6	7	3/8	3/8
1-1/4	7	7	3/8	3/8
1-1/2	8	9	3/8	3/8
2	8	10	3/8	3/8
2-1/2 (Note 2)	9	11	1/2	1/2
3	10	12	1/2	1/2
4	12	14	1/2	5/8
5	13	16	1/2	5/8
6	14	17	5/8	3/4
8	16	19	3/4	3/4

## B. Ductile Iron Pipe Hanger Spacing:

PIPE MATERIAL	MAXIMUM HANGER SPACING Feet	HANGER ROD DIAMETER Inches
ABS (All sizes)	4	3/8
FRP (All Sizes)	4	3/8
Ductile Iron (Note 2)		
PVC (All Sizes)	4	3/8

C. Note 1: Refer to manufacturer's recommendations for grooved end piping systems.

D. Note 2: 20 feet maximum spacing, minimum of one hanger for each pipe section close to joint behind bell. Provide hanger at each change of direction and each branch connection. For pipe sizes 6 inches and smaller, subjected to loadings other than weight of pipe and contents, limit span to maximum spacing for water service steel pipe.

END OF SECTION 2305229

## SECTION 230548 - VIBRATION ISOLATION

### PART 1 GENERAL

#### 1.1 WORK INCLUDED

- A. Vibration isolation for piping and equipment.
- B. Piping flexible connections.

#### 1.2 RELATED EQUIPMENT SECTIONS

- A. Section 23 82 00 – Terminal Heat Transfer Units.

#### 1.3 REFERENCES

- A. ASHRAE – Guide to Average Noise Criteria Curves.

#### 1.4 QUALITY ASSURANCE

- A. Maintain ASHRAE criteria for average noise criteria curves for all equipment at full load condition.
- B. Provide all vibration isolators and equipment bases for Division 23 work from the product line of a single manufacturer, unless otherwise accepted by the Acoustics Consultant.
- C. Select isolators to provide uniform deflections within acceptable tolerances when supporting the equipment approved for this project. Coordinate as required with the equipment manufacturers to accomplish this.
- D. Provide engineering, isolator selection, site supervision, and inspection by manufacturer's personnel who shall perform these services directly. Alert the Engineer and Acoustics Consultant of isolator selections that may result in resonances with the equipment and structural systems they are intended to isolate. Replace isolators that upon installation are found to resonate with the supported equipment.
- E. Provide complete isolation systems that include all elements recommended by the manufacturer for compliance with project requirements and applicable codes, ordinances, and regulations. Include all incidental products and materials required for a complete installation even if not explicitly described in the Construction Documents.

- F. Install vibration isolation systems using skilled workers trained and licensed, as applicable, by the manufacturer for installations of the types used on this project. Upon completion of the Work, provide final inspection by the manufacturer's representative and submit to the Architect and Engineer a written report authored by the manufacturer's representative certifying the correctness of installation and compliance with the approved submittal data. Include tabulation of the static deflection expected under design and operating loads in comparison with the actual static deflection measured in the completed installations.

#### 1.5 UNACCEPTABLE TYPES

- A. Do not use housed spring mounts on this project. Mason models C, CI, and CS; Amber-Booth models XI and XK; Kinetics SL and SM; and similar mounts are not acceptable.
- B. Do not use captive spring mounts on this project. Provide seismic restraint by means of resilient snubbers at the perimeter of the equipment or equipment base and not by mounts that combine isolation and snubbing functions. Mason model SSLFH, Amber-Booth model SWPQ, and similar mounts are not acceptable.
- C. Do not use cork as an isolation material.
- D. Do not use braided metallic hose for vibration isolation in piping unless fluid temperatures and pressures are beyond the service range of spherical elastomeric isolators.

#### 1.6 SUBMITTALS

- A. Submit manufacturer's data, shop drawings, and product performance certifications in accordance with the General Requirements.
- B. Manufacturer's Data: Submit technical product data confirming that products comply with specified requirements:
  - 1. Illustrations and descriptions of components including, but not limited to isolators, equipment bases, thrust and seismic restraints, anchors, and accessories.
  - 2. Operation and maintenance instructions.
- C. Shop Drawings
  - 1. Full-size details of isolation systems, including plan and section drawings indicating isolator and flexible connection locations and types, isolator and connector schedules, and installation details.
  - 2. Indicate substrate construction required of other subcontractors.
- D. Color code legend for spring and elastomer capacities.
- E. Samples: provide a sample of each type of isolator assembly used in the project. It is not necessary to submit samples of each spring capacity and pad hardness.

- F. Calculations: submit manufacturer's engineer's calculations of loads, deflections, and natural frequencies for record only.
- G. General Requirements for Vibration Isolation Mounts and Hangers: Provide catalog cut sheets, shop drawings, and other documents as necessary to describe the installation and its components.

1. Springs:

- a. Equipment name and number
- b. Operating Weight of Equipment
- c. Lowest reciprocating or rotating speed
- d. Isolator type
- e. Weight supported by isolator
- f. Scheduled deflection
- g. Proposed deflection under operating load
- h. Natural Frequency
- i. Spring free height
- j. Spring operating height
- k. Spring solid height at coil bind
- l. Spring diameter

2. Elastomeric Pads:

- a. Equipment name and number
- b. Operating Weight of Equipment
- c. Isolator type
- d. Weight supported by isolator
- e. Pad bearing area
- f. Pad free height
- g. Pad operating height
- h. Scheduled deflection
- i. Proposed deflection under operating load
- j. Percent deflection
- k. Natural Frequency
- l. Hardness and compliance with AASHTO Bridge Bearing Neoprene quality standard

1.7 REGULATORY REQUIREMENTS

- A. Conform to International Mechanical Code.

## 1.8 MANUFACTURER RESPONSIBILITIES

- A. Manufacturer of vibration isolation equipment shall have the following responsibilities:
1. Determine vibration isolation sizes and locations.
  2. Provide piping and equipment isolation systems as scheduled or specified.
  3. Guarantee specified isolation system deflection.
  4. Provide installation instruction, drawings and field supervision to assure proper installation and performance.

## PART 2 PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers listed below have demonstrated an ability to comply with specifications for vibration isolation products similar to those required for this project. However, specific products made by the listed manufacturers do not all comply with the requirements of this specification. Subject to the requirement for a single manufacturer and the restrictions regarding unacceptable types of isolators, the products of the following manufacturers are acceptable sources for this project:
1. Mason Industries, Inc.
  2. Kinetics Noise Control.
  3. Amber-Booth Company, Inc.
  4. E.A.R.
  5. PSI-Thunderline/Link-Seal.
  6. Ductmate Industries, Inc.
  7. Unger Technologies.
  8. Owner Approved Equal.

### 2.2 SPRING REQUIREMENTS

- A. Provide steel springs with static deflections equal to or greater than those shown on the Construction Documents. Submittals based on rated deflections will be rejected.
- B. Unless otherwise noted, size springs to provide a natural frequency of not more than 3 Hertz. Where spring deflections called out in the Construction Documents exceed those required to achieve a natural frequency of 3 Hz or less, the greater deflection will govern.
- C. Size springs to provide not less than 50 percent additional travel to solid, coil-bind condition beyond the deflection under operating load.
- D. Size springs so that diameter is not less than 80 percent of the height of the spring at operating load.
- E. Provide springs that do not permanently deflect after loading to a solid, coil-bind condition.



- F. Do not weld springs to other components of the isolator assembly unless specifically noted in the Submittals and accepted by the Acoustics Consultant.
- G. Color code springs to allow positive identification after installation. Match color coding to the color code legend provided with the submittals.

## 2.3 ELASTOMER REQUIREMENTS

- A. Provide elastomeric elements with static deflections equal to or greater than those shown on the Construction Documents. Submittals based on rated deflections will be rejected.
- B. Provide neoprene elements with a maximum hardness of 40 durometer, Shore A rating, where possible, but in no case exceeding 50 durometer. Where deflections called out in the construction documents exceed those required to achieve the specified natural frequencies, the greater deflection will govern.
- C. Meet AASHTO Highway Bridge Specifications for all neoprene products installed in irretrievable locations and as required elsewhere in the Construction Documents.

## 2.4 ACCEPTABLE PRODUCTS

- A. (Type A) Elastomeric Pads: 5/16-inch minimum thickness, waffled or ribbed neoprene. Where multiple layers are required to provide the specified deflections, interleave pads with 16 gauge steel shim plates. Size pads for deflection equal to 10 to 15 percent of unloaded height and provide pads of sufficient thickness to achieve the specified deflection. Provide load-distributing top plates if required for uniform loading. Acceptable products include:
  - 1. Individual pads
    - a. Mason W, SW, and Super W
    - b. Kinetics NP
    - c. Amber-Booth NR
    - d. Owner Approved Equal.
  - 2. Neoprene/Steel composite pads:
    - a. Mason WSW
    - b. Amber-Booth SP-NR Style E
    - c. Owner Approved Equal.

- B. (Type B) Neoprene-In-Shear Base-Mounted Isolators: Provide double-deflection isolators with steel bottom plates with pre-drilled bolt holes for attachment to floor or base, a threaded steel insert at the top of the isolator for attaching the equipment, and friction surfaces at both top and bottom. Coat all metal surfaces with neoprene. Design isolators for 0.25 to 0.35 inches of deflection. Acceptable products include:

1. Neoprene-In-Shear Isolators:

- a. Mason ND
- b. Kinetics RD
- c. Amber-Booth RVD
- d. Owner Approved Equal.

- C. (Type D) Restrained Open Spring Base-Mounted Isolators: Provide built-in adjustable spring restraints for equipment with operating weight greater than weight upon installation to prevent equipment from deflecting (or rising) when the additional weight is applied (or removed in the future). Provide isolators as specified for Type C but with restraint studs and adjustable nuts. Provide ½ inch minimum clearance around the restraint studs. Use bridge-bearing quality neoprene for elastomeric friction pads at chillers and cooling towers. Acceptable products include:

1. Restrained Base Mounted Isolators:

- a. Mason SLR
- b. Kinetics FLS
- c. Amber-Booth CT
- d. Owner Approved Equal.

- D. (Type F) Spring Hangers: Provide spring of the general characteristics specified in Paragraph 2.2, above in a rigid steel hanger box. Seat spring in a molded neoprene cup with steel washer reinforcing. Mold neoprene element with a rod isolation bushing that prevents rigid contact between hanger rod and housing from vertical through an angular deflection of not less than 15 degrees in any direction. For ductwork hung by straps, provide hangers with eyes on the top and bottom to allow for bolting to the straps. Acceptable products include:

1. Spring hangers:

- a. Mason types 30 and W30
- b. Owner Approved Equal.

- E. (Type G) Spring/Elastomer-in-Series Hangers: Provide neoprene-in-shear element of 1¼-inch minimum thickness and a spring of the general characteristics specified in Paragraph 2.2, above. Seat spring in a molded neoprene cup with steel washer reinforcing. Mold neoprene element with a rod isolation bushing that prevents rigid contact between hanger rod and housing from vertical through an angular deflection of not less than 15 degrees in any direction. Design neoprene for .25 to .35 inch minimum static deflection at rated load. Do not directly stack the spring and neoprene isolator elements. For ductwork hung by straps, provide hangers with eyes on the top and bottom to allow for bolting to the straps. Acceptable products include:

1. Spring/Elastomer-in-Series Hangers:

- a. Mason 30N
- b. Kinetics SRH
- c. Amber-Booth BSRA
- d. Owner Approved Equal.

- F. (Type H) Pre-compressed Spring/Elastomer-in-Series Hangers: Provide built-in adjustable spring restraints for equipment with operating weight greater than weight upon installation to prevent equipment from deflecting (or rising) when the additional weight is applied (or removed in the future). Provide isolators as specified in Subparagraph G but pre-compressed with restraint mechanisms that can be released to free the spring when subjected to its operational load. Provide an integral scale to indicate amount of deflection. For ductwork hung by straps, provide hangers with eyes on the top and bottom to allow for bolting to the straps. Acceptable products include:

1. Pre-compressed Spring/Elastomer-in-Series Hangers:

- a. Mason PC30N
- b. Amber-Booth PBSRA
- c. Owner Approved Equal.

- G. (Type P) Flexible Neoprene Piping Connectors: Provide flanged twin-sphere or threaded single-sphere isolators with Kevlar cord and peroxide-cured EPDM body with steel rings embedded in flanges to prevent pull-out. Connectors must accept elongation, compression, axial, and transverse motion. Select materials to suit system temperature, pressure, and fluid type. Do not use control rods or cables to limit extension of the isolator. Use twin-sphere isolators for pipes 2 inches to 14 inches in diameter. Single-sphere isolators may be used for pipes less than 2 inches and greater than 14 inches in diameter. Straight-wall flexible connectors are not acceptable except for sewage ejector pumps. Acceptable products include:

1. Flexible Neoprene Piping Connectors:

- a. Mason types SFDEJ, SFDJR, and SFU
- b. Owner Approved Equal.

- H. (Type Q) Flexible Duct Connections: Provide Hypalon-coated, woven fiberglass, flameproof fabric (24 oz per square yard), serviceable from -40°F to 250°F. Acceptable products include:
1. Ductmate Pro-Flex
    - a. Owner Approved Equal.
- I. (Type S) Elastomeric Isolators for Mounting Bolts: Provide neoprene grommets, bushings, and washers for all bolts used to secure isolators to floors and housekeeping slabs and for all snubbers. Size bolt holes and washers to accommodate grommets, sleeves, and bushings and to preclude contact between rigid components that would cause bridging between isolated elements and the building structure. Baseplates for neoprene pads may be rigidly bolted to the floor or housekeeping slab if the bolts secure the baseplates only and do not continue through the neoprene to meet any other rigid material. Do not exceed 40 durometer, Shore A hardness. Acceptable products include:
1. Grommets (Washer Bushings):
    - a. Mason HG
    - b. E.A.R. Isodamp and C-1000
    - c. Owner Approved Equal.
  2. Bushings:
    - a. Mason HLB
    - b. Owner Approved Equal.
  3. Washers:
    - a. Mason HLW
    - b. Owner Approved Equal.

## PART 3 EXECUTION

### 3.1 INSTALLATION

#### A. General:

1. Install in accordance with manufacturer's written instructions. Vibration isolators must not cause any change of position of equipment or piping resulting in piping stresses or misalignment.
2. Mechanical equipment shall be isolated from the building structure by means of noise and vibration isolators as scheduled on the drawings.
3. All piping and vertical risers shall be isolated from the building structure by means of noise and vibration isolation guides and supports.

4. All piping and ductwork to be isolated shall freely pass through walls and floors without rigid connections. Penetration points shall be sleeved or otherwise formed to allow passage of piping or ductwork, and maintain 3/4" to 1 1/4" clearance around the outside surfaces. This clearance space shall be tightly packed with fiberglass, and caulked airtight after installation of piping or ductwork.
5. No rigid connections between equipment and building structure shall be made that degrades the noise and vibration isolation system herein specified.
6. Electrical circuit connections to isolated equipment shall be looped to allow free motion of isolated equipment.
7. The Contractor shall not install any equipment, piping or conduit which makes rigid contact with the "building" unless permitted in the Specification. Building includes, but is not limited to slabs, beams, columns, studs and walls.
8. Coordinate work with other trades to avoid rigid contact with the building. Inform other trades following work, such as plastering or electrical, to avoid any contact which would reduce the vibration isolation.
9. Bring to the Architect's attention prior to installation any conflicts with other trades which will result in unavoidable rigid contact with equipment or piping as described herein, due to inadequate space or other unforeseen conditions. Corrective work necessitated by conflicts after installation shall be at the responsible contractor's expense.
10. Bring to the Architect's attention any discrepancies between the specifications and field conditions or changes required due to specific equipment selection, prior to installation. Corrective work necessitated by discrepancies after installation shall be at the contractor's expense.
11. Obtain inspection and approval of any installation to be covered or enclosed, prior to such closure.
12. Correct, at no additional cost, all installation which are deemed defective in workmanship or materials.
13. For all isolated equipment, make connections of piping, ductwork, and conduit using flexible connections specified in this section. Make no connections to isolated equipment in a manner that would compromise the performance of the isolation systems.

### 3.2 MOUNTS AND HANGERS

- A. Align mounts and hangers squarely above or below the equipment mounting holes to avoid introducing lateral loads and deflection.
- B. Deflection requirements:
  1. Verify installed isolators have deflections equal to or greater than deflections specified on the submittals.
  2. Where multiple deflections apply to a single isolator (where a single isolator supports multiple isolated elements), the largest deflection governs.
  3. Vary the size and/or hardness of isolators as required to yield equal deflection for all isolators supporting a single piece of equipment or length of pipe or ductwork. Consult manufacturer for direction when specified isolators do not yield required deflection and correct non-compliant isolators at no cost to the Owner.

- C. Support equipment, ductwork, conduit and piping independently. Do not hang equipment, ductwork, piping, or conduit from other isolated equipment, ductwork, piping, or conduit.
- D. Maintain 2 inches of clearance between isolated elements and walls, ceilings, and other non-isolated building components.
- E. Isolate drain piping attached to vibration isolated equipment from rigid components of the building.
- F. Limit stops must be inactive and out of contact with the isolator during equipment operation.
- G. Adjust leveling bolts and hanger rod lengths so that equipment is level and in alignment with connecting ductwork and piping.
- H. Restrained isolators may be substituted for unrestrained isolators at installer's option to simplify installation.
- I. Isolate hanger rods passing through barrier ceilings with elastomeric sleeves or grommets or treat as resilient penetrations in accordance with the details and Section 13082 – Acoustical Sealants. Unless noted otherwise, locate equipment, piping, and ductwork below barrier ceilings.

### 3.3 TESTING, EVALUATION AND ACCEPTANCE PROCEDURES

- A. If it is found that the construction fails the acoustic test measurements or performance requirements identified in the Contract Documents, make changes necessary to meet the requirements identified in the Contract Documents and be responsible for the costs associated with performing all additional acoustical tests to verify the acoustic performance of the construction. Costs for additional acoustical testing shall include consulting fees at per hour rates in effect at the time of testing along with related expenses including, but not limited to, travel expenses and test equipment use charges.

END OF SECTION 230548



## SECTION 230553 - MECHANICAL IDENTIFICATION

### PART 1 GENERAL

#### 1.1 WORK INCLUDED

- A. Nameplates.
- B. Tags.
- C. Stencils.
- D. Pipe Markers.

#### 1.2 RELATED SECTIONS

- A. Section 22 05 03 - Plumbing Piping.
- B. Section 23 07 01 - Piping Insulation.
- C. Section 23 11 26 - Fuel Piping.
- D. Section 23 21 13 – Hydronic Piping.
- E. Section 23 21 15 – Steam and Condensate Piping.

#### 1.3 REFERENCES

- A. ASME A13.1 - Scheme for the Identification of Piping Systems.

#### 1.4 SUBMITTALS

- A. Submit under provisions of the General Requirements.
- B. Submit list of wording, symbols, letter size, and color coding for mechanical identification.
- C. Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.
- D. Product Data: Provide manufacturers catalog literature for each product required.

## 1.5 PROJECT RECORD DOCUMENTS

- A. Submit under provisions of the General Requirements.
- B. Record actual locations of tagged valves.

## PART 2 PRODUCTS

### 2.1 NAMEPLATES

- A. Manufacturers:
  - 1. Laco.
  - 2. Seton.
  - 3. Brady.
  - 4. Owner Approved Equal.
- B. Description: Laminated three-layer plastic with engraved black letters on light contrasting background color.

### 2.2 TAGS

- A. Manufacturers:
  - 1. Laco.
  - 2. Seton.
  - 3. Brady
  - 4. Owner Approved Equal.
- B. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inch diameter.
- C. Chart: Typewritten letter size list in anodized aluminum frame.

### 2.3 STENCILS

- A. Stencil: Paint for labeling will not be accepted. All labeling will be with manufacturers labels and letters.

## 2.4 PIPE MARKERS

- A. Color: Conform to ASME A13.1.
- B. Plastic Pipe Markers: Factory fabricated, flexible, semi- rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.
- C. Plastic Tape Duct Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.
- D. Underground Plastic Pipe Markers: Bright colored continuously printed plastic ribbon tape, minimum 6 inches wide by 4 mil thick, manufactured for direct burial service.

## PART 3 EXECUTION

### 3.1 PREPARATION

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

### 3.2 INSTALLATION

- A. Install plastic nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.
- B. Install tags with corrosion resistant stainless steel chain.
- C. Install plastic pipe markers in accordance with manufacturer's instructions.
- D. Identify air handling units, pumps, heat transfer equipment, tanks, and water treatment devices with plastic nameplates. Small devices, such as in-line pumps, may be identified with tags.
- E. Identify control panels and major control components outside panels with plastic nameplates.
- F. Identify valves in main and branch piping with tags (ie: HWS, HWR, BWS, BWR, HW, CW, etc).
- G. Identify air terminal units with numbered tags.
- H. Tag automatic controls, instruments, and relays. Key to control schematic.

- I. Identify piping, concealed or exposed, with plastic pipe markers. Use tags on piping 3/4 inch diameter and smaller. Identify service, flow direction. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.
- J. Identify ductwork with plastic tape markers. Identify type of service ie. supply, return, fresh air, exhaust relief and direction of flow. Locate identification at air handling unit, at each side of penetration of structure or enclosure, and at each obstruction.
- K. Identify calibrated balancing valves with tags indicating model number, flow rate, service and setting.

### 3.3 VALVE CHART AND SCHEDULE

- A. Provide valve chart and schedule in aluminum frame with clear plastic shield. Install in location directed by Owner.

END OF SECTION 230553

## SECTION 230593 - TESTING, ADJUSTING AND BALANCING

### PART 1 GENERAL

#### 1.1 SECTION INCLUDES

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

#### 1.2 RELATED SECTIONS

- A. General Conditions - Starting of Systems.
- B. Division 22 Specifications.
- C. Division 23 Specifications.

#### 1.3 REFERENCES

- A. AABC - National Standards for Total System Balance.
- B. ADC - Test Code for Grilles, Registers, and Diffusers.
- C. ASHRAE 111 - Practices for Measurement, Testing, Adjusting, and Balancing of Building Heating, Ventilation, Air-conditioning, and Refrigeration Systems.
- D. NEBB - Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems.
- E. SMACNA - HVAC Systems Testing, Adjusting, and Balancing.

#### 1.4 SUBMITTALS

- A. Submit under provisions of the General Requirements.
- B. Submit name of adjusting and balancing agency for approval within 30 days after notice of award of Contract.
- C. Field Reports: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
- D. Prior to commencing work, submit report forms or outlines indicating adjusting, balancing, and equipment data required.

- E. Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for Architect/Engineer and for inclusion in operating and maintenance manuals.
- F. Provide reports in soft cover, letter size, 3-ring binder manuals, complete with index page and indexing tabs, with cover identification at front and side. Include set of reduced drawings with air outlets and equipment identified to correspond with data sheets, and indicating thermostat locations.
- G. Test Reports: Indicate data on AABC National Standards for Total System Balance forms.
- H. BAS Contractor shall provide to the Test & Balance Company the following minimum information to help expedite the initial review of the HVAC System:
  - 1. Provide design drawings and specifications for balancing review.
  - 2. Layout the project on data sheets to further review the design for correct total air flows, pump flows, box sizes, etc.
  - 3. Provide sheet metal shop drawings.
  - 4. Provide equipment submittals.
  - 5. Provide control company submittals.
- I. BAS Contractor shall submit complete background experience of his proposed Air and Water Testing and Balancing Contractor for Architect/Engineer's approval before executing a contract for the work.

#### 1.5 PROJECT RECORD DOCUMENTS

- A. Submit under provisions of the General Requirements.
- B. Record actual locations of flow measuring stations, balancing valves and rough setting.

#### 1.6 QUALITY ASSURANCE

- A. The TAB firm shall be a sub-contractor to the Building Automation System (BAS) Contractor and have at least fifteen (15) years successful testing, adjusting and balancing experience on projects with testing and balancing requirements similar to those required for this project.
- B. The TAB firm SHALL NOT BE THE ORIGINAL INSTALLER of the systems or equipment to be tested and shall not be related to any of the successful Mechanical Contractors. He shall otherwise act as an independent contractor that specializes in and whose business is limited to testing and balancing.
- C. Work shall be done under the direct supervision of a qualified test and balance engineer employed by the TAB contractor. Instruments used by this contractor shall be accurately calibrated and maintained in good working order. If requested, tests shall be conducted in the presence of the Engineer or Owner.

## 1.7 SEQUENCING AND SCHEDULING

- A. Sequence work to commence after completion of each system and schedule completion of work before Substantial Completion of Project. TBS Contractor shall coordinate his work with the Building Automation Contractor's work. Refer to the General Requirements for Sequence of Construction for each school. TAB Contractor shall be required to start and stop work as required to accommodate phase sequence of each school.

## PART 2 PRODUCTS

NOT USED

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Verify that systems are complete and operable before commencing work. Ensure the following conditions:
1. Systems are started and operating in a safe and normal condition.
  2. Temperature control systems are installed complete and operable.
  3. Proper thermal overload protection is in place for electrical equipment.
  4. Final filters are clean and in place. If required, install temporary media in addition to final filters.
  5. Duct systems are clean of debris.
  6. Fans are rotating correctly.
  7. Fire and volume dampers are in place and open.
  8. Air coil fins are cleaned and combed.
  9. Access doors are closed and duct end caps are in place.
  10. Air outlets are installed and connected.
  11. Duct system leakage is minimized.
  12. Hydronic systems are flushed, filled, vented, and pressure tested.
  13. Pumps are rotating correctly.
  14. Proper strainer baskets are clean and in place.
  15. Service and balance valves are open.
  16. All automatic and manual dampers are operable and fully open.
- B. Submit field reports. Report defects and deficiencies noted during performance of services which prevent system balance.
- C. Beginning of work means acceptance of existing conditions.
- D. A construction deviation field report must be submitted noting deviation or deficiencies in the above 3.1A, that would preclude or prevent system balance.



### 3.2 PREPARATION

- A. Provide instruments required for testing, adjusting, and balancing operations. Make instruments available to Architect/Engineer to facilitate spot checks during testing.
- B. Provide additional balancing devices as required.
- C. All HVAC systems must have manufacturers start-up reports prior to balancing systems.

### 3.3 INSTALLATION TOLERANCES

- A. Air Handling Systems: Adjust to within plus or minus 5 percent of design for supply systems and plus or minus 10 percent of design for return and exhaust systems.
- B. Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 5 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.
- C. Hydronic Systems: Adjust to within plus or minus 10 percent of design.
- D. Balance to reduce/eliminate objectionable noise and note on report as required.

### 3.4 ADJUSTING

- A. Ensure recorded data represents actual measured or observed conditions.
- B. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.
- C. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.
- D. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.
- E. At final inspection, recheck random selections of data recorded in report. Recheck points or areas as selected and witnessed by the Owner.

### 3.5 SCHEDULES

- A. Equipment Requiring Testing, Adjusting, and Balancing (Including but Not Limited to):
  - HVAC Pumps
  - Boiler Feed Pumps

B. Report Forms

1. Title Page:

- a. Name of Testing, Adjusting, and Balancing Agency
- b. Address of Testing, Adjusting, and Balancing Agency
- c. Telephone number of Testing, Adjusting, and Balancing Agency
- d. Project name
- e. Project location
- f. Project Architect
- g. Project Engineer
- h. Project Contractor
- i. Project altitude
- j. Report date

2. Summary Comments:

- a. Design versus final performance
- b. Notable characteristics of system
- c. Description of systems operation sequence
- d. Summary of outdoor and exhaust flows to indicate amount of building pressurization
- e. Nomenclature used throughout report
- f. Test conditions

3. Instrument List:

- a. Instrument
- b. Manufacturer
- c. Model number
- d. Serial number
- e. Range
- f. Calibration date

4. Electric Motors:

- a. Manufacturer
- b. Model/Frame
- c. HP/BHP
- d. Phase, voltage, amperage; nameplate, actual, no load
- e. RPM
- f. Service factor
- g. Starter size, rating, heater elements
- h. Sheave Make/Size/Bore

5. V-Belt Drive:

- a. Identification/location
- b. Required driven RPM
- c. Driven sheave, diameter and RPM
- d. Belt, size and quantity
- e. Motor sheave diameter and RPM
- f. Center to center distance, maximum, minimum, and actual

END OF SECTION 230593

## SECTION 230701 - PIPE INSULATION

### PART 1 GENERAL

#### 1.1 WORK INCLUDED

- A. All plumbing and HVAC piping jackets and accessories.
- B. All piping saddles.

#### 1.2 RELATED SECTIONS

- A. Section 22 05 03 - Plumbing Piping.
- B. Section 23 05 29 - Supports and Anchors.
- C. Section 23 05 53 - Mechanical Identification.
- D. Section 23 21 13 - Hydronic Piping.
- E. Section 23 21 20 – Steam and Condensate Piping.

#### 1.3 REFERENCES

- A. ANSI/ASTM C195 - Mineral Fiber Thermal Insulation Cement.
- B. ASTM C335 - Steady-State Heat Transfer Properties of Horizontal Pipe Insulation.
- C. ASTM C449 - Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement.
- D. ASTM C518 - Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
- E. ASTM C534 - Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form.
- F. ANSI/ASTM C547 - Mineral Fiber Preformed Pipe Insulation.
- G. ASTM C585 - Inner and Outer Diameters and Rigid Thermal Insulation for Nominal Sizes of Pipe and Tubing (NPS System).
- H. ASTM C921 - Properties of Jacketing Materials for Thermal Insulation.
- I. ASTM D1667 - Flexible Cellular Materials - Vinyl Chloride Polymers and Copolymers (Closed Cell Foam).

J. ASTM D2842 - Water Absorption of Rigid Cellular Plastics.

K. ASTM E84 - Surface Burning Characteristics of Building Materials.

L. ASTM E96 - Water Vapor Transmission of Materials.

#### 1.4 REGULATORY REQUIREMENTS

A. Conform to 2012 International Mechanical Code and Energy Code.

#### 1.5 SUBMITTALS

A. Submit under provisions of the General Requirements.

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

C. Submit manufacturer's installation instructions under provisions of the General Requirements.

D. Contractor shall review all shop drawings prior to submitting them for Architect/Engineer's review. Contractor shall stamp each shop drawing to certify that he has reviewed it. Engineer will not check any shop drawings that Contractor has not stamped with his review certification.

#### 1.6 QUALITY ASSURANCE

A. Materials: Flame spread/fuel contributed/smoke developed rating of 25/50 or less in accordance with ASTM E84. Material shall not melt or drip when exposed to flame.

#### 1.7 QUALIFICATIONS

A. Applicator: Company specializing in performing the work of this Section with minimum five years experience.

#### 1.8 DELIVERY, STORAGE AND HANDLING

A. Deliver products to site under provisions of the General Requirements.

B. Store, protect and handling products under provisions of the General Requirements.

C. Deliver materials to site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.

## 1.9 ENVIRONMENTAL REQUIREMENTS

### A. Insulation Work:

1. Maintain ambient temperatures and conditions for installation of insulation as required by manufacturers of insulation adhesives, mastics and insulation cements.

## PART 2 PRODUCTS

## 2.1 ACCEPTABLE MANUFACTURERS

### A. Insulation:

1. Manville Corporation.
2. Knauf Fiberglass.
3. CertainTeed Corp.
4. Owens Corning Fiberglass.
5. Owner Approved Equal.

### B. Steel and Wood Insulation Protection Saddles:

1. Acceptable Manufacturers:
  - a. Grinnell.
  - b. B-Line.
  - c. Unistrut.
  - d. Owner Approved Equal.

## 2.2 INSULATION MATERIALS

### A. Glass Fiber Insulation (Type "A"):

1. Insulation: ASTM C547; rigid molded, noncombustible.
  - a. K Value: 0.23 at 75 degrees F.
  - b. Minimum Service Temperature: 0 degrees F.
  - c. Maximum Service Temperature: 850 degrees F.
  - d. Maximum Moisture Absorption: 0.2 percent by volume.

### B. Glass Fiber Insulation (Type "B")

1. Insulation: ASTM C547 and ASTM C795; rigid molded, noncombustible.
  - a. 'K' value: ASTM C177, 0.24 at 75 degrees F.
  - b. Maximum Service Temperature: 850 degrees F.
  - c. Maximum moisture absorption: 0.2 percent by volume.

C. Vapor Barrier Jacket:

1. ASTM C921; factory applied vapor retarder composed of a white draft facing out reinforced with glass fiber yarn and bonded to aluminized film (ASJ).
2. Moisture Vapor Transmission: ASTM E96; 0.02 perm inches.
3. Secure with factory applied self-sealing longitudinal laps and butt strips.
4. Jacket Temperature Limit: Minus 20 to 150 degrees F.

D. Vapor Barrier Lap Adhesive:

1. Compatible with insulation.

E. Fittings (Concealed and Exposed):

1. Insulate all fittings (plumbing and HVAC) with a minimum of two layers of precut blanket insulation.
2. Insulation blanket thickness to equal K value of straight sections of insulation.
3. Tie wire to be 18 gauge stainless steel with twisted ends.
4. Jacket shall be a one piece pre-molded high impact fitting 25/50 rated, off-white color, 10 mil thick, brush on welding adhesive connections.

F. Insulating Cement/Mastic:

1. Acceptable Manufacturers:
  - a. Fibrex.
  - b. Pabco.
  - c. Manville.
  - d. Owner Approved Equal.
2. ASTM C195; hydraulic setting on mineral wool.

## 2.3 JACKETS

A. PVC Plastic (Fittings and ALL Exposed Interior Piping – Below 9'-0")

1. Jacket: ASTM C921, one-piece molded type fitting covers and sheet material, off-white color.
  - a. Minimum service temperature: -40 degrees F.
  - b. Maximum service temperature: 150 degrees F.
  - c. Moisture vapor transmission: ASTM E96; 0.002 perm-inches.
  - d. Maximum Flame Spread: ASTM E84; 25.
  - e. Maximum Smoke Developed: ASTM E84; 50.
  - f. Thickness: 10 mil.
  - g. Connections: Brush on welding adhesive.



- B. Aluminum Jacket: ASTM B209 (All exterior refrigerant piping serving air cooled condenser).
  - 1. Thickness: 0.016-inch sheet.
  - 2. Finish: Embossed.
  - 3. Joining: Longitudinal slip joints and 2-inch laps.
  - 4. Fittings: 0.016-inch thick die shaped fitting covers with factory attached protective liner.
  - 5. Metal Jacket Bands: 3/8 inch wide; 0.010-inch thick stainless steel.
- C. Water Based Armaflex Finish: ASTM 84 (all exterior suction refrigerant piping service air cooled condenser)
  - 1. Color: Standard white.
  - 2. Composition: Pigmented Acrylic Latex.
  - 3. Flammability: Non flammable; water based.
  - 4. Application: Brass or roller.

### PART 3 EXECUTION

#### 3.1 INSULATION

- A. Examination:
  - 1. Verify that piping has been tested before applying insulation materials.
  - 2. Verify that surfaces are clean, foreign material removed and dry. Flux to be removed from copper piping.
- B. Installation:
  - 1. Install materials in accordance with manufacturer's instructions.
  - 2. On exposed piping, locate insulation and cover seams in least visible locations.
  - 3. All insulation to have a vapor barrier jacket (ASJ) with factory applied self-sealing longitudinal laps and butt strips.
  - 4. Support all piping with insulation protection saddles.
    - a. All Piping:
      - 1) 2 to 2-1/2 Inch Pipe Size: Wood dowel with insulation shields.
      - 2) 3/4 Inch and Larger: High density pre-molded type with insulation shields or manufactured wood saddles.
      - 3) 3 inch and larger: Manufactured steel saddles welded to pipe.
  - 5. Run insulation continuous through walls, floors, sleeves, pipe hangers and other pipe penetrations.
  - 6. Insulate all piping located behind chases.
  - 7. Insulate entire system including fittings, valves, unions, flanges, strainers, expansion joints, pump bodies, chemical feeders, rolairtrols, chemical feed piping from pot feeders and separators.

8. Finish all insulation at supports, protrusions and interruptions.
9. Seal all aluminum jackets outdoors air and water tight.
10. Exterior Applications: Provide vapor barrier jacket. Insulate fittings, joints and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapor barrier cement. Cover with aluminum jacket with seams located on bottom side of horizontal piping.

### 3.2 INSULATION SCHEDULE

PIPING SYSTEMS	INSULATION TYPE	PIPE SIZES/INSULATION THICKNESS			
		<u>1/2 To 1"</u>	<u>1-1/4 To 1-1/2"</u>	<u>2" To 4"</u>	<u>5" &amp; Larger</u>
A. Plumbing and Mechanical Systems					
Domestic Cold Water Supply	A	1"	1"	2"	2"
Steam	B	2"	2"	3"	4"
Condensate	B	2"	2"	2"	---
Heating Hot Water	A	1"	1-1/2"	2"	2"
Sanitary Drainage From Mech. Equipment Rooms	A	1/2"	1/2"	1/2"	1/2"

Note: ALL exposed interior piping below 9'-0" shall have a PVC jacket as specified.

END OF SECTION 230701

## SECTION 230705 – EQUIPMENT INSULATION

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Equipment insulation.
- B. Covering.

#### 1.2 RELATED SECTIONS

- A. Section 23 05 53 - Mechanical Identification.

#### 1.3 REFERENCES

- A. ASTM A167 - Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
- B. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.
- C. ASTM C195 - Standard Specification for Mineral Fiber Thermal Insulation Cement.
- D. ASTM C449/C449M - Standard Specification for Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement.
- E. ASTM C518 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
- F. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
- G. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation.
- H. ASTM C921 - Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.
- I. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- J. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.
- K. NAIMA National Insulation Standards.

1.4 SUBMITTALS FOR REVIEW

- A. Submit under provisions of Division 1 General Requirements.
- B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for equipment scheduled.
- C. Contractor shall review all shop drawings prior to submitting them for Architect/Engineer's review. Contractor shall stamp each shop drawing to certify that he has reviewed it. Engineer will not check any shop drawings that contractor has not been stamped with his review certification.

1.5 QUALITY ASSURANCE

- A. Applicator Qualifications: Company specializing in performing the work of this section with minimum three years experience.

1.6 REGULATORY REQUIREMENTS

- A. Materials: Flame spread/smoke developed rating of 25/50 in accordance with ASTM E84.
- B. Conform to 2012 International Mechanical Code.

1.7 DELIVERY, STORAGE, AND PROTECTION

- A. Accept materials on site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.
- B. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.
- C. Contractor shall store all materials shipped to the site in a protected area. If material is stored outside of the building, it must be stored off the ground a minimum of six inches set on 6 x 6 planks and/or wood pallets. All material must be completely covered with waterproof tarps or visquin. All piping will have the ends closed to keep out dirt and other debris. No equipment will be allowed to be stored on the site unless it is sitting on wood planks and is completely protected with weatherproof covers.

1.8 ENVIRONMENTAL REQUIREMENTS

- A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.
- B. Maintain temperature during and after installation for minimum period of 24 hours.

## PART 2 - PRODUCTS

### 2.1 GLASS FIBER, RIGID

#### A. Manufacturer:

1. Owens Corning.
2. Knauf.
3. Pittsburgh Corning.
4. Approved Equal.

#### B. Insulation: ASTM C612; rigid, noncombustible.

1. 'K' ('Ksi') Value: ASTM C177 or ASTM C518, 0.24 at 75 degrees F.
2. Maximum Service Temperature: 450 degrees F.
3. Maximum Moisture Absorption: 0.1 percent by volume.
4. Density: 2.0 lb/cu ft.

#### C. Vapor Barrier Jacket:

1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film.
2. Moisture vapor transmission: ASTM E96; 0.02 perm.
3. Secure with self-sealing longitudinal laps and butt strips.
4. Secure with outward clinch expanding staples and vapor barrier mastic.

#### D. Facing: 1 inch galvanized steel hexagonal wire mesh stitched on one face of insulation.

#### E. Vapor Barrier Lap Adhesive:

1. Compatible with insulation.

#### F. Insulating Cement/Mastic:

1. ASTM C195; hydraulic setting on mineral wool.

### 2.2 JACKETS

#### A. Canvas Jacket: UL listed.

1. Fabric: ASTM C921, 6 oz/sq yd, plain weave cotton treated with dilute fire retardant lagging adhesive.
2. Lagging Adhesive:
  - a. Compatible with insulation.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

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

### 3.2 INSTALLATION

- A. Factory Insulated Equipment: Do not insulate.
- B. Exposed Equipment: Locate insulation and cover seams in least visible locations.
- C. Apply insulation close to equipment by grooving, scoring, and beveling insulation. Fasten insulation to equipment with studs, pins, clips, adhesive, wires, or bands.
- D. Fill joints, cracks, seams, and depressions with bedding compound to form smooth surface. On cold equipment, use vapor barrier cement.
- E. Insulated equipment containing fluids below ambient temperature: Insulate entire system.
- F. Fiber glass insulated equipment containing fluids below ambient temperature: Provide vapor barrier jackets, factory-applied or field-applied. Finish with glass cloth and vapor barrier adhesive.
- G. For hot equipment do not insulate flanges and unions, but bevel and seal ends of insulation.
- H. Fiber glass insulated equipment containing fluids above ambient temperature: Provide standard jackets, with or without vapor barrier, factory-applied or field-applied. Finish with glass cloth and adhesive.
- I. Finish insulation at supports, protrusions, and interruptions.
- J. Cover glass fiber insulation with metal mesh and finish with heavy coat of insulating cement.
- K. Nameplates and ASME Stamps: Bevel and seal insulation around; do not insulate over.
- L. Equipment Requiring Access for Maintenance, Repair, or Cleaning: Install insulation so it can be easily removed and replaced without damage.

3.3 SCHEDULES

A. Steam Systems:

1. Feed Water Tank and Piping: 2" thick - glass fiber rigid.

END OF SECTION 230705



## PART 1 – GENERAL

A. Section Includes:

1. Carbon dioxide sensors.
2. Control panel enclosures.
3. Thermostats/sensors.
4. Control air dampers.
5. Electric damper actuators.
6. Input/output sensors.

### B. Related Sections:

1. Section 23 09 93 - Sequence of Operations for HVAC Controls: Sequences of operation implemented using products specified in this section.
2. Section 26 05 03 - Wiring Connections: Execution requirements for electric connections specified by this section.

A. American Society of Heating, Refrigerating and Air-Conditioning Engineers:

1. ASHRAE 62 - Ventilation for Acceptable Indoor Air Quality.

B. American Society of Mechanical Engineers:

1. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.
2. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.

### C. ASTM International:

1. ASTM A126 - Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
2. ASTM A536 - Standard Specification for Ductile Iron Castings.
3. ASTM B32 - Standard Specification for Solder Metal.
4. ASTM B88 - Standard Specification for Seamless Copper Water Tube.
5. ASTM B280 - Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service.
6. ASTM D2737 - Standard Specification for Polyethylene (PE) Plastic Tubing.

- ### 1.3 SUBMITTALS

- ## 1.4 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.
- B. Project Record Documents: Record actual locations of control components, including panels, thermostats, and sensors.
- C. Operation and Maintenance Data: Submit inspection period, cleaning methods, recommended cleaning materials, and calibration tolerances.

1.5 QUALITY ASSURANCE

- A. Provide pneumatic tubing located in plenums with peak optical density not greater than 0.5, average optical density not greater than 0.15, and flame spread not greater than 5 feet when tested in accordance with UL 1820.
- B. Control Air Damper Performance: Test in accordance with AMCA 500.

1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Accept controls on site in original factory packaging Inspect for damage.

1.8 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.
- B. Coordinate installation of control components in duct systems with work of Section 23 31 00 and 23 33 00.

1.9 WARRANTY

- A. Section 01 70 00 - Execution and Closeout Requirements: Product warranties and product bonds.

1.10 MAINTENANCE SERVICE

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for maintenance service.
- B. Furnish service and maintenance of control system for one year from Date of Substantial Completion.
- C. Furnish complete service of controls systems, including callbacks.
- D. Include systematic examination, adjustment, and lubrication of unit, and controls checkout and adjustments. Repair or replace parts in accordance with manufacturer's operating and maintenance data. Use parts produced by manufacturer of original equipment.

- ## 1.11 EXTRA MATERIALS

- ## 1.12 REGULATORY REQUIREMENTS

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## 2.1 CONTROL PANEL ENCLOSURES

- A. Furnish for each system under automatic control with relays and controls mounted in cabinet and temperature indicators, pressure gages, pilot lights, push buttons and switches flush on cabinet panel face.
- B. Construction: NEMA 250, general purpose utility enclosure with enameled finish face panel.
- C. Covers: Continuous hinge, held closed by common key for all panels.
- D. Enclosure Finish: Manufacturer's standard enamel.

### A. Room Thermostats/Sensors:

1. Room sensors shall be constructed for either surface or wall box mounting.
2. Room sensors shall be flush mounted stainless steel plate with 10K Type II thermistor sensor only, setpoint to be adjusted via BAS, no occupancy override.

- ### B. Line Voltage Thermostats:

1. Integral manual On/Off/Auto selector switch, single or two-pole.
2. Dead band: Maximum 2 degrees F.
3. Cover: Locking with concealed setpoint, without thermometer.
4. Load Motor capacity rating.

- ### C. Outdoor Reset Thermostat:

1. Remote bulb or bimetal rod and tube type, proportioning action with adjustable throttling range, adjustable setpoint.
2. Scale range: -10 to 70 degrees F.

- D. Immersion Thermostat: Remote bulb or bimetallic rod and tube type, proportional action with adjustable setpoint and adjustable throttling range.

- ### E. Outside Air Sensors

1. Outside air sensors shall be designed to withstand the environmental conditions to which they will be exposed. They shall also be provided with a solar shield.
2. Sensors exposed to wind velocity pressures shall be shielded by a perforated plate that surrounds the sensor element.
3. Temperature transmitters shall be of NEMA 3R construction and rated for ambient temperatures.



- ## 2.5 TRANSMITTERS

1. Pressure transmitters shall be constructed to withstand 100% pressure over-range without damage, and to hold calibrated accuracy when subject to a momentary 40% over-range input.
2. Pressure transmitters shall transmit a 0 to 5 VDC, 0 to 10 VDC, or 4 to 20 mA output signal
3. Differential pressure transmitters used for flow measurement shall be sized to the flow sensing device, and shall be supplied with Tee fittings and shut-off valves in the high and low sensing pick-up lines to allow the balancing Contractor and Owner permanent, easy-to-use connection.
4. A minimum of a NEMA 1 housing shall be provided for the transmitter. Transmitters shall be located in accessible local control panels wherever possible. Low Differential Water Pressure Applications (0" – 20" w.c.).
5. The differential pressure transmitter shall be of industrial quality and transmit a linear, 4 to 20 mA output in response to variation of flow meter differential pressure or water pressure sensing points.
6. The differential pressure transmitter shall have non-interactive zero and span adjustments that are adjustable from the outside cover and meet the following performance specifications:
  - a. .01-20" w.c. input differential pressure range.
  - b. 4-20 mA output.
  - c. Maintain accuracy up to 20 to 1 ratio turndown.
  - d. Reference Accuracy: +0.2% of full span.

1. The differential pressure transmitter shall be of industry quality and transmit a linear, 4 to 20 mA output in response to variation of differential pressure or air pressure sensing points.
2. The differential pressure transmitter shall have non-interactive zero and span adjustment that are adjustable from the outside cover and meet the following performance specifications:
  - a. (0.00 – 1.00” to 5.00”) w.c. input differential pressure ranges. (Select range appropriate for system application.)
  - b. 4-20 mA output.
  - c. Maintain accuracy up to 20 to 1 ratio turndown.
  - d. Reference Accuracy: +.02% of full span.



C. Temperature Transmitters:

1. One pipe, directly proportional output signal to measured variable, linearity within plus or minus 1.2 percent of range for 200 degree F span and plus or minus 1 percent for 50 degree span, with suitable temperature range, compensated bulb, averaging capillary, or rod.

2.6 STATUS AND SAFETY SWITCHES

A. General Requirements.

1. Switches shall be provided to monitor equipment status, safety conditions, and generate alarms at the FMS when a failure or abnormal conditions occurs. Safety switches shall be provided with two sets of contacts and shall be interlock wired to shut down respective equipment.

B. Current Sensing Switches

1. The current sensing switch shall be self-powered with solid state circuitry and a dry contact output. It shall consist of a current transformer, a solid state current sensing circuit, adjustable trip point, solid state switch, SPDT relay, and an LED indicating the on or off status. A conductor of the load shall be passed through the window of the device. It shall accept over-current up to twice its trip point range.
2. Current sensing switches shall be used for run status for fans, over-current up to twice its trip point range.
3. Current sensing switches shall be calibrated to show a positive run status only when the motor is operating under load. A motor running with a broken belt or coupling shall indicate a negative run status.

C. Air pressure Safety Switches

1. Air pressure safety switches shall be of the manual reset type with SPDT contacts rated for 2 amps at 120 VAC.
2. Pressure range shall be adjustable with appropriate scale range and differential adjustment for intended service.

2.7 CABLE

A. Manufacturers:

1. Southwest Wire, 5950 Office Boulevard NE, Albuquerque, New Mexico 87109.
2. Windy City Wire. 832 South Central Avenue, Chicago, Illinois 60644.
3. Owner Approved Equal.

B. School District 205 Wiring Standard:

1. Cable shall be 18 AWG wire, plenum rated, shield.
2. Color Coding (verify final color coding with school district and school district's controls maintenance contractor prior to purchase):
  - a. N2 Bus Blue
  - b. Analog Input Cable Yellow
  - c. Analog Output Cable Tan
  - d. Binary Input Cable Orange
  - e. Binary Output Cable Violet
  - f. N1 Bus Purple
  - g. 24 VAC Cable Gray
  - h. Spare White
  - i. Ethernet –CAT 5 Purple
  - j. N2 E Pink
3. All cable will be purchased from the school district's preferred vendors listed above.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify air handling units and ductwork installation is complete and air filters are in place before installing sensors in air streams.
- C. Verify location of thermostats and humidistats and other exposed control sensors with Drawings before installation.
- D. Verify building systems to be controlled are ready to operate.

3.2 INSTALLATION

- A. Install thermostats, space temperature sensors, and other exposed control sensors after locations are coordinated with other Work.
- B. Install thermostats, space temperature sensors, and other exposed control sensors 48 inches above floor. Align with light switches.
- C. Install freeze protection thermostats using flanges and element holders.
- D. Install outdoor reset thermostats and outdoor sensors indoors, with sensing elements outdoors with sun shield.

- ### 3.3 FIELD QUALITY CONTROL

- ### 3.4 DEMONSTRATION AND TRAINING

- END OF SECTION 230900

## 1.1 SUMMARY

- A. Section includes control equipment and software.
- B. Related Sections:
1. Section 23 09 00 - Instrumentation and Control for HVAC: Control system components.
  2. Section 23 09 93 - Sequence of Operations for HVAC Controls: Sequences of operation implemented using products specified in this section.
  3. Section 26 05 03 - Equipment Wiring Connections: Execution requirements for electric connections specified by this section.

A. American National Standards Institute:

1. ANSI MC85.1 - Terminology for Automatic Control.

- A. Building automation system shall be an extension of the existing Tridium JACE based LON control system.
- B. Automatic temperature controls field monitoring and control system using field programmable microprocessor based units with communications to Building Automation and Control System.
- C. Base system on distributed system of fully intelligent, stand-alone controllers, operating in a multi-tasking, multi-user environment on token passing network, with central and remote hardware, software, and interconnecting wire and conduit.
- D. Provide computer software and hardware, operator input/output devices, control units, local area networks (LAN), sensors, control devices, actuators.
- E. Provide controls for air terminals, radiation, reheat coils, unit heaters, fan coils, rooftop units, etc. when directly connected to control units. Individual terminal unit control is specified in Section 23 09 00.
- F. Provide control systems consisting of thermostats, control valves, dampers and operators, indicating devices, interface equipment and other apparatus and accessories to operate mechanical systems, and to perform functions specified.
- G. Provide installation and calibration, supervision, adjustments, and fine tuning necessary for complete and fully operational system.



## 1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience, and with service facilities within 50 miles of Project.
- B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

## 1.7 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

## 1.8 WARRANTY

- A. Section 01 70 00 - Execution and Closeout Requirements: Product warranties and product bonds.

## 1.9 MAINTENANCE SERVICE

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for maintenance service.
- B. Furnish service and maintenance of control systems for two years from Date of Substantial Completion.
- C. Include systematic examination, adjustment, and lubrication of unit, and controls checkout and adjustments. Repair or replace parts in accordance with manufacturer's operating and maintenance data. Use parts produced by manufacturer of original equipment.
- D. Perform work without removing units from service during building normal occupied hours.
- E. Provide emergency call back service during working hours for this maintenance period.
- F. Maintain locally, near Place of the Work, adequate stock of parts for replacement or emergency purposes. Have personnel available to ensure fulfillment of this maintenance service, without unreasonable loss of time.
- G. Perform maintenance work using competent and qualified personnel under supervision of manufacturer or original installer.
- H. Do not assign or transfer maintenance service to agent or subcontractor without prior written consent of Owner.

- A. Conform to Health/Life Safety Code for Public Schools.
- B. Conform to (IMC) International Mechanical Code (2012).
- C. Conform to (IBC) International Building Code (2012).
- D. Conform to (IFC) International Fire Code, excluding Chapter 4 (2012).
- E. Conform to State of Illinois Plumbing Code (2014).
- F. Conform to Illinois Accessibility Code. (71 IL Adm. Code 400)
- G. Conform to (IECC) International Energy Conservation Code (2012)
- H. Conform to (IFGC) International Fuel Gas Code (2012).
- I. Conform to Illinois State Fire Marshal's Boiler and Pressure Vessel Safety. (41 IL Adm Code 120)
- J. Conform to (ICC) International Code Council Reference Standards (2012).
- K. Conform to (NFPA) National Fire Protection Association 70 National Electrical Code (2008).
- L. Products: Listed and classified by Underwriter's Laboratories, Inc. as suitable for the purpose specified and indicated.

## 2.1 OPERATOR WORKSTATION

- ## 2.2 CONTROL UNITS

- A. Units: Modular in design and consisting of processor board with programmable RAM memory, local operator access and display panel, and integral interface equipment.
- B. Control Units Functions:
  1. Monitor or control each input/output point.
  2. Completely independent with hardware clock/calendar and software to maintain control independently.
  3. Acquire, process, and transfer information to operator station or other control units on network.





- F. Transmission Median: Fiber optic or single pair of solid 24 gauge twisted, shielded copper cable.
- G. Network Support: Time for global point to be received by any station, less than 3 seconds. Furnish automatic reconfiguration when station is added or lost. In event transmission cable is cut, reconfigure two sections with no disruption to system's operation, without operator intervention.

## 2.4 OPERATING SYSTEM SOFTWARE

- A. Input/output Capability From Operator Station:
  - 1. Request display of current values or status in tabular or graphic format.
  - 2. Command selected equipment to specified state.
  - 3. Initiate logs and reports.
  - 4. Change analog limits.
  - 5. Add, delete, or change points within each control unit or application routine.
  - 6. Change point input/output descriptors, status, alarm descriptors, and unit descriptors.
  - 7. Add new control units to system.
  - 8. Modify and set up maintenance scheduling parameters.
  - 9. Develop, modify, delete or display full range of color graphic displays.
  - 10. Automatically archive select data even when running third party software.
  - 11. Capability to sort and extract data from archived files and to generate custom reports.
  - 12. Support two printer operations.
  - 13. Alarm printer: Print alarms, operator acknowledgments, action messages, system alarms, operator sign-on and sign-off.
  - 14. Data printer: Print reports, page prints, and data base prints.
  - 15. Select daily, weekly or monthly as scheduled frequency to synchronize time and date in digital control units. Accommodate daylight savings time adjustments.
  - 16. Print selected control unit database.
- B. Operator System Access: Via software password with minimum 30 access levels at work station and minimum 3 access levels at each control unit.
- C. Data Base Creation and Support: Use standard procedures for changes. Control unit automatically checks workstation data base files upon connection and verify data base match. Include the following minimum capabilities:
  - 1. Add and delete points.
  - 2. Modify point parameters.
  - 3. Change, add, or delete English language descriptors.
  - 4. Add, modify, or delete alarm limits.
  - 5. Add, modify, or delete points in start/stop programs, trend logs, and other items.
  - 6. Create custom relationship between points.
  - 7. Create or modify DDC loops and parameters.
  - 8. Create or modify override parameters.
  - 9. Add, modify, and delete applications programs.
  - 10. Add, delete, develop, or modify dynamic color graphic displays.

1. Utilizes custom symbols or system supported library of symbols.
2. Sixteen (16) colors.
3. Sixty (60) outputs of real-time live dynamic data for each graphic.
4. Dynamic graphic data.
5. 1,000 separate graphic pages.
6. Modify graphic screen refresh rate between 1 and 60 seconds.

1. Accept data from LAN as needed without scanning entire network for updated point data.
2. Interrogate LAN for updated point data when requested.
3. Allow operator command of devices.
4. Allow operator to place specific control units in or out of service.
5. Allow parameter editing of control units.
6. Store duplicate data base for every control unit and allow down loading while system is on line.
7. Control or modify specific programs.
8. Develop, store and modify dynamic color graphics.
9. Data archiving of assigned points and support overlay graphing of this data using up to four (4) variables.

1. Off normal condition: Cause alarm and appropriate message, including time, system, point descriptor, and alarm condition. Select alarm state or value and alarms causing automatic dial-out.
2. Critical alarm or change-of-state: Display message, stored on disk for review and sort, or print.
3. Print on line changeable message, up to 60 characters in length, for each alarm point specified.
4. Display alarm reports on video. Display multiple alarms in order of occurrence.
5. Define time delay for equipment start-up or shutdown.
6. Allow unique routing of specific alarms.
7. Operator specifies when alarm requires acknowledgment.
8. Continue to indicate unacknowledged alarms after return to normal.
9. Alarm notification:
10. Print automatically.
11. Display indicating alarm condition.
12. Selectable audible alarm indication.

H. Automatic Restart: Automatically start field equipment on restoration of power. Furnish time delay between individual equipment restart and time of day start/stop.

1. Page linking.
2. Generate, store, and retrieve library symbols.
3. Single or double height characters.
4. Sixty (60) dynamic points of data for each graphic page.
5. Pixel level resolution.
6. Animated graphics for discrete points.
7. Analog bar graphs.
8. Display real time value of each input or output line diagram fashion.



- C. Start/Stop Time Optimization:
  - 1. Perform optimized start/stop as function of outside conditions, inside conditions, or both.
  - 2. Adaptive and self-tuning, adjusting to changing conditions unattended.
  - 3. For each point under control, establish and modify:
    - a. Occupancy period.
    - b. Desired temperature at beginning of occupancy period.
    - c. Desired temperature at end of occupancy period.
- D. Night Setback/Setup Program: Reduce heating space temperature set point or raise cooling space temperature set-point during unoccupied hours; in conjunction with scheduled start/stop and optimum start/stop programs.
- E. Calculated Points: Define calculations and totals computed from monitored points (analog/digital points), constants, or other calculated points.
  - 1. Employ arithmetic, algebraic, Boolean, and special function operations.
  - 2. Treat calculated values like any other analog value; use for any function where a "hard wired point" might be used.
- F. Event Initiated Programming: Any data point capable of initiating event, causing series of controls in a sequence.
  - 1. Define time interval between each control action between 0 to 3600 seconds.
  - 2. Output may be analog value.
  - 3. Provide for "skip" logic.
  - 4. Verify completion of one action before proceeding to next action. When not verified, program capable of skipping to next action.
- G. Direct Digital Control: Furnish with each control unit Direct Digital Control software so operator is capable of customizing control strategies and sequences of operation by defining appropriate control loop algorithms and choosing optimum loop parameters.
  - 1. Control loops: Defined using "modules" are analogous to standard control devices.
  - 2. Output: Paired or individual digital outputs for pulse width modulation, and analog outputs.
  - 3. Firmware:
    - a. PID with analog or pulse-width modulation output.
    - b. Floating control with pulse-width modulated outputs.
    - c. Two-position control.
    - d. Primary and secondary reset schedule selector.
    - e. Hi/Low signal selector.
    - f. Single pole double-throw relay.
    - g. Single pole double throw time delay relay with delay before break, delay before make and interval time capabilities.
  - 4. Direct Digital Control loop: Downloaded upon creation or on operator request. On sensor failure, program executes user defined failsafe output.
  - 5. Display: Value or state of each of lines interconnecting DDC modules.

H. Fine Tuning Direct Digital Control PID or floating loops:

1. Display information:
  - a. Control loop being tuned.
  - b. Input (process) variable.
  - c. Output (control) variable.
  - d. Set-point of loop.
  - e. Proportional band.
  - f. Integral (reset) Interval.
  - g. Derivative (rate) Interval.
2. Display format: Graphic, with automatic scaling; with input and output variable superimposed on graph of "time" versus "variable".

I. Trend logging:

1. Each control unit capable of storing samples of control unit's data points.
2. Update file continuously at operator assigned intervals.
3. Automatically initiate upload requests and then stores data on hard disk.
4. Time synchronize sampling at operator specified times and intervals with sample resolution of one minute.
5. Co-ordinate sampling with specified on/off point- state.
6. Display trend samples on workstation in graphic format. Automatically scale trend graph with minimum 60 samples of data in plot of time versus data.

## 2.6 HVAC CONTROL PROGRAMS

### A. General:

1. Support Inch-pounds and S.I. metric units of measurement.
2. Identify each HVAC Control system.

### B. Optimal Run Time:

1. Control start-up and shutdown times of HVAC equipment for both heating and cooling.
2. Base on occupancy schedules, outside air temperature, seasonal requirements, and interior room mass temperature.
3. Start-up systems by using outside air temperature, room mass temperatures, and adaptive model prediction for how long building takes to warm up or cool down under different conditions.
4. Use outside air temperature to determine early shut down with ventilation override.
5. Analyze multiple building mass sensors to determine seasonal mode and worse case condition for each day.





C. Supply Air Reset:

1. Monitor heating and cooling loads in building spaces, terminal reheat systems, both hot deck and cold deck temperatures on dual duct and multizone systems, single zone unit discharge temperatures.
2. Adjust discharge temperatures to most energy efficient levels satisfying measured load by:
  - a. Raising cooling temperatures to highest possible value.
  - b. Reducing heating temperatures to lowest possible level.
3. Operator commands:
  - a. Add/delete fan status point.
  - b. Lock/unlock program.
  - c. Request HVAC point summary.
  - d. Add/Delete discharge controller point.
  - e. Define discharge controller parameters.
  - f. Add/delete air flow rate.
  - g. Define space load and load parameters.
  - h. Request space load summary.
4. Control summary:
  - a. HVAC control system status (begin/end).
  - b. Supply air reset system status.
  - c. Optimal run time system status.
  - d. Heating and cooling loop.
  - e. High/low limits.
  - f. Deadband.
  - g. Response timer.
  - h. Reset times.
5. Space load summary:
  - a. HVAC system status.
  - b. Optimal run time status.
  - c. Heating/cooling loop status.
  - d. Space load point ID.
  - e. Current space load point value.
  - f. Control heat/cool limited.
  - g. Gain factor.
  - h. Calculated reset values.
  - i. Fan status point ID and status.
  - j. Control discharge temperature point ID and status.
  - k. Space load point ID and status.
  - l. Airflow rate point ID and status.

D. Enthalpy Switchover:

1. Calculate outside and return air enthalpy using measured temperature and relative humidity; determine energy expended and control outside and return air dampers.
2. Operator commands:
  - a. Add/delete fan status point.
  - b. Add/delete outside air temperature point.
  - c. Add/delete discharge controller point.
  - d. Define discharge controller parameters.
  - e. Add/delete return air temperature point.
  - f. Add/delete outside air dewpoint/humidity point.
  - g. Add/delete return air dewpoint/humidity point.
  - h. Add/delete damper switch.
  - i. Add/delete minimum outside air.
  - j. Add/delete atmospheric pressure.
  - k. Add/delete heating override switch.
  - l. Add/delete evaporative cooling switch.
  - m. Add/delete air flow rate.
  - n. Define enthalpy deadband.
  - o. Lock/unlock program.
  - p. Request control summary.
  - q. Request HVAC point summary.
3. Control summary:
  - a. HVAC control system begin/end status.
  - b. Enthalpy switchover optimal system status.
  - c. Optimal return time system status.
  - d. Current outside air enthalpy.
  - e. Calculated mixed air enthalpy.
  - f. Calculated cooling coil enthalpy using outside air.
  - g. Calculated cooling coil enthalpy using mixed air.
  - h. Calculated enthalpy difference.
  - i. Enthalpy switchover deadband.
  - j. Status of damper mode switch.

## 2.7 PROGRAMMING APPLICATION FEATURES

A. Trend Point:

1. Output trend logs as line-graphs or bar graphs. Output graphic on terminal, with each point for line and bar graphs designated with a unique [pattern] [color], vertical scale either actual values or percent of range, and horizontal scale time base. Print trend logs up to 12 columns of one point/column.

B. Alarm Messages:

1. Assign alarm messages to system messages including point's alarm condition, point's off-normal condition, totaled point's warning limit, hardware elements advisories.
2. Output assigned alarm with "message requiring acknowledgment".
3. Operator commands include define, modify, or delete; output summary listing current alarms and assignments; output summary defining assigned points.

C. Weekly Scheduling:

1. Automatically initiate equipment or system commands, based on selected time schedule for points specified.
2. Program times for each day of week, for each point, with one minute resolution.
3. Automatically generate alarm output for points not responding to command.
4. Allow for holidays, minimum of 366 consecutive holidays.
5. Operator commands:
  - a. System logs and summaries.
  - b. Start of stop point.
  - c. Lock or unlock control or alarm input.
  - d. Add, delete, or modify analog limits and differentials.
  - e. Adjust point operation position.
  - f. Change point operational mode.
  - g. Open or close point.
  - h. Enable/disable, lock/unlock, or execute interlock sequence or computation profile.
  - i. Begin or end point totals.
  - j. Modify total values and limits.
  - k. Access or secure point.
  - l. Begin or end HVAC or load control system.
  - m. Modify load parameter.
  - n. Modify demand limiting and duty cycle targets.
6. Output summary: Listing of programmed function points, associated program times, and respective day of week programmed points by software groups or time of day.

D. Interlocking:

1. Permit events to occur, based on changing condition of one or more associated master points.
2. Binary contact, high/low limit of analog point or computed point capable of being used as master. Master capable of monitoring or commanding multiple slaves.
3. Operator commands:
  - a. Define single master/multiple master interlock process.
  - b. Define logic interlock process.
  - c. Lock/unlock program.
  - d. Enable/disable interlock process.
  - e. Execute terminate interlock process.
  - f. Request interlock type summary.



### 3.4 DEMONSTRATION AND TRAINING

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for demonstration and training.
- B. Furnish basic operator training for 3 persons on data display, alarm and status descriptors, requesting data, execution commands and log requests. Include a minimum of 16 hours instructor time. Furnish training on site.
- C. Demonstrate complete and operating system to Owner.
- D. Training of the Owner's operating and maintenance personnel is required in cooperation with the Owner's representative, provide competent, factory authorized personnel to provide instruction to operation and maintenance personnel concerning the location, operation, and troubleshooting of the installed systems, the instruction shall be scheduled in coordination with the Owner's representative after submission and approval of formal training plans. Refer to Section 01 77 06 for general contractor closeout requirements. Refer to individual sections for specific contractor training requirements.

END OF SECTION 230923

## SECTION 23 09 93 - SEQUENCE OF OPERATIONS FOR HVAC CONTROLS

### PART 1 – GENERAL

#### 1.1 SUMMARY

A. Section includes sequence of operation for:

1. Unit Ventilator Control (CUV)
2. Boiler Control Panel Interface.
3. Miscellaneous Exhaust Fan Control.
4. Steam Suspend Unit Heater Control.
5. Heating Base Mounted Pumps.
6. Pump Lead/Lag Control and Proof of Flow.
7. Sanitary Ejector Pump Control.
8. Steam to Hot Water Heat Exchange Control.
9. Combustion Air Control.

B. Related Sections:

1. Section 23 09 00 - Instrumentation and Control for HVAC: For equipment, devices, and system components to implement sequences of operation.
2. Section 23 09 23 - Direct-Digital Control System for HVAC: For equipment, devices, system components, and software to implement sequences of operation.

#### 1.2 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Shop Drawings: Indicate mechanical system controlled and control system components.

1. Label with settings, adjustable range of control and limits. Submit written description of control sequence.
2. Submit flow diagrams for each control system, graphically depicting control logic.
3. Submit draft copies of graphic displays indicating mechanical system components, control system components, and controlled function status and value.

#### 1.3 CLOSEOUT SUBMITTALS

A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.

B. Project Record Documents: Record actual locations of components and set points of controls, including changes to sequences made after submission of shop drawings.



#### 1.4 REGULATORY REQUIREMENTS

- A. Conform to Health/Life Safety Code for Public Schools.
- B. Conform to (IMC) International Mechanical Code (2012).
- C. Conform to (IBC) International Building Code (2012).
- D. Conform to (IFC) International Fire Code, excluding Chapter 4 (2012).
- E. Conform to State of Illinois Plumbing Code (2014).
- F. Conform to Illinois Accessibility Code. (71 IL Adm. Code 400)
- G. Conform to (IECC) International Energy Conservation Code (2015)
- H. Conform to (IFGC) International Fuel Gas Code (2012).
- I. Conform to Illinois State Fire Marshal's Boiler and Pressure Vessel Safety. (41 IL Adm Code 120)
- J. Conform to (ICC) International Code Council Reference Standards (2012).
- K. Conform to (NFPA) National Fire Protection Association 70 National Electrical Code (2008).
- L. Products: Listed and classified by Underwriter's Laboratories, Inc. as suitable for the purpose specified and indicated.

#### PART 2 PRODUCTS

Not Used

#### PART 3 EXECUTION

##### 3.1 GENERAL

- A. Temperature control system shall be DDC as specified in Section 23 09 23 "Direct Digital Control System for HVAC" and Section 23 09 00 "instrumentation and Control for HVAC".
- B. Temperature control system shall be web-based and communicate seamlessly, via LON over the district's Ethernet LAN/WAN. All DDC control points listed in this section shall be performed by the DDC system and displayed on a PC browser with Internet Explorer. For future work, new DDC system software shall have capability and sufficient capacity to control entire building plus 20 percent spare capacity.

- C. All DDC control points listed in this section shall be performed by the DDC system. Any other control work required to complete the sequence of operation herein specified shall be electric temperature controls. Contractor shall provide all wiring, conduit where required, transformers, relays, etc. necessary for a complete operating system. At contractor's option, entire control system specified herein may be DDC.

### 3.2 SEQUENCE OF OPERATION

A. Classroom Unit Ventilator (2 pipe heating/cooling face and bypass damper) ASHRAE Cycle II

1. Occupied Heating

- a. The fan will operate continuously. The outdoor air damper will be opened (subject to the mixed air low limit thermostat) to a minimum position (adjustable). On a call for heat, the coil face and dampers shall modulate under control of the space temperature sensor.
- b. A low temperature freeze protection thermostat laced on the discharge of the water coil, shall upon sensing a drop in temperature below its setpoint, 38 degrees F. (adjustable), open the face and bypass damper, shut down the unit vent face and close the fresh air damper. This control must be manually reset.
- c. Once the space temperature setpoint is reached, the outdoor air damper will modulate open above minimum setting to keep space from overheating.
- d. If the discharge air temperature drops below 60 degrees F. (adjustable), the outdoor air damper will modulate to minimum and face and bypass dampers modulate to provide required heat to maintain space temperature.

2. Occupied Cycle Cooling:

- a. The BAS shall communicate to the classroom unit if the system is in the heating or cooling mode. If cooling is available, the face and bypass damper will modulate to maintain space temperature after the outdoor air damper opens to its minimum setting and closes on a call for heat. The discharge low limit control will reset to 50 degrees F. (adjustable).
- b. Economizer Control: The BAS shall communicate the building economizer availability. If direct expansion is available and the outdoor air temperature is over 65 degrees F. dry bulb (adjustable), then the outdoor air damper will return to its minimum position.

3. Morning Warm Up Cycle:

- a. The outdoor air damper will remain closed, the face and bypass damper will open full heat, the unit will run continuously. Once the space temperature setpoint is reached, the OA damper will open and unit will control as called for in "Occupied Cycle Heating".

4. Unoccupied Cycle:
    - a. In the unoccupied mode, the unit ventilator shall cycle to maintain night setback temperature. The outdoor air damper will remain closed and the face and bypass damper remains full open.
  5. Night Time Purge (Cooling Cycle Only):
    - a. The BAS shall evaluate the indoor and outdoor conditions during a specified time during the unoccupied mode and determine if a night time purge is required. If conditions are correct, the BAS shall bring the zone into the occupied mode and allow the unit to introduce outdoor air, while disabling mechanical cooling. This shall allow for economical pre-cooling of the building.
  6. The BAS shall be able to open/close or modulate all outdoor air dampers on each unit ventilator with a user override command.
- B. Heating Base Mounted Pump Control.
1. Above 65°F. (adjustable) pumps will be off.
  2. Standby Pump Control: The heating water pumps staged (sequenced) through local DDC panel so that one serves as lead and other as lag pump. The lead.lag sequence alternates between respective pumps through DDC software program.
  3. Upon failure of any primary pump, standby pump starts and alarms through the BAS.
  4. Each pump will have a differential pressure flow sensor in piping to report flow to DDC panel.
  5. Provide differential pressure flow sensors. As differential pressure (highest reading to control) controllers shall operate variable frequency drive (VFD) of pump to reduce water flow.
- C. Pump Lead/Lag Control and Proof of Flow
1. Multiple pumps serving as circulating pump and standby shall be controlled through a lead/lag/alternator sequence. All hardware and software required to provide this operation shall be furnished and installed by BAS contractor.
  2. Indication or proof of flow for each pump and/or system shall be through positive means. Each pump shall have a differential pressure switch to indicate flow. Each line and bridge shall utilize an in-line flow proving device. Each flow proving device shall be annunciated in the BAS system.
- D. Condensate Pump Control
1. Provide contacts on condensate pump control panel/system to alarm upon failure.
- E. Duplex Ejector Pump Control
1. Provide contacts on pump control panel/system to alarm upon failure.

F. Steam to Hot Water Heat Exchanger

1. Control of a heat exchanger served by two steam valves in a “1/3 – 2/3” configuration.
  - a. Upon a call to run, the “1/3 – 2/3” steam valves will be modulated by a PID control loop to maintain the required hot water temperature setpoint. The valves will be controlled in the following manner:
    - 1) The 1/3 valve will be modulated first.
    - 2) If the output of the PID control loop exceeds 25% (adjustable) for more than 2 minutes (adjustable), the 2/3 valve will become the first valve modulated making the 1/3 valve control range switch to the 66% to 100% output range of the PID control loop.
    - 3) If the output of the PID control loop exceeds 60% (adjustable) for more than 2 minutes (adjustable), the 1/3 valve will become the first valve modulated (the 1/3 valve will be 100% open at this time) making the 2/3 valve control range switch to the 33% to 100% output range of the PID control loop (the 2/3 valve will be modulating at this time).
    - 4) The reverse sequence shall occur at the 40% (adjustable) and the 25% (adjustable) points as steam demand decreases.
    - 5) The sequence shall also reset anytime the output of the PID control loop equals zero.

G. Miscellaneous Exhaust Fan Control.

1. Exhaust fans shall be furnished with motorized backdraft dampers by the manufacturer. If required, the BAS Contractor shall be responsible for field wiring the damper motors to the exhaust fan motors.
2. Exhaust fan to be controlled by static pressure sensing. As space pressure increases as CUV's bring in O.A. for economizer exhaust fan shall increase in speed to maintain a positive pressure of  $\pm 0.015$  inches static pressure.
3. BAS system will show status (on/off) of all exhaust fans installed through a current sensing relay on each fan. Issue a non-critical alarm on failure.
4. Refer to exhaust fan schedule on contract documents for control requirements.

H Steam Suspended Unit Heater Control

1. Unit fans shall cycle according to the wall mounted thermostat. On a drop in temperature, the fan shall cycle on and the steam control valve is to open. When the thermostat setpoint is satisfied, the valve shall be closed and the fan shall continue to run for 10 minutes (adjustable).

I. Steam Boilers

1. General:
  - a. Boilers will be provided with a Multiple Boiler Sequencing Control panel/system.
  - b. BAS to integrate to above panel for all alarms, status, pressure readings, etc. available and report to BAS. BAS system shall not assume control.

- c. Provide integration of boiler flame safeguard controls with BAS. Integration shall provide monitoring of all data available at these controllers via the BAS. Install Communications Interface furnished by the boiler manufacturer. Provide all necessary communication wiring between communications interface and burner controllers (provided by boiler manufacturer).
  - d. BAS shall pick up boiler alarm from each boiler panel. Burner panel will have a set of dry contacts in control panel. BAS connected to each panel. BAS will show one boiler panel alarm on BAS system for any failure.
  - e. BAS Contractor shall install a pressure sensor in the supply header of the main boiler loop and report loop pressure on BAS system.
  - f. BAS shall hard wire interlock each boiler to open and close its respective combustion air damper. The end switch on the combustion damper will be interlocked with boiler panels so boiler won't fire until damper proven open.
  - g. The BAS shall control and monitor the following:
    - 1) Boiler alarm condition.
    - 2) Boiler supply pressure. Critical alarm on high/low limit.
  - h. The BAS shall provide boiler control as follows:
    - 1) Provide a spring/fall to winter changeover signal from the BAS based on O.A.T. or user selected date.
2. System Off:
- a. Boilers shall be off. Multiple Boiler Sequencing Control panel disabled.
3. System Start:
- a. When the outdoor air temperature falls below the heating system enable set point (60 degrees F, adj.) or user selected date the boiler Sequencing Panel shall be indexed to operate:
    - 1) Combustion air damper(s) shall be open on a call for boiler to fire. End switch on outdoor air damper shall prevent boiler from firing unless damper is open.
  - b. A boiler shall operate for a minimum of 15 minute (adj.) or per manufacturer recommendations.
4. System Run:
- a. Boiler Sequencing Panel shall control boilers.
5. System Stop:
- a. When the outdoor air temperature rises above the heating system enable set point (60 degrees F, adj.), or the user selected date the Multiple Boiler Sequencing Panel shall be disabled:
    - 1) Combustion air damper(s) shall be closed when boilers are disabled.

6. Safeties and Alarms:

- a. Flame Safeguard: Flame safeguard microprocessor shall annunciate discrete alarm conditions.
- b. Annunciate off-normal alarm whenever boiler status does not equal command.

7. Failure Modes:

- a. Boiler Failure: If a boiler fails to operate, the boiler shall be disabled and alarm shall be annunciated. Associated pump shall be stopped and combustion air damper shall close.
- b. Sensor Failure: Upon the failure of an analog sensor, associated fire rates shall remain at their last position and alarm shall be annunciated.

J. Combustion Air Control

1. Upon a signal from one of the heating boiler control panels, the associated motorized combustion air damper will be open. An end switch connection will be made and a signal will be sent to the boiler control panel for boiler to start. When boiler stops, the associated combustion air damper will close.
2. Upon a signal from one of the domestic water heaters/boilers control panels, the associated motorized combustion air damper will be open. An end switch connection will be made and a signal will be sent to the heater/boiler control panel for heater/boiler to start. When boiler stops, the associated combustion air damper will close.
3. Initiate critical alarm if boiler room space temperature is below 50 degrees F.

END OF SECTION 2309933

## SECTION 231126 - FUEL PIPING

### PART 1 GENERAL

#### 1.1 SECTION INCLUDES

- A. Pipe and pipe fittings.
- B. Valves.
- C. Gas pressure reducing regulators.
- D. Natural gas piping system.

#### 1.2 RELATED SECTIONS

- A. Section 23 05 03 – Testing of HVAC Piping.
- B. Section 23 05 29 – Supports and Anchors.

#### 1.3 REGULATORY REQUIREMENTS

- A. Illinois State Plumbing Code, ISPC.
- B. Building Officials and Code Administrators International, Inc., 2012 International Mechanical Code.
- C. National Fire Protection Association, NFPA-54: Installation Code for Natural Gas Burning Appliances and Equipment.
- D. National Electric Code, NEC, Spread of Fire Products of Combustion.

#### 1.4 PROJECT RECORD DOCUMENTS

- A. Submit under provisions of the General Requirements.

#### 1.5 DELIVERY, STORAGE AND HANDLING

- A. Store and protect products under provisions of the General Requirements.
- B. Deliver and store valves in shipping containers with labeling in place.



- C. Contractor shall store all materials shipped to the site in a protected area. If material is stored outside of the building, it must be stored off the ground a minimum of six inches set on 6 x 6 planks and/or wood pallets. All material must be completely covered with waterproof tarps or visquin. All piping will have the ends closed to keep out dirt and other debris. No equipment will be allowed to be stored on the site unless it is sitting on wood planks and is completely protected with weatherproof covers.

## PART 2 PRODUCTS

### 2.1 NATURAL GAS PIPING, ABOVE GRADE

- A. Steel Pipe: ASTM A53 or A120, Schedule 40 black. Fittings: ANSI/ASME B16.3, malleable iron or ASTM A2434, forged steel welding type. Joints: Screwed for pipe 1-1/2 inches and under (exposed and accessible); ANSI/AWS D1.1, welded, for pipe two inches and over and for 1-1/2 inches and under (concealed and inaccessible; above ceiling).

### 2.2 FLANGES, UNIONS AND COUPLINGS

- A. Pipe Size 2 Inches and under: 150 psig malleable iron unions for threaded ferrous piping; bronze unions for copper pipe, soldered joints.
- B. Pipe Size 2 Inches and over: 150 psig forged steel slip-on flanges for ferrous piping; bronze flanges for copper piping; neoprene gaskets for gas service; 1/16 inch thick preformed neoprene.
- C. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

### 2.3 ACCEPTABLE MANUFACTURERS - GAS COCKS

- A. Stockham.
- B. Eclipse, Inc.
- C. Ladish Co.
- D. Owner Approved Equal.

### 2.4 GAS COCKS

- A. Up to 2 Inches: Bronze body, bronze tapered plug, non-lubricated, teflon packing, threaded ends.
- B. Over 2 Inches: Cast iron body and plug, non-lubricated, teflon packing, flanged ends.

## 2.5 FIRE AND SMOKE PENETRATION SEALANTS

### A. Fire Seal:

1. Seal penetrations of fire-rated walls, floors or ceilings by raceways for compliance with NEC 300-21.
  - a. Acceptable Manufacturers:
    - 1) Dow Corning: Fire Stop.
    - 2) Nelson: Flameseal.
    - 3) T & B: Flameseal.
    - 4) 3M Co.: Fire Barrier.
    - 5) Owner Approved Equal.
  - b. Fill void around raceways.
  - c. Sleeves: Heavy wall Schedule 40 steel pipe, anchored to building construction and finished plumb with wall, ceiling or floor lines.

### B. Thermal Seal:

1. Seal penetrations of thermally insulated equipment, walls or rooms to prevent heat transfer.
2. Dual exterior of raceway with fiberglass or other material compatible to equipment or room and approved by Architect/Engineer.
3. Seal interior of raceway with duct sealing compound at entry to equipment or room.

### C. Water Seal:

1. Seal penetrations of perimeter walls or floors below grade to prevent entry of water; use materials compatible with wall or floor construction and approved by Architect/Engineer.
2. Seal Penetrations of Roof: Sealed with flashings compatible with roof design and approved by roofing system manufacturer and Architect/Engineer.

## PART 3 EXECUTION

### 3.1 GAS PIPING CONNECTIONS

- A. Support all piping as called for in Section 23 05 29, Supports and Anchors.
- B. Run a vent line from each gas regulator, including the gas regulator at the gas meter, up through and/or above the roof and terminate with a goose neck a minimum of 18 inches above the roof. Provide insect screen on outlet of each vent pipe.

- C. All gas piping in unfinished (exposed structure) areas to run exposed, tight to ceiling. All gas piping in finished (finished ceiling) areas to be run concealed, tight to structure above.
  - 1. All piping above inaccessible ceilings (i.e. drywall, plaster, etc.), buried in or under floor slabs or drops in walls or chases shall have welded or brazed joints, regardless of pipe size.
  - 2. All gas pipe in or below concrete slabs shall be installed in Schedule 40 PVC or 18 gauge galvanized steel pipe sleeve with all joints sealed air tight, and vented to outdoors. Gas pipe sleeves to have ends sealed to prevent gas from escaping into ceiling spaces.
- D. Install Schedule 40 steel pipe sleeves through all foundations, floors, walls and roofs. Each sleeve shall be sealed at both ends with one of the following:
  - 1. Fire Walls: Fire seal.
  - 2. Floors at Grade: Water seal.
  - 3. Floors Above Grade: Fire seal.
  - 4. Foundations and Outside Walls: Water seal.
  - 5. Walls (Not Fire walls): Thermal seal.
- E. Gas piping mounted on roof shall be mounted on pipe stands and painted to match school standards. Mount on a maximum center line as called for on drawings.

END OF SECTION 231126

## SECTION 232113 – HYDRONIC PIPING

### PART 1 GENERAL

#### 1.1 WORK INCLUDED

A. Pipe and pipe fittings for:

1. Heating/Cooling water system.
2. Equipment drains and overflows.

B. Valves:

1. Ball valves.
2. Butterfly valves.
3. Check valves.
4. Gate or globe valves are not acceptable for isolation service on this project.

#### 1.2 RELATED SECTIONS

- A. Section 23 05 29 - Supports and Anchors.
- B. Section 23 05 53 - Mechanical Identification.
- C. Section 23 05 93 - Testing of HVAC and Gas Piping.
- D. Section 23 07 01 - Piping Insulation.
- E. Section 23 09 23 – Direct-Digital Control System for HVAC.
- F. Section 23 21 16 - Hydronic Specialties.
- G. Section 23 21 23 – HVAC Pumps.
- H. Section 23 50 00 – Firetube Boilers.
- I. Section 23 80 00 – Classroom Unit Ventilators.

#### 1.3 REFERENCES

- A. ASME - Boiler and Pressure Vessel Codes.
- B. ASME B16.3 - Malleable Iron Threaded Fittings Class 50 and 300.
- C. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.

- D. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
- E. ASME B31.9 - Building Services Piping.
- F. ASTM A53 - Pipe, Steel, Black and Hot-Dipped, Zinc Coated Welded and Seamless.
- G. ASTM B32 - Solder Metal.
- H. ASTM B88 - Seamless Copper Water Tube.

#### 1.4 SYSTEM DESCRIPTION

- A. Where more than one piping system material is specified, ensure system components are compatible and joined to ensure the integrity of the system is not jeopardized. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.
- B. Use unions, flanges, and couplings downstream of valves and at equipment or apparatus connections. Do not use direct welded or threaded connections to valves, equipment or other apparatus.
- C. Use non-conducting dielectric connections whenever jointing dissimilar metals in systems.
- D. Provide pipe hangers and supports in accordance with ASTM B31.9, MSS SP69 and ASTM F708.
- E. Use flanged ball, lug end bubble tight positive shut-off butterfly valves for shut-off and to isolate equipment, part of systems, or vertical risers.
- F. Use ball or butterfly valves for throttling, bypass, or manual flow control services.
- G. Use 3/4 inch ball valves with cap for drains at main shut-off valves, low points of piping, bases of vertical risers, and at equipment. Pipe to nearest floor drain.

#### 1.5 INSTALLATION OF BAS PRODUCTS

- A. Install control valves, wells for temperature sensors and threaded sockets for pressure sensors in the locations directed by the BAS contractor.
- B. Install BAS valves and sensors in the locations shown on the plans and as required to achieve the Sequence of Operation.
- C. Failure of this contractor to adequately coordinate his work with the BAS contractor shall not be justification for any request for additional payment.
- D. This contractor shall include the cost of coordinating and installing related BAS components in his bid.

## 1.6 SUBMITTALS

- A. Submit under provisions of Division 1 General Requirements.
- B. Contractor shall review all shop drawings prior to submitting them for Architect/ Engineer's review. Contractor shall stamp each shop drawing to certify that he has reviewed it. Engineer will not check any shop drawings that contractor has not stamped with his review certification.

## 1.7 REGULATORY REQUIREMENTS

- A. Conform to ANSI/ASME B31.9 code for installation of piping system.
- B. Conform to 2012 International Mechanical Code.

## 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Division 1 General Requirements.
- B. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- C. Provide temporary protective coating on cast iron and steel valves.
- D. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- E. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

## PART 2 PRODUCTS

### 2.1 HOT/CHILLED WATER PIPING, ABOVE GROUND

- A. Steel Pipe: ASTM A53 or A120, Schedule 40, black.
  - 1. Fittings: ANSI/ASTM B16.3, malleable iron or ASTM A234, forged steel welding type fittings.
  - 2. Joints: Welded for 2-1/2" and larger.
- B. Copper Tubing: ASTM B88, Type L, hard drawn.
  - 1. Fittings: ANSI/ASME B16.18, cast brass, or ASME B16.22, brazed wrought copper.
  - 2. Joints: ASTM B32 - Solder Grade 95TA.
- C. All piping 2-1/2 inches and above to be steel pipe as stated in paragraph A. above. All piping 2 inches and under to copper tubing as stated in paragraph B. above.

## 2.2 CONDENSATE DRAINS OVERFLOWS AND EQUIPMENT DRAIN PIPING

### A. Copper Tubing: ASTM B88, Type L, hard drawn.

1. Fittings: ANSI/ASME B16.18, cast brass, or ASME B16.22, brazed wrought copper.
2. Joints: ASTM B32 - Solder Grade 95TA.

## 2.3 UNIONS, FLANGES, AND COUPLINGS

### A. Unions for Pipe 2 Inches and Under:

1. Copper Pipe: Bronze, soldered joints.

### B. Flanges for Pipe Over 2 Inches:

1. Ferrous Piping: 150 psig forged steel, slip-on.
2. Copper Piping: Bronze.
3. Gaskets: 1/16-inch thick preformed neoprene.

## 2.4 BALL VALVES

### A. Up To and Including 2-1/2 inches:

1. Manufacturers:
  - a. Milwaukee - Model BA1005.
  - b. Nibco - Model T585-70.
  - c. Stockham - Model S-216.
2. Bronze one piece body, stainless steel ball, teflon seats and stuffing box ring, lever handle with balancing stops, solder ends.

## 2.5 BUTTERFLY VALVES

### A. Manufacturers:

1. Milwaukee - Model C Series.
2. Nibco - Model LD2000.
3. Stockham - Model LD712.

### B. Body: Ductile iron with resilient replaceable EPDM seat, wafer or lug ends, extended neck.

### C. Disc: Aluminum bronze.

### D. Operator: 10-position lever handle.



## 2.6 SWING CHECK VALVES

### A. Up To and Including 2 Inches:

1. Manufacturers:
  - a. Milwaukee.
  - b. Nibco.
  - c. Stockham.
2. Bronze body, bronze trim, bronze rotating swing disc, with composition disc, threaded ends.

### B. Over 2 Inches:

1. Manufacturers:
  - a. Milwaukee.
  - b. Nibco.
  - c. Stockham.
2. Iron body, bronze trim, swing disc, renewable disc and seat, flanged ends.

## PART 3 EXECUTION

### 3.1 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt on inside and outside before assembly.
- C. Prepare piping connections to equipment with flanges or unions.
- D. Keep open ends of pipe free from scale and dirt. Protect open ends with temporary plugs or caps.
- E. After completion, fill, clean, and treat systems.

### 3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install heating water to ASME B31.9.
- C. Route piping in orderly manner, parallel to building structure, and maintain gradient.
- D. Install piping to conserve building space, and not interfere with use of space and other work.

- E. Group piping whenever practical at common elevations.
- F. Sleeve pipe passing through partitions, walls and floors. Pack fire seal between sleeve and pipe.
- G. Slope piping and arrange to drain at low points.
- H. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- I. Inserts: Refer to Section 15140.
- J. Pipe Hangers and Supports: Refer to Section 15140.
- K. Furnish and install 3/4" ball valve, with hose connection and cap, at all high and low points in the piping system for vents and drains respectively.
- L. Install and pipe, coupon racks, pot feeder and side stream filter per manufacturer's recommendations.
- M. Pipe equipment and condensate drains to nearest floor/roof drain. Run pipe close to equipment bases to avoid tripping hazards.

END OF SECTION 232113

## SECTION 232116 - HYDRONIC SPECIALTIES

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Expansion tanks.
- B. Air vents.
- C. Air separators.
- D. Strainers.
- E. Pump suction fittings.
- F. Combination pump discharge valves (triple duty type).
- G. Relief valves.
- H. Automatic flow control balancing fittings.
- I. This contractor shall install all control valves in piping system.
- J. This contractor shall furnish all pipe wells in piping system

#### 1.2 RELATED SECTIONS

- A. Section 23 21 13 - Hydronic Piping.
- B. Section 23 21 23 – HVAC Pumps.
- C. Section 23 25 00 - Chemical Water Treatment.
- D. Section 23 50 00 – Fire Tube Boilers.
- E. Section 23 83 00 – Terminal Heat Transfer Units.
- F. Division 27 – Building Automation System.

#### 1.3 REFERENCES

- A. ANSI/ASME - Boilers and Pressure Vessel Codes, SEC 8-D-Rules for Construction of Pressure Vessels.

#### 1.4 SUBMITTALS

- A. Submit under provisions of Division 1 General Requirements.
- B. Contractor shall review all shop drawings prior to submitting them for Architect/ Engineer's review. Contractor shall stamp each shop drawing to certify that he has reviewed it. Engineer will not check any shop drawings that contractor has not stamped with his review certification.
- C. Equipment manufacturer shall provide two (2) year warranty (parts and labor) on their equipment. Installing Contractor will provide two (2) year warranty on all parts and labor associated with the installation of the equipment.
- D. Grooved joint piping products shall be shown on drawings and product submittals, and be specifically identified with the applicable Victaulic style or series number.

#### 1.5 OPERATION AND MAINTENANCE DATA

- A. Submit under provisions of Division 1 General Requirements.
- B. Maintenance Data: Include installation instructions, assembly views, lubrication instructions, and replacement parts list.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Division 1 General Requirements.
- B. Accept equipment on site in shipping containers with labeling in place. Inspect for damage.
- C. Provide temporary protective coating on cast iron and steel equipment/valves.
- D. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- E. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.
- F. Contractor shall store all materials shipped to the site in a protected area. If material is stored outside of the building, it must be stored off the ground a minimum of six inches set on 6 x 6 planks and/or wood pallets. All material must be completely covered with waterproof tarps or visquin. All piping will have the ends closed to keep out dirt and other debris. No equipment will be allowed to be stored on the site unless it is sitting on wood planks and is completely protected with weatherproof covers.

## PART 2 - PRODUCTS

### 2.1 DIAPHRAGM-TYPE EXPANSION TANKS

#### A. Manufacturers:

1. Bell & Gossett, ITT.
2. Wessels.
3. Armstrong.
4. Taco.

#### B. Construction: Welded steel, tested and stamped in accordance with ASME SEC 8-D; supplied with National Board Form U-1, rated for working pressure of 125 psig, with flexible diaphragm sealed into tank.

#### C. Accessories: Pressure gage and air-charging fitting, tank drain; precharge to 12 psig. Provide service shut-off valves for yearly serving and draining of tank.

### 2.2 AIR VENTS

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

#### B. Float Type:

1. Brass or semi-steel body, copper, stainless steel valve and valve seat; suitable for system operating temperature and pressure; with isolating valve.

#### C. Washer Type.

1. Brass with hydroscopic fiber discs, vent ports, adjustable cap for manual shut-off, and integral spring loaded ball check valve.

### 2.3 AIR SEPARATORS

#### A. Acceptable Manufacturers:

1. Bell & Gossett, ITT.
2. Armstrong.
3. Taco.

B. Combination Air Separators/Strainers:

1. Steel, tested and stamped in accordance with ANSI/ASME SEC 8-D; for 125 psig operating pressure, with integral galvanized steel strainer, tangential inlet and outlet connections, and internal stainless steel air collector tube.

2.4 STRAINERS

A. Size 2 inch and Under:

1. Manufacturers:
  - a. O.C. Keckley Co.
  - b. Armstrong Machine Works.
  - c. MetraFlex Co.
2. Screwed brass or iron body for 175 psig working pressure, Y pattern with 1/32 inch stainless steel perforated screen.

B. Size 2-1/2 inch thru 4 inch:

1. Manufacturers:
  - a. O.C. Keckley Co.
  - b. Armstrong Machine Works.
  - c. MetraFlex Co.
  - d. Victaulic Co.
2. Flanged iron body for 175 psig working pressure, Y pattern with 3/64 inch stainless steel perforated screen.
3. Grooved ductile iron body for 300 psig working pressure, Y pattern with 1/16 or 1/8 inch stainless steel perforated screen. Victaulic Style 732.
4. Grooved ductile iron body for 750 psig working pressure, T pattern with mesh removable basket, 57% free open area. Victaulic Series 730.

C. Size 5 inch and Larger:

1. Manufacturers:
  - a. O.C. Keckley Co.
  - b. Armstrong Machine Works.
  - c. MetraFlex Co.
  - d. Victaulic Co.
2. Flanged iron body for 175 psig working pressure, basket pattern with 1/8 inch stainless steel perforated screen.

3. Grooved ductile iron body for 300 psig working pressure, Y pattern with 1/16 or 1/8 inch stainless steel perforated screen. Victaulic Style 732.
4. Grooved ductile iron body for 750 psig working pressure, T pattern with mesh removable basket, 57% free open area. Victaulic Series 730.
5. AGS grooved carbon steel body, (sizes 14 inch thru 24 inch), for 300 psig working pressure, T pattern with mesh removable basket, 57% free open area. Victaulic Style W730.

## 2.5 PUMP SUCTION FITTINGS

### A. Manufacturers:

1. Bell & Gossett, ITT.
2. Armstrong.
3. Taco.
4. Victaulic Co.

B. Fitting: Angle pattern, cast-iron or ductile iron body, threaded for 2 inch and smaller, flanged or grooved for 2-1/2 inch and larger, rated for 300 psig maximum working pressure, with inlet vanes, cylinder strainer with 3/16 or 5/32 inch diameter openings, disposable fine mesh strainer to fit over cylinder strainer, and permanent magnet located in flow stream and removable for cleaning.

C. Accessories: Adjustable foot support or base support boss, blowdown tapping in bottom, gauge tapping in side.

D. Grooved inlet by flanged outlet pump suction fittings shall be Victaulic Series 731-G for sizes up to and including 12 inches. AGS grooved inlet by flanged outlet pump suction fittings shall be Victaulic Series W731-G for sizes 14 inch thru 24 inch.

## 2.6 COMBINATION PUMP DISCHARGE VALVES

### A. Manufacturers:

1. Bell & Gossett, ITT.
2. Armstrong.
3. Taco.
4. Victaulic Co.

B. Valves: Straight or angle pattern, flanged cast-iron valve body with bolt-on bonnet for 175 psig operating pressure, non-slam check valve with spring-loaded bronze disc and seat, stainless steel stem, and calibrated adjustment permitting flow regulation.

- C. Victaulic Tri-Service Valve Assembly: Combination shut-off, throttling and non-slam check valve may be used in lieu of pump discharge valves. Straight pattern valve consisting of Vic®-300 MasterSeal™ butterfly valve assembled with Style 716 or 779 Venturi check and grooved joint couplings (style to be determined by system requirements), with working pressures to 300 psi. Optional assembly: Vic-Plug valve Series 377 assembled with Style 779 Venturi check and Style 307 transition couplings, with working pressures to 175 psi. Memory stops standard.

## 2.7 FLOW CONTROL BALANCING FITTING (BF)

### A. Acceptable Manufacturers

1. Griswold (Combo Valve).
2. B & G Sentry.
3. Hays Measurflo.
4. Nexus Ultramatic.
5. No Substitutions

### B. General:

1. Flow control cartridge assembly shall be precision ground, all AISI Type 300 Series passivated stainless steel; shall be available in four PSID control ranges; minimum range shall be capable of being activated by less than 2 PSI; shall be capable of controlling flow within +/- 5% of rated flow. Plated brass internal parts will not be acceptable.
2. Manufacturer shall supply certified independent laboratory tests verifying accuracy of performance of all products.
3. All products shall be warranted by the manufacturer for five years from date of installation.

### C. Water Style Valves:

1. Class 150 wafer valves shall consist of gray iron (ASTM A-126-61T, Class 30) body and stainless steel flow control cartridge assemblies; shall be rated at 200 psi/250 degrees F.; shall be mechanically compatible with ANSI B16.1-1967 125 lb. cast iron flanges, ANSI B16.5-1968 or MSS-SP-44 150 lb. steel flanges; shall be supplied with pressure/temperature test valves; shall be permanently marked to show flow rate, PSID control range and direction of flow; shall have single or multiple, parallel-installed stainless steel cartridge assemblies to provide rated flow rate; shall include all plated steel studs required for installation; shall be available in 4, 6, 8, 10, 12, 14, 20 and 30 inch sizes, with flow rate from 14.0 GPM to 12,750 GPM.



D. Combination Valves (1/2 inch Though 3 Inch Pipe Size):

1. Combination flow control valves, sizes 1/2 inch through 1-1/2 inch, shall be brass alloy body ASTM B584, rated no less than 150 psi/250 degrees F. These sizes shall include two union ends in combination with interchangeable end pieces for either inlet or outlet of valve body. Valve bodies shall accept either 1/2 inch or 3/4 inch end pieces on the 3/4 inch body and 1 inch or 1-1/4 inch end pieces on the 1-1/4 inch body. Available flow rates shall range from 0.5 GPM to 34.0 GPM. Milwaukee ball valve shall be included and factory assembled.
2. Combo valves, sizes 2 inches through 2-1/2 inches, shall be gray iron, ASTM A126-61T, Class 30, rated at no less than 300 psi/275 degrees F. These sizes shall include removable threaded flanged end connections and Milwaukee ball valve as standard equipment. Available flow rates shall range from 14.0 GPM to 150.0 GPM.
3. Combination flow control valves size 3 inches. Valves shall consist of gray cast iron A-126-61T, Class 30, body and stainless steel flow control cartridge assembly, rated at 200 psi/250 degrees F. Valve body shall include temperature pressure fittings. Valves shall be complete with 150 lb. removal steel flanges and lug style butterfly shut-off valve. Butterfly valve shall be Milwaukee with iron body, aluminum bronzed disc, EPDM sea and handle operator.
4. Dual pressure/temperature test valves for verify accuracy of flow performance shall be provided on all valve sizes.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install specialties in accordance with manufacturer's instructions to permit intended performance.
- B. Where large air quantities can accumulate, provide enlarged air collection standpipes.
- C. Provide manual air vents at system high points and as indicated.
- D. For automatic air vents in ceiling spaces or other concealed locations, provide vent tubing to nearest drain.
- E. Provide air separator on suction side of system circulation pump and connect to expansion tank.
- F. Provide valved drain and hose connection on strainer blow down connection.
- G. Provide pump suction fitting on suction side of base mounted and inline centrifugal pumps. Remove temporary strainers after cleaning systems.
- H. Provide combination pump discharge valve on discharge side of base mounted centrifugal pumps.

- I. Support pump fittings with floor mounted pipe and flange supports.
- J. Provide balancing fitting valves on water outlet from terminal heating units such as radiation, unit heaters and VAV boxes.
- K. Provide relief valves on pressure tanks, low pressure side of reducing valves, heat exchangers, and expansion tanks.
- L. Select system relief valve capacity so that it is greater than make-up pressure reducing valve capacity. Select equipment relief valve capacity to exceed rating of connected equipment.
- M. Pipe relief valve outlet to nearest floor drain tight to edge of concrete pad such that pipe does not cross any walkway or cause a tripping hazard.
- N. Grooved joint piping systems shall be installed in accordance with the manufacturer's (Victaulic) guidelines and recommendations. All grooved couplings, fittings, valves, and specialties shall be the products of a single manufacturer. Grooved end shall be clean and free from indentations, projections, and roll marks in the area from pipe end to groove.
  - 1. AGS Installation: Install the Victaulic AGS piping system in accordance with the latest Victaulic installation instructions. AGS products shall not be installed with standard grooved end pipe or components. Installing AGS products in combination with standard grooved end products could result in joint separation and/or leakage.

### 3.2 OWNER TRAINING

- A. At the completion of the project, the Installing Contractor shall provide training for Owner's staff. Training shall consist of on-site (hands-on) training which will show the location of all devices and the operation of all controls, devices, maintenance and repair requirements, etc.
- B. Victaulic's factory-trained field representative shall provide on-site training for contractor's field personnel in the installation of grooved piping products. Factory trained representative shall periodically review the product installation. Contractor shall remove and replace any improperly installed products.

END OF SECTION 232116

## SECTION 232123 - HVAC PUMPS

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. In-line circulators.
- B. Vertical in-line pumps.
- C. Base mounted pumps.

#### 1.2 RELATED SECTIONS

- A. Section 23 07 01 - Piping Insulation.
- B. Section 23 21 13 - Hydronic Piping.
- C. Section 23 21 16 - Hydronic Specialties.
- D. Section 23 50 00 – Fire Tube Boilers.

#### 1.3 REFERENCES

- A. ANSI/UL 778 - Motor Operated Water Pumps.
- B. NFPA 70 - National Electrical Code.

#### 1.4 PERFORMANCE REQUIREMENTS

- A. Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, and operate within 25 percent of midpoint of published maximum efficiency curve.

#### 1.5 SUBMITTALS

- A. Submit under provisions of Division 1 General Requirements.
- B. Product Data: Provide certified pump curves showing performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable. Include electrical characteristics and connection requirements.

1.6 OPERATION AND MAINTENANCE DATA

- A. Submit under provisions of Division 1 General Requirements.
- B. Operation and Maintenance Data: Include installation instructions, assembly views, lubrication instructions, and replacement parts list.

1.7 REGULATORY REQUIREMENTS

- A. Products Requiring Electrical Connection: Listed and classified by UL.
- B. Conform to International Mechanical Code 2012.
- C. Conform to IECC 2012.

1.8 EXTRA MATERIALS

- A. Furnish under provisions of Division 1 General Requirements.
- B. Provide one set of mechanical seals for each pump.

1.9 WARRANTY

- A. Provide 2 (two) year parts and labor warranty from time of equipment start-up.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Store and protect products under provisions of Division 1 General Requirements.
- B. Deliver and store material in shipping containers with labeling in place.
- C. Contractor shall store all materials shipped to the site in a protected area. If material is stored outside of the building, it must be stored off the ground a minimum of six inches set on 6 x 6 planks and/or wood pallets. All material must be completely covered with waterproof tarps or visquin. All piping will have the ends closed to keep out dirt and other debris. No equipment will be allowed to be stored on the site unless it is sitting on wood planks and is completely protected with weatherproof covers.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

1. Bell & Gossett, ITT
2. Armstrong.
3. Taco.

### 2.2 IN-LINE CIRCULATORS

- A. Type: Horizontal shaft, single stage, direct connected, with resiliently mounted motor for in-line mounting, oil lubricated, for 175 psig maximum working pressure.
- B. Casing: Cast iron, with flanged pump connections.
- C. Impeller: Cast bronze, keyed to shaft.
- D. Bearings: Two, grease lubricated ball.
- E. Shaft: Alloy steel with aluminum bronze sleeve, integral thrust collar.
- F. Seal: Carbon rotating against a stationary ceramic seat, EPT fitted, 250 degrees F maximum continuous operating temperature.
- G. Drive: Close coupled.
- H. Motor: High efficiency – non overloading.
- I. Pump shall be factory tested per Hydraulic Institute Standards.
- J. Paint pump with minimum one coat of high grade enamel.

### 2.3 VERTICAL IN-LINE PUMPS

- A. Type: Vertical, single stage, close coupled, vertically split casing, for in-line mounting, for 175 psig working pressure.
- B. Casing: Cast iron, with suction and discharge gage port, casing wear ring, seal flush connection, drain plug, flanged suction and discharge.
- C. Impeller: Cast bronze, fully enclosed, keyed directly to motor shaft or extension.
- D. Shaft: Carbon steel with stainless steel impeller cap screw or nut and bronze sleeve.

- E. Seal: Carbon rotating against a stationary ceramic seat, EPT fitted, 250 degrees F maximum continuous operating pressure.
- F. Drive: Replaceable flexible coupler.
- G. Motor: High efficiency – non overloading.
- H. Pump shall be factory tested.

#### 2.4 BASE MOUNTED PUMPS

- A. Type: Horizontal shaft, single stage, direct connected, end suction design for 175 psig maximum working pressure. End suction to be true back pull-out, capable of being serviced without disturbing piping connections.
- B. Casing: Cast iron, with suction and discharge gage ports, renewable bronze casing wearing rings, seal flush connection, vent and drain plug, flanged suction and discharge.
- C. Impeller: Cast bronze, fully enclosed, keyed to shaft, dynamically balanced.
- D. Bearings: Grease lubricated ball bearings.
- E. Shaft: Alloy steel with aluminum bronze shaft sleeve.
- G. Seal: Carbon rotating against a stationary ceramic seat, EPT fitted, 250 degrees F maximum continuous operating temperature.
- H. Drive: Flexible coupling with OSHA compliant coupling guard.
- I. Motor: High efficiency – non overloading.
- J. Baseplate: Structural steel or fabricated steel fully enclosed at sides and ends with integral drain rim.
- K. Pump shall be factory tested and painted with minimum one coat of high-grade enamel.

#### 2.5 MANUFACTURER'S FIELD SERVICES

- A. Pump manufacturer shall furnish a factory trained service engineer without additional charge to start the units. Pump manufacturer shall maintain service capabilities to more than 100 miles from the jobsite.
- B. The manufacturer shall furnish complete submittals applicable for field maintenance and service.

## 2.6 OWNER TRAINING BY EQUIPMENT MANUFACTURER

- A. At the completion of the project, the equipment manufacturer and installing contractor shall provide training of Owner's staff. Training shall consist of on-site (hands-on) training which will show the location of all devices, operation of all controls, devices, motors, and maintenance and repair requirements.

## PART 3 - EXECUTION

### 3.1 PREPARATION

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

### 3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Provide access space around pumps for service. Provide no less than minimum as recommended by manufacturer or 12" whichever is greater.
- C. Decrease from line size with long radius reducing elbows or reducers. Support piping adjacent to pump such that no weight is carried on pump casings. For close coupled or base mounted pumps, provide supports under elbows on pump suction and discharge line sizes 4 inches and over.
- D. Provide line sized shut-off gate or butterfly valve and end suction diffuser on pump suction, and line sized shut-off gate or butterfly valves and combination pump discharge triple duty valve on pump discharge. See pump details on the drawings for all related pump trim.
- E. Provide air cock and drain connection on horizontal pump casings.
- F. Provide drains for bases and seals, piped to and discharging into floor drains.
- G. Check, align, and certify alignment of base mounted pumps prior to start-up.
- H. Install base mounted pumps on concrete housekeeping base with inertia base, with anchor bolts, set and level, and grout in place.
- I. Lubricate pumps before start-up.

END OF SECTION 232123

SECTION 23 22 20 – STEAM AND STEAM CONDENSATE PIPING

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Base bid:
  - 1. Heating Contractor.
    - a. Pipe and pipe fittings.
    - b. Valves.
    - c. Steam piping system.
    - d. Steam condensate-piping system.

1.2 RELATED SECTIONS

- A. Section 23 05 53 - Mechanical Identification.
- B. Section 23 07 01 - Piping Insulation.
- C. Section 23 22 30 - Steam and Steam Condensate Specialties.

1.3 REFERENCES

- A. ASME - Boiler and Pressure Vessel Codes, SEC 9 - Qualification Standard for Welding and Brazing Procedures, Welders, Brazers, and Welding and Brazing Operators.
- B. ASME B16.3 - Malleable Iron Threaded Fittings Class 150 and 300.
- C. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
- D. ASTM A53 - Pipe, Steel, Black and Hot-Dipped Zinc Coated, Welded and Seamless.
- E. ASTM A234 - Pipe Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures.
- F. ASTM B32 - Solder Metal.
- G. ASTM F708 - Design and Installation of Rigid Pipe Hangers.
- H. AWS A5.8 - Brazing Filler Metal.
- I. AWS D1.1 - Structural Welding Code.



#### 1.4 SYSTEM DESCRIPTION

- A. When more than one piping system material is selected, ensure systems components are compatible and joined to ensure the integrity of the system is not jeopardized. Provide necessary joining fittings. Ensure flanges, unions, and couplings for servicing are consistently provided.
- B. Use unions, flanges, and downstream of valves and at equipment or apparatus connections. Use dielectric unions where joining dissimilar materials. Do not use direct welded or threaded connections.
- C. Provide pipe hangers and supports in accordance with ASTM B31.9 unless indicated otherwise.
- D. Use gate or ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.
- E. Use ball valves for throttling, bypass, or manual flow control services.

#### 1.5 SUBMITTALS

- A. Submit under provisions of the general conditions and general requirements of the contract.
- B. Product Data: Provide data on pipe materials, pipe fittings, valves and accessories. Provide manufacturers catalogue information. Indicate valve data and ratings.
- C. Welders Certificate: Include welders certification of compliance with ASME/SEC 9 and AWS D1.1.
- D. Manufacturer's Installation Instructions: Indicate hanging and support methods, joining procedures.

#### 1.6 PROJECT RECORD DOCUMENTS

- A. Submit under provisions of the general conditions and general requirements of the contract.
- B. Record actual locations of valves.

#### 1.7 OPERATION AND MAINTENANCE DATA

- A. Submit under provisions of the general conditions and general requirements of the contract.
- B. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.

1.8 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum five years documented experience.
- B. Installer: Company specializing in performing the work of this section with minimum five years documented experience.
- C. Welders: Certify in accordance with ASME SEC 9 or AWS D1.1.

1.9 REGULATORY REQUIREMENTS

- A. Conform to ASME B31.9 code for installation of piping system.
- B. Provide certificate of compliance from authority having jurisdiction indicating approval of welders.
- C. Welding Materials and Procedures: Conform to ASME SEC 9 and applicable state labor regulations.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of the general conditions and general requirements of the contract.
- B. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- C. Provide temporary protective coating on cast iron and steel valves.
- D. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- E. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

PART 2 – PRODUCTS

2.1 STEAM PIPING (150 PSIG MAXIMUM) ABOVE GROUND

- A. Steel Pipe: ASTM A53, Schedule 80, black.
  - 1. Fittings: ASTM B16.3 malleable iron Class 250, or ASTM A234 forged steel Class 300, steel-seamless, tube-turn.
  - 2. Joints: Threaded (accessible locations) or AWS D1.1, welded.
  - 3. Flanges and Flange Fittings: Class 300, ASTM A307, grade "B".

## 2.2 STEAM CONDENSATE PIPING (ABOVE GROUND)

- A. Steel Pipe: ASTM A53, full weight Schedule 80, black.
  - 1. Fittings: ASTM B16.3 malleable iron Class 125, or ASTM A234 forged steel Class 125, Yology, tube-turn.
  - 2. Joints: Threaded (accessible locations), or AWS D1.1, welded.
  - 3. Flanges and Flange Fittings: Class 125, ASTM A-307, grade "B".

## 2.3 GATE VALVES

- A. Up To and Including 2 Inches:
  - 1. Acceptable Manufacturers:
    - a. Crane.
    - b. Lunkenheimer.
    - c. Vogt.
    - d. Jenkins.
  - 2. Bronze body, bronze trim, screwed bonnet, rising stem, handwheel, solid wedge disc with bronze seat rings, threaded ends.
  - 3. Handles to be removable.
- B. 2 Inches and Over:
  - 1. Manufacturers:
    - a. Crane.
    - b. Lunkenheimer.
    - c. Vogt.
    - d. Jenkins.
  - 2. Cast iron body, bronze trim, bolted bonnet, rising stem, handwheel, outside screw and yoke, solid wedge disc with bronze seat rings, flanged ends.

## 2.4 GLOBE VALVES

- A. Up To and Including 1-1/2 Inches:
  - 1. Manufacturers:
    - a. Crane.
    - b. Lunkenheimer.
    - c. Vogt.
    - d. Jenkins.
  - 2. Bronze body, bronze trim, screwed bonnet, rising stem and handwheel, inside screw with backseating stem, renewable plug disc and stainless steel seat ring, threaded ends.

B. 2 Inches and Over:

1. Manufacturers:

- a. Crane.
- b. Lunkenheimer.
- c. Vogt.
- d. Jenkins.

2. Cast iron body, bronze trim, bolted bonnet, rising stem, handwheel, outside screw and yoke, rotating plug-type disc with renewable seat ring and disc, flanged ends.

2.5 SWING CHECK VALVES

A. Up To and Including 1-1/2 Inches:

1. Acceptable Manufacturers:

- a. Williams-Hager.
- b. Lunkenheimer.
- c. Jenkins.
- d. Stockham.

2. Bronze or iron body, bronze trim, bronze rotating swing disc with composition seat, threaded ends, renewable stainless steel trim..

B. 2 Inches and Over:

1. Acceptable Manufacturers:

- a. Williams-Hager.
- b. Lunkenheimer.
- c. Jenkins.
- d. Stockham.

2. Cast iron body, bronze trim, bronze or bronze faced rotating swing disc, renewable stainless steel disc and seat, flanged ends.

PART 3 - EXECUTION

3.1 PREPARATION

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

- C. Prepare piping connections to equipment with flanges or unions.
- D. Keep open ends of pipe free from scale and dirt. Whenever work is suspended during construction protect open ends with temporary plugs or caps.
- E. After completion, fill, clean, and treat systems. Refer to Section 23 25 00.

### 3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Route piping in orderly manner, plumb and parallel to building structure, and maintain gradient.
- C. Install piping to conserve building space and not interfere with use of space.
- D. Sleeve pipe passing through partitions, walls, and floors.
- E. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. Refer to Section 23 05 16.
- F. Pipe Hangers and Supports:
  - 1. Install in accordance with ASTM B31.9 and ASTM F708.
  - 2. Support horizontal piping as scheduled.
  - 3. Place hangers within 12 inches of each horizontal elbow.
  - 4. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
  - 5. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
  - 6. Provide sheet lead packing between hanger or support and piping.
- G. Provide clearance for installation of insulation and access to valves and fittings.
- H. Slope steam piping one inch in 40 feet (0.25 percent) in direction of flow. Use eccentric reducers to maintain bottom of pipe level.
- I. Slope steam condensate piping one inch in 40 feet (0.25 percent). Provide drip trap assembly at low points and before control valves. Run condensate lines from trap to nearest condensate receiver. Provide loop vents over trapped sections.
- J. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welds.

- K. Prepare unfinished pipe, fittings, supports, and accessories ready for finish painting.
- L. Install valves with stems upright or horizontal, not inverted.
- M. Provide check valve on discharge of each condensate return pump (between pump and discharge shut-off valves).

END OF SECTION 232220

## SECTION 23 22 30 – STEAM AND STEAM CONDENSATE 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.
- 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. Perform all Work required to provide and install the following steam specialties indicated by the Contract Documents with supplementary items necessary for their proper installation.
  - 1. Steam traps.
  - 2. Flash tanks.
  - 3. Condensate return pumping units.
  - 4. Steam relief valves.
  - 5. Steam safety valve discharge elbows.
  - 6. Steam pipe anchors.
  - 7. Steam pipe guides.
  - 8. Drip traps.
  - 9. Sediment strainers.
  - 10. Automatic air vents.
  - 11. Gauges and gauge connections.
  - 12. Thermometer and thermometer wells.
  - 13. Steam orifice meters.
  - 14. Steam integrating (condensate) meters.

#### 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 following references:

1. ASTM A105 - Forgings, Carbon Steel, for Piping Components.
2. ASTM A216 - Steel Casings, Carbon, Suitable for Fusion Welding, for High Temperature Service.
3. ASTM A395 - Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures.
4. ASME B31.9 - Building Services Piping.

#### 1.4 QUALITY ASSURANCE

- A. All specialties of the same type shall be provided from the same manufacturer.
- B. Manufacturer's name and pressure rating marked on body of each device.

#### 1.5 SUBMITTALS

A. Product Data:

1. Submit Shop Drawings, wiring diagrams and product data on all steam specialties.

B. Record Documents:

1. Shop Drawing submittal of traps shall contain an itemized list with a tabulation of the load, trap type and trap size.

### PART 2 - PRODUCTS

#### 2.1 GENERAL

- A. 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.

#### 2.2 MANUFACTURERS

A. Steam Traps:

1. Armstrong.
2. Spirax Sarco.
3. Spence.



B. Flash Tanks:

1. Penn Separator.
2. Wendland.
3. Wilson.

C. Condensate Pumping Units:

1. Skidmore.
2. Aurora.
3. Mepco.
4. Spirax Sarco

D. Steam Relief Valves:

1. Consolidated Type 1511.
2. Spirax Sarco 211S or SV Series.
3. Spence Engineering 41.
4. Crane 2501.

E. Steam Discharge Pan Elbows:

1. Grinnell Fig. No. 1538F.
2. Spirax Sarco DPE.
3. Spence Engineering DPE.

F. Automatic Air Vents:

1. Spirax Sarco 13W
2. Spence Engineering.

G. Sediment Strainers:

1. Muller Steam Specialty.
2. Keckley.
3. Spirax Sarco

H. Gauges:

1. Ashcroft No. 1279-R Duragauge.

I. Thermometer and Wells:

1. Weksler Industrial Thermometers.
2. Ashcroft 1279-R.
3. Conbraco 20-150.

J. Steam Condensate Integrating Meters:

1. Daniel Model CRA turbine meter.
2. Winters.

K. Vacuum Breakers:

1. Spirax Sarco VB
2. Kadent Johnson VB

2.3 INVERTED BUCKET TRAPS

- A. Cast iron or semi-steel body and bolted cover for 250 psig working steam pressure (WSP); provide access to internal parts without disturbing piping; with top test plug and bottom drain plugs, brass or stainless steel bucket, stainless steel seats and plungers, and stainless steel lever mechanism with knife edge operating surfaces.

2.4 FLOAT AND THERMOSTATIC TRAPS

- A. ASTM A126, cast iron or semi-steel body and bolted cover for 125 psig WSP; provide access to internal parts without disturbing piping; with bottom drain plug, stainless steel or bronze bellows type air vent, stainless steel or copper float, stainless steel lever and valve assembly.
- B. Float and thermostatic traps for clean steam service shall have Type 316L stainless steel bodies, covers, and all internal components.

2.5 THERMOSTATIC TRAPS

- A. Pressure balanced type with ASTM A216 WCB cast steel body and bolted or screwed cover and integral ball joint union, for 300 psig WSP; monel or stainless steel bellows, stainless steel valve and seat; integral stainless steel strainer.
- B. Freeze-proof type with cast iron body for 300 psig WSP, bronze bellows, stainless steel valve and seat, external adjustment.
- C. Bi-metallic type with ASTM A105 forged steel body and cover, for 300 psig WSP, bi-metal element with stainless steel components, integral Type 304 stainless steel strainer screen, and ¼ inch blow down valve.
- D. Clean steam thermostatic traps for non-critical process areas shall be self-adjusting balanced pressure type capable of operating close to saturated steam temperature. All wetted parts shall be manufactured from Type 316L stainless steel. Traps shall be maintainable, of sealed construction, and shall be completely self-draining when installed in vertical pipeline.

2.6 FLASH TANKS

- A. Closed type, welded steel construction, tested and stamped in accordance with Section 8D of ANSI/ASME Boilers and Pressure Vessels Code for 125 psig working pressure; cleaned, prime coated and supplied with steel support legs. Construct with nozzles and tappings for installation of accessories and piping connections.

2.7 CONDENSATE PUMPING UNITS

- A. Condensate pumping units shall be duplex horizontal type to include receiver, interstrainer, duplex pumps, float switches, control panel and accessories. Pumps shall be single-stage centrifugal type with head capabilities and flow rates as scheduled. Pumps shall be capable of pumping 212 degrees F condensate at the controlled water level.
- B. Unit shall be complete with 3/16 inch thick steel receiver with rust resistant coating and shall have magnesium anode protection.
- C. Each motor shall be provided with safety switch and a magnetic starter with current overload relays providing overload and undervoltage protection. These magnetic starters shall be provided with three-pole overload protection.
- D. Pumps shall be bronze fitted throughout. Bearings shall be such as to protect them from dust and corrosion.
- E. Each unit shall have fully automatic control by a float and float switch. An alternator switch shall be provided as a part of the unit to automatically alternate pumps at the end of each pump operation.
- F. All accessories and auxiliaries, such as pressure gauges, water gauge glasses, etc., shall be installed complete.
- G. Electrical wiring and controls shall be complete so that no wiring beyond that required by the driving motor need be supplied in the field. Such units shall be tested at the factory and adjusted prior to shipment. Alternator shall be mechanical type. If electrical alternator is used, it shall be Allen Bradley.
- H. Each pump shall have stainless steel shafts. Furnish an extra set of Viton seals. Each duplex pump shall have two-point power connections (not a single point) and integral shut-off valves upstream and downstream of each pump.
- I. Capacities and electrical characteristics shall be as scheduled on Drawings.
- J. Provide high level alarm switch complete with transformer, bell and one set of 120 volt AC rated, normally open contacts for connection to the building automation system (BAS).

- K. Control Cabinet: NEMA II enclosure, UL listed, with piano hinged door, grounding lug, combination magnetic starters with overload relays, circuit breakers and cover interlock, electric alternator, AUTO-OFF switch, test button, terminal strip, high level alarm light, acknowledge button, alarm horn and fusible control circuit transformer. Provide a normally open auxiliary alarm contact for connection to the BAS.

## 2.8 STEAM RELIEF VALVES

- A. Relief valves 2 inches and smaller shall have brass bodies and arranged for screwed connections. Such relief valves shall be Spence Type 41 or Spirax Sarco 211 Series safety valves for steam. Bushings shall not be used.
- B. Relief valves 2-1/2 inches and larger for all medium and low pressure steam piping systems be arranged for flanged inlet and screwed outlet connections. Such relief valves shall be Spence Type 41 or Spirax Sarco SV Series, ASME Standard Cast Iron Safety Valves.
- C. The pressure at which each relief valve shall open is designated on the Drawings. Specify the pressure at which each relief valve must be set. Each valve shall have a metal tag attached stamped with the valve identification plus the pressure setting. Each valve shall be sized at full steam flow through the PRV and discharge piping must be equal or greater than the steam relief valve outlet size.
- D. Safety relief valve shall comply with ASME Section 1 or 8 as applicable. Provide Certificate of Conformance per ASME standard.

## 2.9 DRIP TRAPS

- A. Traps shall be 3/4 inch traps unless specifically shown to the contrary, i.e., they shall have 3/4 inch inlet and outlet connections.
- B. High-pressure drip traps shall have steel or semi-steel bodies and the internal operating mechanisms shall be made of heat-treated chrome steel. The caps shall be bolted to the bodies by the use of alloy steel heat-treated machine bolts, No. 300 Armstrong Traps, manufactured by Armstrong Machine Works. Capacity for discharging at least 3,500 pounds of condensate per hour when operating at a pressure of 250 pounds per square inch.
- C. All drip traps used in medium pressure steam piping systems shall be 3/4 inch Armstrong No. 811 inverted bucket traps, with cast iron bodies and stainless steel trim.
- D. Low-pressure traps shall be equal to Armstrong "A" or "B" series sized to handle 200 percent of the load with an operating differential pressure equal to 50 percent of the inlet steam pressure.

## 2.10 SEDIMENT STRAINERS

- A. Sediment strainers in high pressure steam piping shall be cast steel and shall be suitable for working steam pressures as high as 300 pounds per square inch and temperatures not in excess of 750 degrees F.
- B. For pipe sizes 2-1/2 inches and larger, flanged pattern sediment strainers shall be used. For pipe smaller than 2-1/2 inches, screwed pattern shall be used.
- C. The flanges of flanged strainers shall be dimensioned, faced, drilled and spot faced to conform to the 300-pound American Standard for Steel Pipe Flanges and Flanged Fittings (B16E-1939).
- D. Strainers in low and medium pressure steam piping systems 2-1/2 inches and larger shall be flanged iron body strainers having bolted covers. These strainers shall be suitable for operating pressures as high as 125 psig.
- E. Sediment strainers in low and medium pressure steam piping systems 2 inches and smaller shall be arranged for screwed pipe connections.

## 2.11 GAUGES AND GAUGE CONNECTIONS

- A. Pressure gauges for interior steam systems shall be 4-1/2 inches with back connection when used on a panel; otherwise they shall have bottom connections. Each gauge shall be provided with Ashcroft carbon steel needle valve and a siphon rated for the steam pressure and temperature. The arrangement of the mechanisms shall conform to pressure ranges and details shown on the Drawings.
- B. The dial graduation shall be 1.5 times the highest working pressure of the steam that the gauge is serving.

## 2.12 THERMOMETER AND THERMOMETER WELLS

- A. Furnish and install thermometers of not less than 9 inch scale complete with brass separable sockets with extension neck to allow for insulation of piping. These thermometers shall be mercury red reading type in one piece glass tubes extending from top of scale to sensor, and shall be located so that they may be easily read. Field adjustable angle thermometers are acceptable.
- B. Thermometers shall be provided with range of 0 to 220 degrees F at hot water heat exchangers. The sensing element of the thermometer shall be at least one inch into the pipe.
- C. Thermometer test wells shall be 3/4 inch Weksler thermal wells, brass with stem of minimum length to extend beyond the mid-diameter of the pipe, 2-1/2 inch extension neck and brass screw plug. Wells shall be suitable for use of industrial type thermometers.
- D. Indicating thermometers shall be Weksler industrial thermometers having stainless steel separable sockets and scales of the range suitable for steam pressures indicated on flow sheets.

## 2.13 STEAM CONDENSATE INTEGRATING METERS

- A. Furnish and install turbine meter in the condensate return system as indicated on Drawings. Turbine meter to be installed to read GPM from all pumps.
- B. Meter shall be constructed of stainless steel with stainless steel internal parts and tungsten carbide bearings:
  - 1. Maximum Operating Range: 210 degrees F.
  - 2. Pressure Range: 0 to 100 psig.
  - 3. Maximum pressure drop: 4 psig.
  - 4. Condensate Flow Rate: Engineer shall complete.
  - 5. Output: 12 VDC.
  - 6. Maximum Accuracy  $\pm 0.05$  percent over linear flow range.
  - 7. Power Available: 12 VDC.

## 2.14 VACUUM BREAKERS

- A. Vacuum breakers shall be used on all modulating or on/off heat exchangers and coils, except in vacuum return systems.
- B. Vacuum breakers shall be of hardened ball check valve design with all working parts manufactured from stainless steel.
- C. Bodies shall be made of brass or stainless steel and shall be suitable for operating conditions of 300 psig saturated steam.

## PART 3 - EXECUTION

### 3.1 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. Install specialties in accordance with manufacturer's instructions.
- C. Install float and thermostatic traps to drain condensate from unit heaters, converters, heating coils, steam separators, flash tanks, steam jacketed equipment and direct steam injected equipment.
- D. Install inverted bucket steam traps to drain condensate from steam main headers and branch lines at an operating differential pressure equal to 50 percent of the inlet steam pressure unless noted otherwise.
- E. Install thermostatic steam traps to drain condensate from steam radiation units, converters, and other similar terminal heating units.

- F. Size steam traps to handle minimum of two times maximum condensate load of apparatus served.
- G. Traps used on steam mains and branches shall be minimum 3/4-inch (20 mm) size.
- H. Install steam traps with union or flanged connections at both ends.
- I. Provide gate valve and strainer at inlet and gate valve at discharge of steam traps.
- J. Provide minimum 10-inch (250 mm) long dirt pocket of same pipe sizes as apparatus return connection between apparatus and steam trap.
- K. Remove thermostatic elements from steam traps or valve out during temporary and trial usage and until system has been operated and dirt pockets cleaned of sediment and scale.
- L. Rate relief valves for pressure upstream of pressure reducing station, for full operating capacity. Set relief at maximum 20 percent above reduced pressure.
- M. Terminate relief valves to outdoors. Provide drip pan elbow with drain connection to nearest floor drain.
- N. When several relief valve vents are connected to a common header, header cross sectional area shall equal sum of individual vent outlet areas.
- O. Steam Safety Valve Discharge Elbows:
  - 1. All vent lines from safety valves shall be provided with safety valve discharge elbows at the point at which such lines rise to an elevation higher than that of the safety valve. The nature and design of the piping systems involved shall effectively drain all condensate from the discharge side of all relief valves. No force shall be exerted on the safety valve by the discharge piping.
  - 2. Provide temperature sensor mounted in steam safety valve piping in close proximity to steam pressure relief valve. Coordinate with Division 25 such that an alarm is initiated at the BAS upon a rise in temperature.
- P. Steam Pipe Anchors:
  - 1. All steam lines shall be securely anchored at points designated on the Drawings and/or at such points as may be needed to assure proper control of the expansion and contraction of such systems.
- Q. Steam Pipe Guides:
  - 1. All steam piping systems shall be properly guided.

R. Drip Traps:

1. High-pressure drip trap assemblies shall be provided per the Contract Documents and where required to keep piping systems completely drained of condensate.
2. Where drip taps are installed in conjunction with 3 inch and larger steam lines, a drip pocket of the nature detailed on the Drawings shall be provided where a natural pocket does not exist. The piping and valves in trap assemblies shall be arranged as detailed on the Drawings; extra strong pipes shall be used on both sides of the trap. The diameter of the drip pocket shall be the same size as the distribution line up to 4 inches in diameter. The diameter shall be half the size of the distribution line over 4 inches but never less than 4 inches.
3. All drip traps used in medium pressure steam piping systems where automatic steam control valves are not employed shall be arranged as shown on the Drawings. Each trap shall be provided with a valved test line and shall be preceded by a sediment strainer.
4. Condensate traps from coils, convertors, hot water generators, and all other devices where modulating steam valves are employed shall be of the float and thermostatic type. Installed traps with less than 12 inch of height between equipment outlet and trap inlet shall be sized for not less than 300 percent of the load. Each trap shall be provide with a ½ inch valve test line and shall be preceded by a sediment strainer. A vacuum breaker shall be supplied for these applications and it can be integral to the trap. Under no circumstances shall a float and thermostatic trap be installed in a manner to lift condensate up in a return line.

S. Sediment Strainers:

1. Each drip trap assembly, each control valve, for steam and each pressure reducing valve assembly regardless of its size shall be preceded by a sediment strainer. The arrangement of these sediment strainers shall be such that the screens may be removed for cleaning with ease through a gasketed plug.
2. Sediment strainers shall be placed in steam piping systems wherever shown on the Drawings and at such other points as may be required for the removal of foreign material from the piping systems.
3. Full sized blow off valves shall be installed on all strainers in steam, condensate, chilled and hot water lines and a drain shall be installed from each valve to the nearest floor drain.

T. Automatic Air Vents:

1. Provide auto air vents with a pressure rating that is equal to system classification but not less than 125 psig. Provide shut-off valve to facilitate maintenance of air vent.
2. Locate all air vents and their discharge lines in accessible locations, preferably clustered.



U. Thermometer and Thermometer Wells:

1. Thermometers shall in all cases be installed upright or at the proper angle to be read while standing on the floor. The wells for thermometers shall be located in vertical pipes where possible. When installed in horizontal pipes, thermometers shall be installed in the side and not on top of the pipe.
2. Thermometer wells and thermometers shall be located where noted on the Drawings and where called for in other Specification Sections. Thermometer test wells shall only be installed in a vertical position in horizontal lines and at 45 degrees in vertical lines to hold a fluid in the well.

V. Condensate Integrating Meters:

1. Meters shall be mounted in a horizontal position at the pump discharge with required upstream and downstream straight runs of pipe.
2. Furnish and install a line size spool piece in the main until all piping has been cleaned and flushed.

W. Condensate Pumping:

1. Install condensate pumping units on a housekeeping pad.
2. Install vent and overflow piping as detailed in the Drawings. Route the overflow pipe to a floor drain. Provide and pipe a receiver drain valve and pipe to the nearest floor drain.
3. Install spring assisted check valves in the discharge of each pump. Install globe valves for pump balancing in the discharge of each pump. Install gate valves downstream of the globe valves.
4. Pump discharge lines 1-1/2 inches and larger shall be piped to the condensate return piping with stainless steel flex connectors.

X. Vacuum Breakers:

1. Vacuum breakers shall be installed in the supply side between the control valve and equipment.
2. Install in a vertical position with cap at top.
3. Mount the vacuum breaker on the highest point of the circuit.
4. Large coils or equipment may require more than one vacuum breaker to be fitted.

END OF SECTION 23 22 30

## SECTION 232500 - CHEMICAL WATER TREATMENT

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Cleaning of piping systems.
- B. Chemical feeder equipment.
- C. Chemical treatment.
- D. Side stream filters.
- E. Anti-freeze feed system.
- F. Pre-mixed heat transfer fluid.

#### 1.2 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

- A. Section 23 21 13 - Hydronic Piping.
- B. Section 23 21 20 – Steam and Condensing Piping.

#### 1.3 REFERENCES

- A. NFPA 70 - National Electrical Code.

#### 1.4 SUBMITTALS

- A. Submit under provisions of Division 1 General Requirements.
- B. Product Data: Provide chemical treatment materials, chemicals, and equipment including electrical characteristics and connection requirements.
- C. Manufacturer's Installation Instructions: Indicate placement of equipment in systems, piping configuration, and connection requirements.
- D. Manufacturer's Field Reports: Indicate start-up of treatment systems when completed and operating properly. Indicate analysis of system water after cleaning and after treatment.

1.5 PROJECT RECORD DOCUMENTS

- A. Submit under provisions of Division 1 General Requirements.
- B. Record actual locations of equipment and piping.

1.6 OPERATION AND MAINTENANCE DATA

- A. Submit under provisions of Division 1 General Requirements.
- B. Operation and Maintenance Data: Include data on chemical feed pumps, agitators, and other equipment including spare parts lists, procedures, and treatment programs. Include step by step instructions on test procedures including target concentrations.

1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the products specified in this Section with minimum ten years documented experience. Company shall have local representatives with water analysis laboratories and full time service personnel.

1.8 REGULATORY REQUIREMENTS

- A. Conform to applicable code for addition of non-potable chemicals to building mechanical systems, and to public sewage systems.
- B. International Mechanical Code 2012.

1.9 MAINTENANCE SERVICE

- A. Furnish service and maintenance of treatment systems for two years from Date of Substantial Completion.
- B. Provide bi-monthly technical service visits to perform field inspections and make water analysis on site. Detail findings in writing on proper practices, chemical treating requirements, and corrective actions needed. Submit two copies of field service report after each visit.
- C. Provide laboratory and technical assistance services during this maintenance period.
- D. Include two hour training course for operating personnel, instructing them on installation, care, maintenance, testing, and operation of water treatment systems. Arrange course at start up of systems.
- E. Provide on site inspections of equipment during scheduled or emergency shutdown to properly evaluate success of water treatment program, and make recommendations in writing based upon these inspections.

1.10 MAINTENANCE MATERIALS

- A. Provide sufficient chemicals for treatment and testing during warranty period.
- B. Provide 6 additional side stream filter cartridges.

1.11 EQUIPMENT

- A. Water Treatment Contractor shall provide water treatment equipment systems for all water using systems as specified below. It shall be the responsibility of the Water Treatment Contractor to properly size all components of the equipment system. The Mechanical Contractor shall install these equipment systems per the Water Treatment Contractor's instructions.

1.12 WASTEWATER STANDARDS

- A. Discharge from any chemically treated system shall be directed to sanitary sewers and shall not result in containment levels which are in excess of standards as set forth by the appropriate water pollution control authorities.

PART 2 - PRODUCTS

2.1 CHEMICAL TREATMENT MANUFACTURERS

- A. HOH.
- B. Nalco.
- C. Butler Chemical.
- D. Maram, Inc.
- E. Great Lakes Treatment.

## 2.2 MATERIALS

- A. System Cleaner:
  - 1. Liquid alkaline compound with emulsifying agents and detergents to remove grease and petroleum products.
  - 2. Biocide.
- B. Closed System Treatment (Water):
  - 1. Sequestering agent to reduce deposits and adjust pH.
  - 2. Corrosion inhibitors.
  - 3. Conductivity enhancers.

## 2.3 BY-PASS (POT) FEEDER

- A. By-Pass Feeder shall be five (5) gallon capacity, steel construction with maximum operating pressure of 200 psi at 200° F. By-pass feeder shall have 4" wide cast iron top closure and 3/4" NPT inlet, outlet, and drain connections. The feeder cover shall be 1/4 turn, quick opening, with self aligning floating seal. By-pass feeder shall be installed as shown on drawings. Mount assembly so that drain valve is mounted a minimum of 18" AFF.

## 2.4 SIDE STREAM FILTER

- A. Filter Vessel - Filter vessel shall house replaceable cartridge type filters, and be rated for industrial applications with maximum operating pressure of 150 psi at 250°F. Filter vessel shall be of 304 stainless steel split-shell construction with V-band clamp and NPT inlet, outlet, bottom drain and top vent connections. Filter vessel shall be installed as shown on drawings and shall be sized to filter the equivalent of the system water capacity once every four (4) hours. Mount assembly so that drain valve is mounted a minimum of 18" AFF.
- B. Filter Cartridges - Filter cartridges shall be wound polypropylene media with a tin core, 10 micron rating, and a maximum temperature rating of 200° F sized to properly fit the filter vessel. Filter cartridges shall be furnished in a quantity sufficient for six (6) complete changes of the filter vessel. Filter cartridges shall be changed when the pressure drop across the filter vessel exceeds 20 psi, or as recommended by Water Treatment Contractor.

## 2.5 MAKE-UP WATER METER

- A. Water meter shall be cold water oscillating piston type rated for industrial use. Meter shall be of bronze construction with NPT union connections, standard register totalizing in gallons, maximum pressure rating of 150 psi, and maximum temperature rating of 110°F. Water meter shall be installed in the make-up water piping fitted with a three (3) valve by-pass.

## 2.6 TEST EQUIPMENT

- A. Provide white enamel test cabinet with local and fluorescent light, capable of accommodating 4 – 10 ml zeroing titrating burettes and associated reagents.
- B. Provide the following test kits:
  - 1. Alkalinity titration test kit.
  - 2. Chloride titration test kit.
  - 3. Sulphite titration test kit.
  - 4. Total hardness titration test kit.
  - 5. Low phosphate test kit.
  - 6. Conductivity bridge, range 0 – 10,000 microhms.
  - 7. Creosol red pH slide complete with reagent.
  - 8. Portable electronic conductivity meter.
  - 9. High nitrate test kit.

## 2.7 CHEMICALS

- A. Water Treatment Contractor shall provide chemical treatment products as specified for cleaning and for the control of scale formation, corrosion, and microbiological growth in all water using systems. The quantity of chemicals furnished shall be sufficient to develop desired treatment levels in all systems from time of start-up through the warranty period, or for a maximum of one year, whichever comes first. Water Treatment Contractor shall have the ability to recycle shipping containers, per DOT guidelines.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Systems shall be operational, filled, started, and vented prior to cleaning. **Use water meter to record capacity in each system.**
- B. Place terminal control valves in open position during cleaning.
- C. Verify that electric power is available and of the correct characteristics.

### 3.2 CLEANING

- A. General - Prior to acceptance by the Owner, all grease, dirt and metallic oxides shall be removed from each closed recirculating system. Equipment shall be provided to meter the water, filter system water, mix and inject the cleaning solution into the system. Mechanical Contractor shall inform Water Treatment Contractor of all system materials of construction, to insure chemical cleaner compatibility. A cleaning agent shall be circulated, wetting all metal surfaces and flushed from the system at completion. Supervision shall be as provided by Water Treatment Contractor.

- B. Procedure - The following Cleaning Procedure shall apply:
1. The system shall be filled through a suitable water meter to determine total water capacity, taking care to bleed all air.
  2. H-O-H Chemicals C-312 Liquid Cleaner or approved equal shall be added to the system at a dosage rate of twenty (20) gallons per one thousand (1000) gallons of system capacity. The Chemical Water Treatment Contractor shall verify cleaner strength.
  3. Hot Water Systems shall be heated to 160-180 degrees F and circulated for 24 hours. Chilled Water Systems shall be circulated for 48 hours.
  4. During the cleaning period, system water shall be circulated through the entire system. Mechanical Contractor shall insure that all small orifices (control valves, strainers, etc.) remain free of debris. A side stream filter shall be used for solids removal during the cleaning period. Filter media shall be changed as specified in the filter cartridge specifications.
  5. When cleaning is complete, the system shall be drained and flushed with fresh water to remove the cleaning solution. Flushing shall continue until the total (M) alkalinity of the system water is within fifty (5) PPM of the total alkalinity of the make-up water.
- C. Immediately following completion and verification of flushing, certification records covering the cleaning operation shall be submitted to the Mechanical Contractor. Records shall include: System volume, cleaner concentration, circulation time, volume of flush water and final alkalinity reading. Each system shall then be chemically treated as provided elsewhere in the specifications.
- D. Chemicals - Grease, dirt, oil and metallic oxides shall be removed from each closed recirculating water system using a non-foaming, liquid cleaning agent formulated to lift and disperse organic soil and to chelate alkaline earth metals and metallic oxides.
- E. Use neutralizer agents on recommendation of system cleaner supplier and approval of Architect/Engineer.
- F. Remove, clean, and replace strainer screens.
- G. Inspect, remove sludge, and flush low points with clean water after cleaning process is completed. Include disassembly of components as required.

### 3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions.

3.4 CLOSED SYSTEM TREATMENT

- A. Provide one bypass feeder on each system. Install isolating and drain valves and necessary piping. Install around balancing valve downstream of circulating pumps unless indicated otherwise.
- B. Introduce closed system treatment through bypass feeder when required or indicated by test.

3.5 PREPARATION FOR FINAL FILL

- A. The piping system shall be hydrostatically tested to the required test conditions to assure no leaks.
- B. Piping system shall be cleaned prior to system final fill of clean water. Dirt, weld slag, filings, oil, etc. shall be removed and flushed from the system prior to final fill.
- C. All heat transfer equipment (chiller, boilers, etc.) shall be isolated while the field piping is being flushed.
- D. For the initial flush Contractor shall meter and fill system with high quality water and Trisodium Phosphate (TSP). Water shall contain less than 100ppm  $\text{CaCO}_3$  hardness and less than 50ppm chloride plus sulfate ions. Blended solution shall have a concentration of 5 pounds TSP per 50 gallons water. Circulate this blended solution for 8-12 hours.
- E. Drain the system of TSP solution. Open the isolation valves to all heat transfer equipment. Using a meter refill, fill the system with high quality water.
- F. Final flush shall be drained and metered. Contractor shall flush all excess water out of the system. Drain all low "pockets".

3.6 HOT WATER FILL PREPARATION

- A. Contractor shall compare the final flush with the initial flush and identify how much water is trapped in the system. Contractor shall calculate the volume required for final operating specified concentration for the system.
- B. The system pump shall be turned on for a few minutes valved back to half flow. This action will move most air to the system high points. With the system pump off, the vents shall be opened and the fill pump shall be started again. This procedure shall be repeated a few times and when most of the air is eliminated, the valves shall be open and the system pump shall be run at full flow.



- C. The systems air eliminator shall be used to remove the final amounts of air. Once all the air is removed, the fill pump shall be run until the systems expansion tank is at the proper level and the system is at the proper working pressure.
- D. The water shall be kept circulating through the HOT WATER system at the design pressure. The contractor shall monitor the system pressure to make sure the pressure does not drop. If the pressure does drop, there is a leak in the system.

### 3.7 FILLING THE SYSTEM

- A. Fill the hot water system with the water complete with all inhibitors, buffers, and anti-foam agent as specified.
- B. Contractor shall vent system during fill. The air has to come out of the system to let the fluid in. Before the fill, check to make sure ALL control valves are in the OPEN position. During the fill, periodically check the valves. To ensure no loss of fluid, close them off as the system fills up.
- C. After the system is filled and the air is properly purged, allow the fluid to circulate for 24 hours. Then, pull a sample using the sample kit provided by the manufacturer.
- D. Contractor shall pull a second sample six months after the initial fill, and on the anniversary of the fill. It is recommended these samples are to be sent to the manufacturer for analysis.
- E. The analysis from the manufacturer should list the following for hot water system:
  - 1. pH, Color, Clarity
  - 2. Reserve Alkalinity, ml
  - 3. Inhibitors: Ferrous, Copper & Brass Corrosion Products
  - 4. Degradation Products
  - 5. Corrosives
  - 6. Scale Promoters
  - 7. Contaminants
- F. The analysis from the manufacturer should list the following for chilled water system:
  - 1. Concentration, vol %
  - 2. Freeze Point, Degrees F
  - 3. pH, Color, Clarity
  - 4. Reserve Alkalinity, ml
  - 5. Inhibitors: Ferrous, Copper & Brass Corrosion Products
  - 6. Degradation Products
  - 7. Corrosives
  - 8. Scale Promoters
  - 9. Contaminants
- G. Manufacturer report shall be submitted to the Engineer for the inclusion in the building submittal records for distribution to the Owner.

3.8 SYSTEM FILL QUANTITY:

- A. The contractor shall include the proper fill quantity of pre-mixed 30% ethylene glycol in his bid for the chilled water system. The mechanical contractor shall completely fill and vent the system as described in this section and provide 6 barrels of pre-mixed solution for the Owner's stock.

3.9 OWNER TRAINING BY INSTALLING CONTRACTOR

- A. At the completion of the project, the Installing Contractor shall provide training of Owner's staff. Training shall consist of on-site (hands-on) training which will show the location of all devices and the operation of all controls, devices, motors, etc. and maintenance and repair requirements.

END OF SECTION 232500

## SECTION 233100 - DUCTWORK

### PART 1 GENERAL

#### 1.1 WORK INCLUDED

- A. Low pressure (rectangular) ductwork.

#### 1.2 RELATED SECTIONS

- A. Section 23 05 29 - Supports and Anchors: Sleeves.
- B. Section 23 05 53 – Mechanical Identification
- C. Section 23 07 00 - Duct Insulation.

#### 1.3 REFERENCES

- A. ASTM A 36 - Structural Steel.
- B. ASTM A 90 - Weight of Coating on Zinc-Coated (Galvanized) Iron or Steel Articles.
- C. ASTM A 366 - Steel, Sheet, Carbon, Cold Rolled, Commercial Quality.
- D. ASTM A 525 - General Requirements for Steel Sheet, Zinc- Coated (Galvanized) by the Hot-Dip Process.
- E. ASTM A 527 - Steel Sheet, Zinc-Coated (Galvanized) by Hot-Dip Process, Lock Forming Quality.
- F. ASTM B209 - Aluminum and Aluminum-Alloy Sheet and Plate.
- G. AWS D9.1 - Welding of Sheet Metal.
- H. NFPA 90A - Installation of Air Conditioning and Ventilating Systems.
- I. NFPA 91 - Installation of Blower and Exhaust Systems for Dust, Stock and Vapor Removal or Conveying.
- J. NFPA 96 - Installation of Equipment for the Removal of Smoke and Grease-Laden Vapors from Commercial Cooking Equipment.

- K. SMACNA - HVAC Air Duct Leakage Test Manual.
- L. SMACNA - HVAC Duct Construction Standards - Metal and Flexible.
- M. UL 181 - Factory-Made Air Ducts and Connectors.

#### 1.4 PERFORMANCE REQUIREMENTS

- A. No variation of duct configuration or sizes permitted except by written permission. Size round ducts installed in place of rectangular ducts in accordance with ASHRAE table of equivalent rectangular and round ducts.

#### 1.5 REGULATORY REQUIREMENTS

- A. Construct ductwork to N.F.P.A. 90A standards.
- B. Conform to International Mechanical Code 2012.

#### 1.6 SUBMITTALS

- A. Submit under provisions of the General Requirements.
- B. Shop Drawings: Submit one-quarter inch shop drawing layouts of all ductwork systems prior to fabrication. Drawings are to be coordinated with other trades.
- C. Test Reports: Indicate pressure tests performed. Include date, section tested, test pressure, and leakage rate, following SMACNA HVAC Air Duct Leakage Test Manual.

#### 1.7 PROJECT RECORD DOCUMENTS

- A. Submit under provisions of the General Requirements.
- B. Record actual locations of ducts and duct fittings. Record changes in fitting location and type. Show additional fittings used.

#### 1.8 QUALITY ASSURANCE

- A. Perform Work in accordance with SMACNA - HVAC Duct Construction Standards - Metal and Flexible.
- B. Maintain one copy of document on site.

1.9 REGULATORY REQUIREMENTS

- A. Construct ductwork to NFPA 90A standard.

1.10 ENVIRONMENTAL REQUIREMENTS

- A. Do not install duct sealants when temperatures are less than those recommended by sealant manufacturers.
- B. Maintain temperatures during and after installation of duct sealants.

PART 2 PRODUCTS

2.1 MATERIALS

- A. General: Non-combustible or conforming to requirements for Class 1 air duct materials or UL 181.
- B. All exposed ductwork that is to be painted shall be paint grip galvanized steel ductwork. ASTM A527 galvanized steel sheet. Lock forming quality G90 zinc coating in conformance with ASTM A90.
- C. Steel Ducts: ASTM A525 or ASTM A527 galvanized steel sheet, lock-forming quality, having zinc coating of 1.25 oz. per sq.ft. for each side in conformance with ASTM A90.
- D. Stainless Steel Ducts: 316 stainless steel of all welded construction with bolted flanged joints.
- E. Aluminum Ducts: ANSI/ASTM B209; aluminum sheet, alloy 3003-H14. Aluminum Connectors and Bar Stock: Alloy 6061-T6 or of equivalent strength.
- F. Fasteners: Rivets, bolts, duct mate (TM) or sheet metal screws.
- G. Sealant: Non-hardening, water resistant, fire resistive, compatible with mating materials; liquid used alone or with tape or heavy mastic.
- H. Hanger Rod: Steel, galvanized; threaded both ends, threaded one end or continuously threaded.

## 2.2 LOW PRESSURE (RECTANGULAR) DUCTWORK

- A. Fabricate and support in accordance with SMACNA Low Pressure Duct Construction Standards and ASHRAE handbooks, except as indicated. Provide duct material, gauges, reinforcing and sealing for operating pressure indicated.
- B. Construct T's, bends and elbows with radius of not less than 1-1/2 times width of duct on centerline. Where not possible and where rectangular elbows are used, provide air foil turning vanes. Where acoustical lining is indicated, provide turning vanes of perforated metal with glass fiber insulation.
- C. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible. Divergence upstream of equipment shall not exceed 30 degrees; convergence downstream shall not exceed 45 degrees.
- D. Provide easements where low pressure ductwork conflicts with piping and structure. Where easements exceed 10 percent duct area, split into two ducts maintaining original duct area.
- E. Use crimp joints with or without bead for joining round ducts sizes 8 inch and smaller with crimp in direction of air flow.
- F. Use double nuts and lock washers on threaded rod supports.
- G. Seal all joints and fittings throughout the low pressure duct system (supply side) with SMACNA approved sealants. Sealants to have a service temperature range of -30 degrees F. to +175 degrees F.

## PART 3 EXECUTION

### 3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install and seal ducts in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible.
- C. Duct Sizes are inside clear dimensions for lined ducts, maintain sizes inside lining.
- D. Provide openings in ductwork where required to accommodate controllers. Provide pitot tube openings where required for testing of systems, complete with metal can with spring device or screw to ensure against air leakage. Where openings are provided in insulated ductwork, install insulation material inside a metal ring.
- E. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.
- F. Use crimp joints with or without bead for joining round duct sizes 8 inch and smaller with crimp in direction of air flow.

- G. Seal all joints in low pressure ductwork with United duct sealer.
- H. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.

### 3.2 INSTALLATION OF CONTROL PRODUCTS

- A. Install gauges, temperature and pressure sensors and other instrumentation in the locations directed by the BAS contractor.
- B. Failure of this contractor to adequately coordinate his work with the BAS contractor shall not be justification for any request for additional payment.
- C. This contractor shall include the cost of coordinating and installing related BAS components in his bid.

### 3.3 SCHEDULES

#### A. DUCTWORK MATERIAL AND PRESSURE CLASS SCHEDULE

<u>SMACNA Air System</u>	<u>Class</u>	<u>Material Pressure</u>
Low Pressure Supply (Heating and Cooling Systems) Outside Air Intake	Steel	4"
General Exhaust	Steel (Aluminum if indicated on plan)	2" (Negative)

END OF SECTION 233100

## SECTION 233110 - BREECHING, CHIMNEYS AND STACKS

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Fabricated chimney liners
- B. Manufactured double wall vents, positive pressure.

#### 1.2 RELATED SECTIONS

- A. Section 23 50 00 – Fire Tube Boilers.

#### 1.3 REFERENCES

- A. ASTM A167 - Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
- B. ASTM A525 - Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, General Requirements.
- C. ASTM A527 - Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Lock-Forming Quality.
- D. ASTM A569 - Steel, Sheet and Strip, Carbon (0.15 Maximum Percent) Hot-Rolled Commercial Quality.
- E. ASTM C64 - Refractories for Incinerators and Boilers.
- F. NEMA MG1 - Motors and Generators.
- G. NFPA 54 (ANSI Z223.1) - The National Fuel Gas Code.
- H. NFPA 70 - National Electrical Code.
- I. SMACNA - HVAC Duct Construction Standards - Metal and Flexible.
- J. UL 378 - Standard for Draft Equipment.
- K. UL 441 - Standard for Gas Vents.



1.4 DEFINITIONS

- A. Breeching: Vent Connector.
- B. Chimney: Primarily vertical shaft enclosing at least one vent for conducting flue gases outdoors.
- C. Smoke Pipe: Round, single wall vent connector.
- D. Vent: That portion of a venting system designed to convey flue gases directly outdoors from a vent connector or from an appliance when a vent connector is not used.
- E. Vent Connector: That part of a venting system that conducts the flue gases from the flue collar of an appliance to a chimney or vent, and may include a draft control device.

1.5 DESIGN REQUIREMENTS

- A. Factory built vents and chimneys used for venting natural draft appliances shall comply with NFPA 211 and be UL listed and labeled.

1.6 SUBMITTALS FOR REVIEW

- A. Shop Drawings: Indicate general construction, dimensions, weights, support and layout of breechings. Submit layout drawings indicating plan view and elevations where factory built units are used.
- B. Product Data: Provide data indicating factory built chimneys, including dimensional details of components and flue caps, dimensions and weights, electrical characteristics and connection requirements.
- C. Submit manufacturer's installation instructions: Indicate assembly, support details, and connection requirements.

1.7 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum five years documented experience.
- B. Installer Qualifications: Company specializing in performing the work of this section with minimum five years documented experience, approved by manufacturer.

1.8 REGULATORY REQUIREMENTS

- A. Conform to applicable code, NFPA 54 (ANSI Z223.1) code for installation of natural gas burning appliances and equipment.
- B. Products Requiring Electrical Connection: Listed and classified by Underwriters' Laboratories, Inc., as suitable for the purpose specified and indicated.
- C. International Mechanical Code 2012.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Store and protect products under provisions of Division 1 General Requirements.
- B. Deliver and store material in shipping containers with labeling in place.
- C. Contractor shall store all materials shipped to the site in a protected area. If material is stored outside of the building, it must be stored off the ground a minimum of six inches set on 6 x 6 planks and/or wood pallets. All material must be completely covered with waterproof tarps or visquin. All piping will have the ends closed to keep out dirt and other debris. No equipment will be allowed to be stored on the site unless it is sitting on wood planks and is completely protected with weatherproof covers.

1.10 COORDINATION

- A. Coordinate size and location of masonry chimney.

PART 2 - PRODUCTS

2.1 DOUBLE WALL VENTS (POSITIVE PRESSURE)

- A. Manufacturers:
  - 1. Schebler – Model PA.
  - 2. Van Packer – Model DW.
  - 3. AMPCO – Model VSI-II.
  - 4. Metalbestos – Model PS.
  - 5. Metal-Fab – Model PIC.
  - 6. Owner approved equal.
- B. Provide double wall metal stacks, UL listed, for use with building heating equipment, in compliance with NFPA 211.

- C. Fabricate with 1 inch minimum air space between walls. Construct inner jacket of 20 gage ASTM A167 Type 316 stainless steel. Construct outer jacket of aluminum coated steel 24 gage for sizes 10 inches to 24 inches and 20 gage for sizes 28 inches to 48 inches.
- D. Accessories, UL labeled:
  - 1. Ventilated Roof Thimble: Consists of roof penetration, vent flashing with spacers and storm collar.
  - 2. Exit Cone: Consists of inner cone, and outer jacket, to increase stack exit velocity 1.5 times.
  - 3. Stack Cap: Consists of conical rainshield with inverted cone for partial rain protection with low flow resistance.

## 2.2 LISTED CHIMNEY LINERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Schebler Chimney Systems
  - 2. Metalbestos
  - 3. Van-Packer
  - 4. Owner approved equal.
- B. Description: Straight, single-wall chimney liner tested according to UL 641 and rated for 1000 deg F continuously, with positive or negative flue pressure complying with NFPA 211.
- C. Steam Boiler Liner Materials: ASTM A 666, Type 304 stainless steel.
- D. Accessories:
  - 1. Fittings: Tees, elbows, increasers, draft-hood connectors, metal caps with bird barriers, adjustable roof flashings, storm collars, support assemblies, thimbles, firestop spacers, and fasteners; fabricated from similar or compatible materials and designs.
    - a. Termination: Provide round chimney top designed to exclude minimum 98 percent of rainfall. Rain cap shall consist of conical rain shield with inverted cone for rain protection with low flow resistance.
  - 2. Sealant: Manufacturer's standard high-temperature sealant.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with NFPA 54 (ANSI Z223.1).
- C. Install breechings with minimum of joints. Align accurately at connections, with internal surfaces smooth.
- D. Support breechings from building structure, rigidly with suitable ties, braces, hangers and anchors to hold to shape and prevent buckling. Support vertical breechings, chimneys, and stacks at 12 foot spacing, to adjacent structural surfaces, or at floor penetrations. Refer to SMACNA HVAC Duct Construction Standards - Metal and Flexible for equivalent duct support configuration and size.
- E. Install concrete inserts for support of breechings, chimneys, and stacks in coordination with formwork.
- F. Pitch breechings with positive slope up from fuel-fired equipment to chimney or stack.
- G. Assemble and install stack sections in accordance with NFPA 82, industry practices, and in compliance with UL listing. Join sections with acid-resistant joint cement to ASTM C105. Connect base section to foundation using anchor lugs.
- H. Level and plumb chimney and stacks.
- I. Clean breechings, chimneys, and stacks during installation, removing dust and debris.
- J. At appliances, provide slip joints permitting removal of appliances without removal or dismantling of breechings, breeching insulation, chimneys, or stacks.
- K. Provide minimum length of breeching to connect appliance to chimney. Provide Type B chimney continuously from appliances.
- L. Seal between sections of positive-pressure vents according to manufacturer's written installation instructions, using sealants recommended by manufacturer.
- M. All breeching and chimney liners shall be supported and hung using manufacturer's own material. All supports and hangers shall be at intervals as required by flue manufacturer's written instructions to support weight of venting system.
- N. Vertical chimney liner shall be provided with drain connection at lowest point and piped to nearest floor drain.

- O. Slope breechings down in direction of appliance, with condensate drain connection at lowest point piped to nearest floor drain. Follow flue manufacturer's instructions and provide additional drains as required for proper installation.
- P. Erect stacks plumb to finished tolerance of no more than 1 inch out of plumb from top to bottom.
- Q. To maintain single source responsibility for exhaust system warranty, both double wall breeching and chimney liner material shall be of the same manufacturer.

### 3.2 SCHEDULES

A. EQUIPMENT	BREECHING	CHIMNEY/STACK
Boilers	Double Wall	Double Wall Positive Pressure
Stack	Stack Liner	304 SS.

### 3.3 CLEANING

- A. After completing system installation, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finishes.
- B. Clean breechings internally, during and after installation, to remove dust and debris. Clean external surfaces to remove welding slag and mill film. Grind welds smooth and apply touchup finish to match factory or shop finish.
- C. Provide temporary closures at ends of breechings, chimneys, and stacks that are not completed or connected to equipment.

END OF SECTION 233110

## SECTION 233300 - DUCTWORK ACCESSORIES

### PART 1 GENERAL

#### 1.1 WORK INCLUDED

- A. Air turning devices/extractors.
- B. Duct access doors.
- C. Duct test holes.
- D. Flexible duct connections.
- E. Volume control dampers.

#### 1.2 RELATED SECTIONS

- A. Section 23 31 00 - Ductwork.

#### 1.3 REFERENCES

- A. NFPA 90A - Installation of Air Conditioning and Ventilating Systems.
- B. NFPA 70 - National Electrical Code.
- C. SMACNA - HVAC Duct Construction Standards - Metal and Flexible.
- D. UL 33 - Heat Responsive Links for Fire-Protection Service.
- E. UL 555 - Fire Dampers and Ceiling Dampers.
- F. UL 555S - Leakage Rated Dampers for Use in Smoke Control Systems.

#### 1.4 SUBMITTALS

- A. Submit under provisions of the General Requirements.

#### 1.5 PROJECT RECORD DOCUMENTS

- A. Submit under provisions of the General Requirements.

1.6 REGULATORY REQUIREMENTS

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

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of the General Requirements.
- B. Protect dampers from damage to operating linkages and blades.

PART 2 PRODUCTS

2.1 AIR TURNING DEVICES/EXTRACTORS

- B. Multi-blade device with blades aligned in short dimension; steel construction; with individually adjustable blades, mounting straps.

2.2 DUCT ACCESS DOORS

- A. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated.
- B. Fabrication: Rigid and close-fitting of galvanized steel with sealing gaskets and quick fastening locking devices. For insulated ductwork, install minimum one inch thick insulation with sheet metal cover.
  - 1. Less Than 12 Inches Square: Secure with sash locks.
  - 2. Up to 18 Inches Square: Provide two hinges and two sash locks.
  - 3. Up to 24 x 48 Inches: Three hinges and two compression latches with outside and inside handles.
  - 4. Larger Sizes: Provide an additional hinge.
- C. Access doors with sheet metal screw fasteners are not acceptable.

2.3 DUCT TEST HOLES

- A. Temporary Test Holes: Cut or drill in ducts as required. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.
- B. Permanent Test Holes: Factory fabricated, air tight flanged fittings with screw cap. Provide extended neck fittings to clear insulation.

## 2.4 FLEXIBLE DUCT CONNECTIONS

- A. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated.
- B. Connector: Fabric crimped into metal edging strip.
  - 1. Fabric: UL listed fire-retardant neoprene coated woven glass fiber fabric to NFPA 90A, minimum density 30 oz per sq yd.
  - 2. Net Fabric Width: Approximately 3 inches wide.
- C. Lead Vinyl Sheet: Minimum 0.55 inch thick, 0.87 lbs per sq ft, 10 dB attenuation in 10 to 10,000 Hz range.

## 2.5 VOLUME CONTROL DAMPERS

- A. Manufacturers:
  - 1. Ruskin.
  - 2. Air Balance.
  - 3. Vent Products.
  - 4. Owner Approved Equal.
- B. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible and as indicated.
- C. Single Blade Dampers: Fabricate for duct sizes up to 6 x 30 inch.
- D. Multi-Blade Damper: Fabricate of opposed blade pattern with maximum blade sizes 4 x 72". Assemble center and edge crimped blades in prime coated or galvanized channel frame with suitable hardware.
- E. End Bearings: Except in round ductwork 12 inches and smaller, provide end bearings. On multiple blade dampers, provide oil-impregnated nylon or sintered bronze bearings.
- F. Quadrants:
  - 1. Provide locking, indicating quadrant regulators on single and multi-blade dampers.
  - 2. On insulated ducts mount quadrant regulators on stand-off mounting brackets, bases, or adapters.
  - 3. Where rod lengths exceed 30 inches provide regulator at both ends.



## PART 3 EXECUTION

### 3.1 INSTALLATION

- A. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA HVAC Duct Construction Standards - Metal and Flexible. Refer to Section 23 31 00 for duct construction and pressure class.
- B. Provide duct access doors for inspection and cleaning before and after filters, coils, fans, automatic dampers, at fire dampers, and elsewhere as indicated. Provide minimum 8 x 8 inch size for hand access, 18 x 18 inch size for shoulder access, and as indicated.
- C. Provide duct test holes where indicated and required for testing and balancing purposes.
- D. Provide flexible connections immediately adjacent to equipment in ducts associated with all fans and motorized equipment, and supported by vibration isolators.
- E. Provide balancing dampers at points on supply, return, and exhaust systems where branches are taken from larger ducts as required for air balancing. Install minimum 2 duct widths from duct take-off.
- F. Provide balancing dampers on duct take-off to diffusers, grilles, and registers, regardless of whether dampers are specified as part of the diffuser, grille, or register assembly.
- G. Install automatic control dampers provided by BAS contractor in the locations indicated on the floor plans.
- H. Manual balancing dampers shall be multi blade type for any duct where the dimension perpendicular to the damper blades is greater than 14".

### 3.2 INSTALLATION OF CONTROL PRODUCTS

- A. Install valves, temperature and pressure sensors and other instrumentation in the locations directed by the BAS contractor.
- B. Install BAS valves and sensors in the locations shown on the plans.
- C. Failure of this contractor to adequately coordinate his work with the BAS contractor shall not be justification for any request for additional payment.
- D. This contractor shall include the cost of coordinating and installing related BAS components in his bid.

END OF SECTION 233300

## SECTION 233400 - BREECHING, CHIMNEYS AND STACKS

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Fabricated breechings.
- B. Type B gas vents.
- C. Manufactured double wall vents, positive pressure.

#### 1.2 RELATED SECTIONS

- A. Section 23 50 00 – Fire Tube Boilers.

#### 1.3 REFERENCES

- A. ASTM A167 - Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
- B. ASTM A525 - Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, General Requirements.
- C. ASTM A527 - Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Lock-Forming Quality.
- D. ASTM A569 - Steel, Sheet and Strip, Carbon (0.15 Maximum Percent) Hot-Rolled Commercial Quality.
- E. ASTM C64 - Refractories for Incinerators and Boilers.
- F. NEMA MG1 - Motors and Generators.
- G. NFPA 54 (ANSI Z223.1) - The National Fuel Gas Code.
- H. NFPA 70 - National Electrical Code.
- I. SMACNA - HVAC Duct Construction Standards - Metal and Flexible.
- J. UL 378 - Standard for Draft Equipment.
- K. UL 441 - Standard for Gas Vents.

1.4 DEFINITIONS

- A. Breeching: Vent Connector.
- B. Chimney: Primarily vertical shaft enclosing at least one vent for conducting flue gases outdoors.
- C. Smoke Pipe: Round, single wall vent connector.
- D. Vent: That portion of a venting system designed to convey flue gases directly outdoors from a vent connector or from an appliance when a vent connector is not used.
- E. Vent Connector: That part of a venting system that conducts the flue gases from the flue collar of an appliance to a chimney or vent, and may include a draft control device.

1.5 DESIGN REQUIREMENTS

- A. Factory built vents and chimneys used for venting natural draft appliances shall comply with NFPA 211 and be UL listed and labeled.

1.6 SUBMITTALS FOR REVIEW

- A. Shop Drawings: Indicate general construction, dimensions, weights, support and layout of breechings. Submit layout drawings indicating plan view and elevations where factory built units are used.
- B. Product Data: Provide data indicating factory built chimneys, including dimensional details of components and flue caps, dimensions and weights, electrical characteristics and connection requirements.
- C. Submit manufacturer's installation instructions: Indicate assembly, support details, and connection requirements.

1.7 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum five years documented experience.
- B. Installer Qualifications: Company specializing in performing the work of this section with minimum five years documented experience, approved by manufacturer.

1.8 REGULATORY REQUIREMENTS

- A. Conform to applicable code, NFPA 54 (ANSI Z223.1) code for installation of natural gas burning appliances and equipment.
- B. Products Requiring Electrical Connection: Listed and classified by Underwriters' Laboratories, Inc., as suitable for the purpose specified and indicated.
- C. International Mechanical Code 2012.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Store and protect products under provisions of Division 1 General Requirements.
- B. Deliver and store material in shipping containers with labeling in place.
- C. Contractor shall store all materials shipped to the site in a protected area. If material is stored outside of the building, it must be stored off the ground a minimum of six inches set on 6 x 6 planks and/or wood pallets. All material must be completely covered with waterproof tarps or visquin. All piping will have the ends closed to keep out dirt and other debris. No equipment will be allowed to be stored on the site unless it is sitting on wood planks and is completely protected with weatherproof covers.

PART 2 - PRODUCTS

2.1 DOUBLE WALL VENTS (POSITIVE PRESSURE)

- A. Manufacturers:
  - 1. Schebler – Model PA.
  - 2. Van Packer – Model DW.
  - 3. AMPCO – Model VSI-II.
  - 4. Metalbestos – Model PS.
  - 5. Metal-Fab – Model PIC.
  - 6. Owner approved equal.
- B. Provide double wall metal stacks, UL listed, for use with building heating equipment, in compliance with NFPA 211.
- C. Fabricate with 1 inch minimum air space between walls. Construct inner jacket of 20 gage ASTM A167 Type 316 stainless steel. Construct outer jacket of aluminum coated steel 24 gage for sizes 10 inches to 24 inches and 20 gage for sizes 28 inches to 48 inches.

D. Accessories, UL labeled:

1. Ventilated Roof Thimble: Consists of roof penetration, vent flashing with spacers and storm collar.
2. Exit Cone: Consists of inner cone, and outer jacket, to increase stack exit velocity 1.5 times.
3. Stack Cap: Consists of conical rainshield with inverted cone for partial rain protection with low flow resistance.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with NFPA 54 (ANSI Z223.1).
- C. Install breechings with minimum of joints. Align accurately at connections, with internal surfaces smooth.
- D. Support breechings from building structure, rigidly with suitable ties, braces, hangers and anchors to hold to shape and prevent buckling. Support vertical breechings, chimneys, and stacks at 12 foot spacing, to adjacent structural surfaces, or at floor penetrations. Refer to SMACNA HVAC Duct Construction Standards - Metal and Flexible for equivalent duct support configuration and size.
- E. Install concrete inserts for support of breechings, chimneys, and stacks in coordination with formwork.
- F. Pitch breechings with positive slope up from fuel-fired equipment to chimney or stack.
- G. For Type B double wall gas vents, maintain UL listed minimum clearances from combustibles. Assemble pipe and accessories as required for complete installation.
- H. Install vent dampers, where applicable, locating close to draft hood collar, and secured to breeching.
- I. Assemble and install stack sections in accordance with NFPA 82, industry practices, and in compliance with UL listing. Join sections with acid-resistant joint cement to ASTM C105. Connect base section to foundation using anchor lugs.

- J. Level and plumb chimney and stacks.
- K. Clean breechings, chimneys, and stacks during installation, removing dust and debris.
- L. At appliances, provide slip joints permitting removal of appliances without removal or dismantling of breechings, breeching insulation, chimneys, or stacks.
- M. Provide minimum length of breeching to connect appliance to chimney. Provide Type B chimney continuously from appliances.

3.2 SCHEDULES

A. EQUIPMENT	BREECHING	CHIMNEY/STACK
Boilers	Double Wall	Double Wall Positive Pressure

END OF SECTION 2334000

## SECTION 234000 - AIR CLEANING DEVICES

### PART 1 GENERAL

#### 1.1 SECTION INCLUDES

- A. Disposable panel filters.

#### 1.2 REFERENCES

- A. ARI 850 - Commercial and Industrial Air Filter Equipment.
- B. ASHRAE 52 - Method of Testing Air Cleaning Devices Used in General Ventilation for Removing Particulate Matter.
- C. UL 900 - Test Performance of Air Filter Units.

#### 1.3 PERFORMANCE TOLERANCES

- A. Conform to ARI 850 Section 7.4.
- B. Dust Spot Efficiency: Plus or minus 5 percent.

#### 1.4 SUBMITTALS

- A. Submit under provisions of the general conditions and general requirements of the contract.
- B. Shop Drawings: Indicate filter assembly and filter frames, dimensions, motor locations, and electrical characteristics and connection requirements.
- C. Product Data: Provide data on filter media, filter performance data, filter assembly and filter frames, dimensions, motor locations and electrical characteristics and connection requirements.
- D. Manufacturer's Installation Instructions: Indicate assembly and change-out procedures.

#### 1.5 OPERATION AND MAINTENANCE DATA

- A. Submit under provisions of the general conditions and general requirements of the contract.
- B. Operation and Maintenance Data: Include instructions for operation, changing, and periodic cleaning.

1.6 EXTRA MATERIALS

A. Panel Filters:

1. Provide one set of construction filters
2. Provide one set of additional filters for occupancy.
3. Provide two sets of attic stock filters.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. PANEL FILTERS

1. American Air Filter.
2. Tri-Dem.
3. Farr.
4. Cambridge
5. Owner approved equal.

2.2 DISPOSABLE PANEL FILTERS FOR UNIT VENTILATORS

A. Media: UL 900 Class 2, fiber blanket, factory sprayed with flameproof, non-drip, non-volatile adhesive, Merv 8.

1. Nominal Size: Per CUV Recommendations.
2. Thickness: 2 inch.

B. Performance Rating:

1. Face Velocity: 500 FPM.
2. Initial Resistance: 0.15 inch WG.
3. Recommended Final Resistance: 0.35 inches WG.

C. Casing: Cardboard frame with perforated metal retainer.



## PART 3 EXECUTION

### 3.1 FIELD INSTALLATION

- A. Install air-cleaning devices in accordance with manufacturer's instructions.
- B. Pleated Filters Only: Install filter gage static pressure tips upstream and downstream of filters. Mount filter gages on outside of filter housing or filter plenum, in accessible position. Adjust and level.
- C. Do not operate fan system until filters (temporary and permanent) are in place. Pleated Filters Only: Replace temporary filters used during construction and testing, and replace with clean set.
- D. Provide filter gages on filter banks, installed with separate static pressure tips upstream and downstream of filters.
- E. All equipment being installed under this contract that utilizes air filter shall have new filter of this type furnished and installed after start-up. Provide an extra set of filters (attic stock) for each of the following:
  - 1. Classroom Unit Ventilators (CUV)

END OF SECTION 234000

## SECTION 235000 - FIRE-TUBE BOILERS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes packaged, factory-fabricated and assembled, gas fired, **horizontal Compact fire-box**, fire-tube boilers, trim, and accessories for generating low pressure **steam**.

#### 1.3 SUBMITTALS

- A. Product Data: Include performance data, operating characteristics, furnished specialties, and accessories.
  - 1. Include rating and data information for boiler as it pertains to: total square feet of fireside heating surface (sq. ft.), boiler horsepower, cubic feet of furnace volume, and minimum heat release of furnace in MBH/Cu. Ft.
  - 2. Submit manufacturer's installation instructions
- B. Shop Drawings: For boilers, boiler trim, and accessories. Include plans, elevations, sections, details, and attachments to other Work.
  - 1. Contractor shall review all shop drawings prior to submitting them Architect/Engineer's review. Contractor shall stamp each shop drawing to certify that he has reviewed it. Engineer will not check any shop drawing that contractor has not stamped with his review certification.
  - 2. Design Calculations: Calculate requirements for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.
  - 3. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment.
  - 4. Wiring Diagrams: Detail power, signal, and control wiring for all boiler, burner, and associated safety devices and ancillary equipment.
- C. Source quality-control test reports.
- D. Submit documentation that the start up and warranty service will be performed by an authorized factory trained and certified technician for both the boiler and burner manufacturer.
- E. Startup service reports.

- F. Operation and Maintenance Data: For fire-tube boilers to include in emergency, operation, and maintenance manuals. Include manufacturer's descriptive literature, operating instructions, cleaning procedures, replacement parts list and maintenance and repair data.
- G. Warranties: Special warranties specified in this Section.

#### 1.4 QUALITY ASSURANCE

- A. Product Options: Drawings indicate size, profiles, and dimensional requirements of fire-tube boilers and are based on the specific system indicated. Refer to Division 1 Section "Product Requirements."
- 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. ASME Compliance: Fabricate and label fire-tube boilers to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
- D. ASHRAE/IESNA 90.1 Compliance: Fire-tube boilers shall have minimum efficiency according to Table 10-8.
- E. UL Compliance: Test fire-tube boilers to comply with UL 795, "Commercial-Industrial Gas Heating Equipment."
- F. Manufacturer: Company specializing in manufacturing the products specified in this Section with a minimum of ten years documented experience.

#### 1.5 COORDINATION

- A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 3.

#### 1.6 WARRANTY

- A. All equipment specified in this Section shall be provided with a one year manufacturer's non-prorated warranty. This warranty shall include all parts and all labor to repair or replace at the owner's discretion.
  - 1. Warranty service shall be performed by the boiler representatives own factory trained and certified technician to ensure sole source responsibility.
- B. Horizontal Fire-Tube Boiler Performance-Efficiency Guarantee:
  - 1. In the operating range from 20 to 100 percent, boiler efficiency shall be a minimum of 83.3%.
  - 2. Guarantee Period: Begins at completion of startup service.

## PART 2 - PRODUCTS

### 2.1 STEEL FIRETUBE BOILER MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply for product selection:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, and are limited to, the manufacturers specified herein.
2. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

### 2.2 FIRE-TUBE BOILERS

A. Acceptable Manufacturers:

1. Burnham Commercial, Inc.
2. Cleaver Brooks Boilers
3. Hurst Boiler & Welding Co.
4. As approved by Owner.

B. Description: Factory-fabricated, assembled, and tested fire-tube boilers with heat exchanger sealed pressure-tight, built on a steel base; including insulated jacket, flue-gas vent, steam supply and water return connections, and controls.

C. Fabricate base and attachment to pressure vessel with reinforcement strong enough to resist boiler movement during a seismic event when boiler base is anchored to building structure.

D. Boiler Characteristics and Capacities:

1. Heating Medium: Steam.
2. Maximum Design Pressure Rating: 15 psig.
3. Operating Pressure: 10 psig
4. Minimum Efficiency @ 25% rate: 84.4%
5. Minimum Efficiency @ 50% rate: 84.3%
6. Minimum Efficiency @ 75% rate: 83.9%
7. Minimum Efficiency @ 100% rate: 83.3%
8. Number of Passes: Three
9. Maximum Size: Boiler must fit through a 60" x 80" doorway opening to allow for access to mechanical room.

E. Pressure Vessel Design: Straight steel tubes rolled into steel headers. Three passes with partial wet-back firebox design with arched upright crown sheet and two passes of firetubes. Hot gas rear reversing chamber shall have water-cooled side walls and light weight target wall: use of cast refractory will not be permitted. Boiler shall be manufactured in strict accordance with ASME and Pressure Vessel Code, Section IV for 15# steam. Vessel design shall include the following features and accessories:

1. Tube Size and Thickness: Construct boiler using a minimum of 2" tubes which shall be roller expanded at each end and flared into tube sheets. Tubes shall minimum thickness of .095" wall thickness.
2. Feedwater diffuser
3. Steel turbulators.
4. Minimum of two lifting lugs on top of boiler.
5. Minimum NPS 1 hose-end drain valves at shell low point.
6. Accessible drain and blowdown tapings, both high and low, for surface and mud removal.
7. Tapings for steam supply, makeup, level controls, and chemical treatment.
8. Rear combustion chamber access door with observation port.
9. Flanged steam supply.
10. Front smokebox condensate drain.
11. Bolt on front and rear flue doors.
12. Removable gas tight bolted-on rear smokebox with top flue outlet.
13. Built-in dry pan under flanged supply opening.
14. Boilers shall be built so that may be easily converted to hot water units in the future. Provide four separate 3/4" NPT connections in pressure vessel shell to accommodate future aquastat immersion wells and pressure/temperature gauge. Boiler shall also be supplied with a 4" NPT connection located on top centerline of vessel for use as a future return water connection. All future water connections shall be capped at factory.

F. Combustion Chamber: Welded steel, water-leg design with refractory insulation poured in the floor. Supply with front and rear flame observation ports.

G. Casing:

1. Insulation: Minimum 2-inch-thick mineral-fiber insulation or 1" high density insulation surrounding the boiler shell.
2. Insulated removable rear smoke box.
3. Jacket: Sheet metal, with screw-fastened closures and enamel powder-coated protective finish.

## 2.3 FORCED-DRAFT GAS BURNER

A. Burner: Boiler(s) shall be supplied with a forced draft full modulating gas burner as manufactured by one of the following provided product meets all criteria of specification:

1. Power Flame, Inc
2. Riello
3. Weishaupt Corporation

- B. Blower: All combustion air shall be furnished by the burner fan, which shall be an integral part of the burner. Burner shall be equipped with a system of interconnected and interlocked controls to synchronize the fuel without objectionable vibration, noise or pulsation with not more than 15% excess air and no CO in the products of combustion. The fan shall be directly driven by motor: with adjustable, dual-blade reverse acting air damper assembly having blade seals to eliminate draft through boiler when burner is off.
1. Provide High Efficiency TEFC motor
  2. Motor H.P.: 1 1/2
  3. RPM: 3450.
  4. Electrical Characteristics: 208 Volt, 3 phase, 60 Hz.
- C. Fuel/Air Ratio Control: Fuel/Air ratio control of burner shall be controlled by a servo motors that accept a 4-20ma signal from PID controller in burner panel. All air and fuel control shall be by direct driven motors to guarantee maximum combustion efficiencies. Burners utilizing jack shafts or mechanical linkages of any kind are not acceptable.
- D. Gas Train: Control devices and modulating control sequence shall comply with requirements of UL, FM, CSD-1, and State of Illinois School Code. Gas trains shall be sized appropriately to fire burners at boilers rated capacity based on low available gas pressure at job site. Gas train shall be factory piped, pressure tested, and wired at manufacturer and at a minimum gas train shall include:
1. Tight shut-off type Main gas pressure regulator rated to accept up to 2# psi inlet gas pressure.
  2. Tight shut-off type Pilot gas pressure regulator rated to accept up to 2# psi inlet gas pressure.
  3. Pilot shut-off valve and pilot solenoid valve.
  4. Modulating gas control butterfly valve.
  5. Two lubricated plug type main gas shut-off valves.
  6. One gas pressure gauge on burner manifold, 0-35" w.c.
  7. Safety motorized gas valve with proof of closure.
  8. Secondary motorized safety gas valve
  9. Leak test cocks before and after all gas valves
  10. High gas pressure switch
  11. Low gas pressure switch
- E. Pilot: Intermittent electric-spark pilot ignition with 100 percent main-valve and pilot-safety shutoff with electronic supervision of burner flame.
- F. Building Management System Interface: Factory-installed hardware to enable building automation system (BAS) to monitor and control boiler **steam pressure** and display boiler status and alarms via BACnet communications protocol.

## 2.4 STEAM BOILER TRIM

- A. Include devices sized to comply with ANSI B31.9, "Building Services Piping."
- B. Pressure Controllers: Operating 0-15# pressuretrol for use as safety backup to PID controller. Control to be mounted on siphon.
- C. High Pressure Cutoff: Manual reset stops burner if operating conditions rise above maximum boiler design pressure. Control to be mounted on siphon.
- D. Low-Water Cutoff & Pump controller: Combination low water cut-off and pump controller (float type) shall energize feedwater pump on water level drop and shut down burner on low water condition. Cutoff switch shall be automatic reset type.
- E. Auxiliary Low water cut-off (float type) with manual reset.
- F. Pressure Transducer: Modulating Firing Rate Controller.
- G. Fuse Link Switch: Provide loose a high ambient air temperature cut-off switch for installation above each boiler/burner unit by Building Automation Contractor.
- H. Emergency Fuel Shut-off Switch: Provide loose a red emergency switch plate cover for installation at boiler room door by Building Automation Contractor.
- I. Flue Brush: Provide flue brush and handle for each boiler supplied.
- J. Stack thermometer: Provide 5" dial (150 F. to 750 F.) back mount thermometer in 1/2" NPT threaded connection on boiler flue outlet box.
- K. Safety Relief Valve:
  - 1. Size and Capacity: As required for equipment according to ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
    - a. Pressure Setting: 15 **psig** .
    - b. A minimum of two full size valves required per boiler with independent connections in boiler shell.
  - 2. Bronze Safety Valves: Class 250, forged copper-alloy disc; fully enclosed steel spring with adjustable pressure range and positive shutoff; factory set and sealed.
    - a. Drip-Pan Elbow: Cast iron and having threaded inlet and outlet with threads complying with ASME B1.20.1.
- L. Compound Pressure Gage: Minimum 6" diameter, -30 -0- 30-psig range.
- M. Water Column: Minimum 12-inch glass gage with shutoff cocks.
- N. Drain Valves: Minimum NPS 3/4 or nozzle size with hose-end connection.

- O. Surface Blowoff: Boiler shall be supplied with a internal perforated skimmer tube that is piped to a metering valve and isolating ball valve.
- P. Blowdown Valves: Factory-installed bottom and surface, slow-acting blowdown valves same size as boiler connection. Blowdown valves shall be combination of slow and quick acting as required by ANSI B31.1.

## 2.5 BURNER CONTROL PANEL

- A. Description: Unless indicated otherwise on plan drawings, boiler shall have a factory pre-wired and burner mounted NEMA 12 control panel. Supply control panel with gasketed door having key lock and window for viewing programmer display. The panel shall house flame safeguard control, main start switch, magnetic motor starter with overload protection, control step-down transformer, control fuse, angled terminal strip, necessary relays, alarm bell, signal lamps, as well as other required devices as detailed herein.
  - 1. Flame Safeguard management system with annunciator display module
  - 2. Fuel/Air ratio controller with display and load controller flush mounted on control panel so that both are easily readable with keypads accessible to operating personal.
  - 3. Modbus communications module
  - 4. Indicating lights for; Power On, Call For Heat, Ignition On, Fuel Valve Open, & Low Water Condition.
  - 5. Alarm Bell: Factory mounted (minimum 4" diameter) on control panel with silence switch.
  - 6. Potentiometer with "Auto-Manual" override switch for control of firing rate
  - 7. Remote-Local switch to work in conjunction with standalone multiple boiler sequencing panel. In local position, burner mounted firing rate controller dictates burner firing rate. In remote position, boiler sequencing panel controls firing rate.
  - 8. Relay and dry contact for combustion air damper interlock.
  - 9. Relay and dry contacts to send boiler alarm to both standalone boiler sequence panel and BAS.
  - 10. Relay and dry contacts for remote Enable & Disable of boiler.
  - 11. Dry contacts for fuse link and emergency door switch.

## 2.6 BURNER OPERATING CONTROLS

- A. Description: To maintain safe operating conditions, burner safety controls limit the operation of burner. Microprocessor-based control system integrates safety and operating controls.
  - 1. PID microprocessor based combination operator and modulating controller having internal 24 VDC power supply to power transducer with 4-20ma-output temperature sensor. Controller shall be UL listed with applicable forced draft combustion burner and shall include:
    - a. Internal 24 VDC power supply to power transducer.
    - b. Scalable analogue input.
    - c. Lockable high and low pressure set points to ensure that the boiler supply pressure can never be adjusted outside acceptable range.



- d. Analogue input for outdoor temperature sensor
- e. Low fire hold capability
- f. Configurable alarm contact
- g. Bright and highly visible display of actual boiler steam pressure and on/off set point.
- h. 4-20ma modulating output
- i. PID optimization through devices own "Auto Tune" capability
- j. Dual set points for night setback
- k. 3 levels of access locking

## 2.7 MULTIPLE BOILER SEQUENCING CONTROL

- A. Provide with boilers a standalone sequencing control system to stage and control firing rate of the boilers. Acceptable manufacturers meeting all requirements set forth herein include: Autoflame, Cleaver Brooks Hawk, Etter Boilerworx FMA-3, and Synex Controls ModSync.
- B. Sequencing Control System will be a microprocessor based Programmable Logic Controller with a Graphical User Interface and Touch Screen capabilities. Active display area shall be a minimum of 4.7" with a display resolution of 320 x 240 pixels. Multiple Status and Configuration Screens shall be available for easy interpretation of the steam loop status and configuration. The sequencing control system shall have a NEMA 4X construction enclosure. Power required shall be 120/60/1.
- C. The sequencing panel shall stage the boilers based on a PID generated value. The Proportional, Integral and Derivative values shall be user defined through the Lead/Lag Configuration Screen. Each boiler stage will be enabled based on a user defined "Percentage from Setpoint" control variable. Boiler Sequencing Start and Stop parameters shall be user defined through the operator interface. A Manual Reset parameter will be provided to allow the Proportional Band to be shifted around setpoint.
- D. The panel shall monitor the steam header pressure using a pressure transducer. A PID Control Variable shall determine when the steam boilers will begin sequencing based on the difference between the actual header pressure and the steam pressure setpoint.
- E. When a request for steam is determined by the sequencing panel, the Lead Steam Boiler shall be energized. The initial firing rate is determined by the Lead Start Firing Rate variable set in the Lead/Lag configuration section.
- F. If the steam pressure continues to decrease, the PID Control Variable will increase. The Lead Steam boiler's firing rate will reach 100% before the Lag Start CV value programmed. The sequencing panel shall enable a Lag Boiler when the Lag Boiler Start control variable value has been reached.
- G. If additional steam is required, the sequencer control shall enable each additional Lag Boiler stage determined by the Lag Stage Start CV value. Each Lag Stage will reach a 100% firing rate before the next stage is enabled.

- H. As the steam pressure increases, the panel shall begin to decrease the firing rate and number of Steam boilers required to maintain the steam pressure. The Lead Boiler is disabled when the steam pressure reaches a selectable value referenced around the steam header setpoint.
- I. Programmable panel shall have the ability for user to control boilers in parallel should job conditions warrant.
- J. The Sequencing Controller shall include automatic rotation of the lead boiler based on a user configured cycle count.
- K. The Sequencing controller shall have the ability to communicate to a Building Automation System using Modbus (RS-485) or accept a 4-20mA Remote Setpoint signal. In addition a BacNet communications gateway shall be provided for connection to BAS.
- L. Multiple setback schedules shall be available based on whether Normal or Setback mode is active. Mode selection shall be determined by a user defined Time of Day / Day of Week Touchscreen entry. The System Mode will automatically change between Normal and Setback based on the user programmed day and times. Manual Building Mode control shall also be available via a Setup menu. System Mode shall be indicated on the Loop Status Screen for ease of reference.
- M. The Sequencing Control System shall provide alarm annunciation of each Boiler connected. Panel shall automatically adjust the boiler sequencing schedule and remove the boiler from the sequencing logic if an alarm occurs. The boiler shall automatically be added back into the rotation loop as soon as the panel senses that the alarm has been cleared.
- N. The boiler sequencing panel will include an Alarm History screen that allows for the last 100 alarm conditions to be viewed. A Date/Time stamp and text description of each alarm condition in the history will be available
- O. The panel shall provide capabilities to Enable/Disable the boilers through the operator interface. Boilers that are disabled will not be included in the sequencing logic.
- P. To decrease cycling of the boilers when steam load is close to being met, a user defined time delay parameter shall be provided that delays enabling of the next boiler stage.
- Q. A user-defined Outdoor Temperature Disable parameter shall be provided to disable the steam boilers if a predetermined outdoor temperature is reached. A hysteresis variable will prevent the boilers from re-enabling until the outdoor temperature decreases a user-defined amount.
- R. Necessary steam header and outdoor temperature sensors shall be supplied with the panel.
- S. The boiler sequencing system shall have the ability for the internal control logic to be field-modified to meet system design changes that may arise during commissioning of the steam plant or future system conversion to hot water. The control logic shall be field adjustable through a downloadable, freely distributed software package that does not require a licensing fee.

## 2.8 SOURCE QUALITY CONTROL

- A. Test and inspect factory-assembled boilers, before shipping, according to ASME Boiler and Pressure Vessel Code: Section I, for high-pressure boilers and Section IV, for low-pressure boilers.
- B. Burner and Hydrostatic Test: Factory adjust burner to eliminate excess oxygen, carbon dioxide, oxides of nitrogen, and carbon monoxide in flue gas and to achieve combustion efficiency; perform hydrostatic test.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Before boiler installation, examine roughing-in for concrete equipment bases, anchor-bolt sizes and locations, and piping and electrical connections to verify actual locations, sizes, and other conditions affecting boiler performance, maintenance, and operations.
  - 1. Final boiler locations indicated on Drawings are approximate. Determine exact locations before roughing-in for piping and electrical connections.
- B. Examine mechanical spaces for suitable conditions where boilers will be installed. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 BOILER INSTALLATION

- A. Install boilers level on concrete base.
- B. Concrete Bases: Anchor boilers to concrete base.
  - 1. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around full perimeter of base.
  - 2. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
  - 3. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
  - 4. Install anchor bolts to elevations required for proper attachment to supported equipment.
  - 5. Cast-in-place concrete materials and placement requirements are specified in front end.
- C. Install gas-fired boilers according to NFPA 54.
- D. Assemble and install boiler trim.
- E. Install electrical devices furnished with boiler but not specified to be factory mounted.

### 3.3 CONNECTIONS

- A. Piping installation requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect gas piping full size to boiler gas-train inlet with union.
- C. Connect steam and condensate piping to supply-, return-, and blowdown-boiler tapings with shutoff valve and union or flange at each connection.
- D. Install piping from safety valves to drip-pan elbow, to steam vent and to nearest floor drain. See drawings for detail.
- E. Connect breeching full size to boiler outlet. **Refer to Section 23 31 10 "Breechings, Chimneys, and Stacks" for venting materials.**
- F. Install piping adjacent to boiler to allow service and maintenance.
- G. Ground equipment according to Section 26 05 26 "Grounding and Bonding."
- H. Connect wiring according to Division 23 Sections.
- I. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

### 3.4 STARTUP SERVICE

- A. Engage a factory-authorized service representative to test, inspect, and adjust boiler components and equipment installation and to perform startup service.
- B. Perform installation and startup checks according to manufacturer's written instructions.
- C. Boil-off and flush boilers as required by manufacturer.
- D. Leak Test: Hydrostatic test. Repair leaks and retest until no leaks exist.
- E. Operational Test: Start units to confirm proper motor rotation and unit operation. Adjust air-fuel ratio and combustion.
- F. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- G. Adjust initial temperature/pressure set points.
- H. Set field-adjustable switches and circuit-breaker trip ranges as indicated.

- I. 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 two visits to site outside normal occupancy hours for this purpose, without additional cost.
- J. The boiler-burner manufacturer's representative, upon completion and start up of the system shall submit to the Owner a written certified report that the installation of the complete system is in accordance with the specification and that the boilers are in proper operating condition. The report shall also document all combustion testing results over a minimum of four separate points across the modulating firing range of the burner. Combustion analysis report shall include:
  1. Boiler & Burner models with corresponding serial number for future reference
  2. Start Up Date
  3. Name of factory trained and authorized service technician performing work
  4. Voltage output of ultra violet flame scanner
  5. Burner manifold pressure
  6. Stack temperature
  7. Boiler combustion chamber pressure
  8. Gas Pressure
  9. Supply water temperature
  10. Combustion Efficiency
  11. Excess Oxygen
  12. Carbon dioxide
  13. Oxides of nitrogen
  14. Carbon monoxide
  15. Draft at boiler flue outlet

### 3.5 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain fire-tube boilers. Refer to Front End Specifications.

END OF SECTION 235000

## SECTION 235010 - FEEDWATER/CONDENSATE RETURN SYSTEM

### PART 1 – GENERAL

#### 1.1 WORK INCLUDES

- A. The work to be performed includes all new equipment, labor, and materials required to furnish and install a Horizontal Feedwater/Return System (hereinafter referred to as “return systems”) as described in this product guide specification.

#### 1.2 REFERENCES

- A. ASME
- B. UL-508A
- C. National Electrical Code (NEC)

#### 1.3 SUBMITTALS

- A. Product Data: Submit manufacturer’s technical product data, including rated capacities of selected model, weights (shipping, installed and operating), installation and start-up instructions, and furnished accessory information.
- B. Shop Drawings: Submit manufacturer’s end assembly drawings indicating dimensions, connection locations, and clearance requirements.
- C. Wiring Diagrams: Submit applicable manufacturer’s electrical requirements for the return system including ladder type wiring diagrams for interlock and control wiring. Clearly differentiate between portions of wiring that are factory installed and portions to be field installed.
- D. Instructions for installation, operation and maintenance of the return system shall be contained in a manual provided with each unit.
- E. A wiring diagram corresponding to the return system configuration shall be included with each unit.

#### 1.4 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Firms regularly engaged in the manufacture of Return Systems with steel tanks/pressure vessels, whose products have been in satisfactory use in service for not less than twenty (20) years. The manufacturer must be a privately owned, American company. The Return Systems must be manufactured in the USA and be able to participate in projects that require a level of USA content of Return Systems materials. The specifying engineer, contractor and end customer must have the option to visit the factory during the manufacture of the Return Systems and be able to witness testing and other relevant procedures.
- B. The entire Return system and its installation shall conform to the manufacturer's instructions and applicable codes.
- C. The equipment shall be in strict compliance with the requirements of this specification and shall be the manufacturer's standard product unless specified otherwise. Additional equipment features, details, accessories, etc. which are not specifically identified but which are a part of the manufacturer's standard product, shall be included in the equipment being furnished.
- D. The equipment shall be of the type, design, and size that the manufacturer currently offers for sale and appears in the manufacturer's current catalog.
- E. The equipment shall fit within the allocated space, leaving ample allowance for maintenance and inspection.
- F. The equipment shall be new and fabricated from new materials. The equipment shall be free from defects in materials and workmanship.
- G. All units of the same classification shall be identical to the extent necessary to ensure interchangeability of parts, assemblies, accessories, and space parts wherever possible.
- H. In order to provide unit responsibility for the specified capacities and performance, the Return Systems manufacturer shall certify in writing that the equipment being submitted shall perform as specified.

#### 1.5 WARRANTY

- A. Manufacturer will repair or replace F.O.B. factory any part of the equipment of our manufacture that is found to be defective in workmanship or material within one (1) year of shipment from the factory provided this equipment has been installed, operated and maintained by the buyer in accordance with approved practices and recommendations.

- B. Manufacturer shall be notified in writing as soon as any defect becomes apparent. This warranty does not include freight, handling or labor charges of any kind. These warranties are contingent upon the proper sizing, installation, operation and maintenance of the return system and peripheral components and equipment. Warranties valid only if installed, operated, and maintained as outlined in the Installation and Operation Manual. No Sales Manager or other representative of manufacturer(s) other than the Quality Manager or an officer of the company has warranty authority. Manufacturer(s) will not pay any charges unless they were pre-approved, in writing, by the Manufacturer(s) Quality Manager. This warranty is exclusive and in lieu of all other warranties, expressed or implied, including but not limited to the implied warranties of merchantability and fitness for a particular purpose. Manufacturer(s) shall in no event be liable for any consequential or incidental damages arising in any way, including but not limited to any loss of profits or business, even if the Manufacturer(s) has been advised of the possibility of such damages. Manufacturer(s)'s liability shall never exceed the amount paid for the original equipment found to be defective.

## PART 2 – PRODUCTS

### 2.1 ACCEPTABLE MANUFACTURERS

- A. This specification is based on Fulton's Return Systems as manufactured by Fulton Steam Solutions, Inc. Equivalent units and manufacturers must meet all design criteria and will be considered upon prior approval.
- B. Basis of Design: Fulton Steam Solutions, Inc. Models:
1. HTL-700
  2. Owner Approved Equal.
- C. The return system manufacturer shall have the capability to construct an engineered system, skid mounted, for the above referenced return systems. This would include but is not limited to mounting any number of boilers in a common system with common piping headers and single source customer connections for single source steam supply, feedwater, drain, electrical power, fuel supply, condensate return, and vents. Electrical panel boxes for the system must be available along with all wiring requirements. Other available components shall include boilers, feed-water pumps, chemical feed systems, water softeners, carbon filters, and various relevant valves and other accessories. The return system manufacturer shall have the engineering capabilities for all aspects of the mechanical and electrical design aspects of the skid mounted system.
- D. Customers, engineers and contractors shall have the option to visit the Return Systems manufacturer's factory to witness manufacturing, testing, and other operational safety inspections associated with the referenced Return Systems.



## 2.2 RETURN SYSTEM DESIGN AND CONSTRUCTION

- A. The return system shall be designed to collect condensate returns, blend with incoming make-up supply water, and feed QTY 3 80 HP steam boilers operating at 4.5-12 PSIG, trimmed at 15psig.
- B. Receiver dimensions shall be 48" diameter x 96" long.
- C. The condensate return system (non-code) shall be constructed of a minimum of 1/4" thick SA-36 carbon steel and shall utilize flat heads constructed of a minimum of 1/4" thick carbon steel. Heads shall be internally stiffened to prevent deflection. The tank shall be attached to a heavy duty channel iron stand, which may be removed for installation and/or shipment. Unit shall breakdown to fit through 6' wide x 6' tall doorway.
- D. The return system shall come equipped with a thermometer, a full height (working) water level gauge glass – including shut-off valves and protective rods.
- E. Water level will be controlled via probes mounted in an external water column. Probes to be provided for low water pump cutoff and alarm, high water alarm, Makeup water on/off.
- F. Makeup water from city water shall be supplied via motorized control valve. Solenoid valves will not be accepted.
- G. The pump(s) supplied with the condensate return system shall be of the horizontal centrifugal end suction design. Pumps are built designed to handle temperatures up to 300oF, and will be of stainless steel construction. Pumps shall be close coupled design and incorporate a seal flush to allow operation to 300oF.
- H. The return system may be supplied with four (4) pumps to feed three (3) boilers.
  - 1. Each pump shall include the following components factory installed:
    - a. Suction Isolation Valve
    - b. Suction Strainer
    - c. Suction flexible connector
    - d. Discharge Check Gauge
    - e. Discharge Isolation Valve
    - f. Discharge Throttling Valve
    - g. Discharge Pressure Gauge
    - h. Boiler motorized feedwater valve, with adjustable end switch.
  - 2. The spare pump shall be piped with manual isolation valves to allow it to service any of the other boilers.

- I. A steam preheat shall be provided means to preheat feedwater. The steam preheat kit shall utilize a pilot operated (temperature) steam control valve. It shall be sized based on 20% makeup conditions, using city water of 60oF with tank operating temperature of 200oF. Heating shall be done indirectly through a tube bundle immersed into the feed system. Materials of construction for the tube bundle shall be 304 stainless steel tubes, carbon steel tubesheet, and cast iron bonnet. The tube bundle shall be trapped and returned into the receiver. (NOTE: Minimum operating pressure 4.5psig, lower pressures will require discharging condensate into condensate receiver in lieu of feedtank)
- J. Steel condensate return systems shall have a primer coat and a finish coat of alkyd enamel.
- K. The Return Systems shall be completely factory assembled as a self-contained unit. Each Return System shall be neatly finished, thoroughly tested, and properly packaged for shipping.
- L. The return system shall have the following connections/openings:
  - 1. Full receiver height sight gauge glass connections
  - 2. Cold water makeup connection
  - 3. Pump discharge(s) to boiler
  - 4. Overflow opening
  - 5. Drain
  - 6. Condensate return connection
  - 7. Vent
  - 8. Preheat kit connection
  - 9. Temperature sensor connection
  - 10. Chemical Feed injection connection
  - 11. Inspection opening
- M. The Full Capacity of the Return System shall not be less than:
  - 1. 750 Gallons
- N. The dimensions of the Horizontal Return System shall be (Tank Length x Overall Height from Floor to Top of Tank):
  - 1. Approximately 72 in x 92 in

## 2.3 ELECTRICAL PANELS

- A. Return Systems may optionally be provided with NEMA 12 electrical panels to house the following components :
  - 1. Lockable Non-fused control panel disconnect switch.
  - 2. Fused Control Stepdown Transformer
  - 3. Pump motor starters and overloads

4. Lighted Pump HOA Switches.
  5. Spare Pump Selector Switch
  6. Water Level Controls
  7. Fusing
- B. All panel boxes shall be designed, built, installed, labeled, and tested according to UL 508A requirements. Wiring shall be in accordance with the National Electrical Code.

### PART 3 – EXECUTION

#### 3.1 INSTALLATION

- A. Equipment and materials shall be installed in an approved manner and in accordance with the return system manufacturer's installation requirements.
- B. The installer shall construct a flat, level foundation designed to support the entire load. Calculations shall be based upon the maximum or filled weight of the system.
- C. Assemble unit sections and parts shipped loose or unassembled for shipment purposes. Follow manufacturer's installation recommendations and instructions.
- D. Install any electrical control items furnished by manufacturer per wiring diagram provided by manufacturer.
- E. Complete system piping installation as required by manufacturer for operation of system.

#### 3.2 FIELD QUALITY CONTROL

- A. After return system tank installation is completed, the manufacturer shall provide the services of a field representative for starting the unit and training the operator.
- B. Arrange with National Board of Boilers and Pressure Vessel Inspectors for inspection of boilers, blowdowns, tanks, piping, and any other applicable system components. Obtain applicable certifications for completed return systems, deliver to Owner, and obtain receipt.

END OF SECTION 235010

## SECTION 235020 - VACUUM PUMP / RECEIVER

### PART 1 - GENERAL

#### 1.1 WORK INCLUDES

- A. The work to be performed includes equipment, labor, and materials required to furnish and install a Multi-Jet Low Return Vacuum System (hereinafter referred to as "vacuum system") as described in this specification.

#### 1.2 REFERENCES

- A. ASME
- B. UL-508A
- C. National Electrical Code (NEC)

#### 1.3 SUBMITTALS

- A. Product Data: Submit manufacturer's technical product data, including rated capacities of selected model, weights (shipping, installed and operating), installation and start-up instructions, and furnished accessory information.
- B. Shop Drawings: Submit manufacturer's end assembly drawings indicating dimensions, connection locations, and clearance requirements.
- C. Wiring Diagrams: Submit applicable manufacturer's electrical requirements for the return system including ladder type wiring diagrams for interlock and control wiring. Clearly differentiate between portions of wiring that are factory installed and portions to be field installed.
- D. Instructions for installation, operation and maintenance of the return system shall be contained in a manual provided with each unit.
- E. A wiring diagram corresponding to the return system configuration shall be included with each unit.

#### 1.4 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Firms regularly engaged in the manufacture of Multi-Jet Low Return Vacuum Pump Systems with cast iron tanks/pressure vessels, whose products have been in satisfactory use in service for not less than twenty (20) years.

- B. The entire Vacuum Return system and its installation shall conform to the manufacturer's instructions and applicable codes.
- C. The entire vacuum condensate return package shall be U.L. Labeled, not just the panel.
- D. The equipment shall be in strict compliance with the requirements of this specification and shall be the manufacturer's standard product unless specified otherwise. Additional equipment features, details, accessories, etc. which are not specifically identified but which are a part of the manufacturer's standard product, shall be included in the equipment being furnished.
- E. The equipment shall be of the type, design, and size that the manufacturer currently offers for sale and appears in the manufacturer's current catalog.
- F. The equipment shall fit within the allocated space, leaving ample allowance for maintenance and inspection.
- G. In order to provide unit responsibility for the specified capacities and performance, the Vacuum Return Systems manufacturer shall certify in writing that the equipment being submitted meets specification without exception.

## 1.5 WARRANTY

- A. One year parts and labor warranty whereas the manufacturer will repair or replace any part of the equipment that is found to be defective in workmanship or material.
- B. Provide 20 year warranty against corrosion failure for cast iron tank.

## PART 2 – PRODUCTS

### 2.1 DESCRIPTION

- A. Furnish and install according to drawings and manufacturer's instructions a vacuum return system as detailed herein and as scheduled on plan.
  - 1. This specification is based on a Model 20LRV2-30-353 Duplex / Cast Iron Multi-Jet Low Return Vacuum Return System as manufactured by Shippensburg Pump Co, Inc.
  - 2. Owner Approved Equal.
- B. Vacuum condensate return system shall consist of a single cast iron receiver on which are mounted two combination air and water pumps, two discharge solenoid valves, one inlet basket strainer, vacuum and float controls, electrical controls and accessories.
- C. The two compartment cast iron receiver with 20 year warranty against corrosion failure shall be equipped with (2) multi-jet vacuum producers. Accessories shall include (1) vacuum compound gauge, (1) thermometer, (2) top and bottom water level gauges with automatic shut-off if glass is broken, (2) lifting eyes, (2) bronze suction isolation valves between pump and receiver plus a valve in each bleed line installed for maintenance, and (1) vacuum breaker.

- D. A cast iron inlet strainer with vertical self-cleaning bronze screen shall be provided for and factory mounted on the condensate receiver inlet. Strainer shall be drilled and tapped for compound gauge and vacuum sensing lines.
- E. Condensate discharge shall be controlled by (2) solenoid valves and float switch assemblies. The unit shall have (2) vacuum switches, (2) float switches in the upper compartment and (2) float switches in the lower compartment.

## 2.2 PUMPS

- A. Provide pumps of size and duty to meet design criteria as detailed on plan drawings.
- B. Provide centrifugal combination air and water pumps that are flange mounted on the receiver.
- C. The pumps shall be of close coupled vertical design, and shall have a cast bronze impeller that is bronze fitted to the cast iron pump housing with a removable bronze wearing ring.
- D. Pumps shall have 250 F. rated mechanical seals.
- E. The entire pump assembly shall be permanently aligned and dynamically balanced to deliver its full rated capacity of air and water at a test point of 51/2" Hg vacuum and 160°F in accordance to the latest ASHRAE Standard Code for Return Line Low Vacuum Heating Pumps.
- F. Pumps shall be driven by a 208/60/3, 3500 RPM TEFC non WEG motor available "off the shelf." The motor shall have a NEMA standard shaft.
- G. Each pump shall be supplied with a discharge pressure gauge.

## 2.3 ELECTRICAL CONTROL PANEL

- A. The pump manufacturer shall furnish, mount on the pump unit, and wire a U.L. labeled NEMA 2 control cabinet with hinged door, containing:
  - 3. Single point power connection
  - 4. Two integral magnetic starters with circuit breakers and cover interlock
  - 5. Two control circuit transformers to achieve totally independent circuits for each pump.
  - 6. Two "Lead-off-lag continuous" selector switches
  - 7. Two Pilot pump run lights
  - 8. Numbered terminal strip
  - 9. Two Momentary contact "Test" push button
  - 10. Removable control mounting plate
- B. U.L. Labeled panel with Liquid Tight Conduit

2.4 TESTING

- A. The unit shall be factory tested as a complete unit.
- B. The manufacturer shall furnish a certified pump performance test.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Equipment and materials shall be installed in an approved manner and in accordance with the feed system manufacturer's installation requirements.
- B. The installer shall construct a flat, level foundation designed to support the entire load. Calculations shall be based upon the maximum or filled weight of the system.
- C. Assemble unit sections and parts shipped loose or unassembled for shipment purposes. Follow manufacturer's installation recommendations and instructions.
- D. Install any electrical control items furnished by manufacturer per wiring diagram provided by manufacturer.
- E. Complete system piping installation as required by manufacturer for operation of system.

3.2 FIELD QUALITY CONTROL

- A. After vacuum return system installation is completed, the supplier shall provide the services of a field representative for starting the unit and training the operator.
- B. Allow for up to 4 hours of owner training.

END OF SECTION 235020

## SECTION 235030 – CONDENSATE PUMP/RECEIVER

### PART 1 – GENERAL

#### 1.1 WORK INCLUDED

- A. The work to be performed includes equipment, labor, and materials required to furnish and install a single condensate pump return station as described in this specification.

#### 1.2 REFERENCES

- A. ASME
- B. UL-508A
- C. National Electrical Code (NEC)

#### 1.3 SUBMITTALS

- A. Product Data: Submit manufacturer's technical product data, including rated capacities of selected model, weights (shipping, installed and operating), installation and start-up instructions, and furnished accessory information.
- B. Shop Drawings: Submit manufacturer's end assembly drawings indicating dimensions, connection locations, and clearance requirements.
- C. Wiring Diagrams: Submit applicable manufacturer's electrical requirements for the return system including ladder type wiring diagrams for interlock and control wiring. Clearly differentiate between portions of wiring that are factory installed and portions to be field installed.
- D. Instructions for installation, operation and maintenance of the return system shall be contained in a manual provided with unit.
- E. A wiring diagram corresponding to the return system configuration shall be included.

#### 1.4 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Firms regularly engaged in the manufacture of Cast Iron Condensate Return Systems, whose products have been in satisfactory use in service for not less than twenty (20) years.
- B. The entire Condensate Return system and its installation shall conform to the manufacturer's instructions and applicable codes.



- C. The equipment shall be in strict compliance with the requirements of this specification and shall be the manufacturer's standard product. Additional equipment features, details, accessories, etc. which are not specifically identified but which are a part of the manufacturer's standard product, shall be included in the equipment being furnished.
- D. The equipment shall be of the type, design, and size that the manufacturer currently offers for sale and appears in the manufacturer's current catalog.
- E. The equipment shall fit within the allocated space, leaving ample allowance for maintenance and inspection.
- F. In order to provide unit responsibility for the specified capacities and performance, the Condensate Return Systems manufacturer shall certify in writing that the equipment being submitted meets specification without exception.

#### 1.5 WARRANTY

- A. One year parts and labor warranty whereas the manufacturer will repair or replace any part of the equipment that is found to be defective in workmanship or material.
- B. Provide 20 year warranty against corrosion failure for cast iron tank.

### PART 2 – PRODUCTS

#### 2.1 ACCEPTABLE MANUFACTURERS

- A. Manufacturers of cast iron condensate return systems meeting all design criteria as set forth herein, and on the plan drawings.
- B. Acceptable Condensate Return System manufacturers include:
  - 1. Bryan Steam Corp.
  - 2. Cleaver Brooks
  - 3. Fulton Steam Solutions, Inc.
  - 4. Shipco Pumps
  - 5. Skidmore Pump
  - 6. Owner Approved Equal.

#### 2.2 DESCRIPTION

- A. Furnish and install according to drawings and manufacturer's instructions a condensate return system as detailed herein and as scheduled on plan.
- B. This specification is based on a Shipco Model 60-EC / Cast Iron Condensate Return System as manufactured by Shippensburg Pump Co, Inc.

- C. Condensate return system shall consist of a single six gallon receiver with a close coupled centrifugal pump flange mounted to receiver.
- D. Receiver tank shall be manufactured of close-grained cast iron and be complete with a 20 year warranty against corrosion. Carbon and stainless steel receivers are not acceptable.
- E. Cast iron tank shall be provided with the following connections;
  - 1. 1" Vent
  - 2. 2" Inlet
  - 3. 1 1/4" Overflow
  - 4. 3/4" Drain
- F. Condensate discharge shall be controlled by a float switch with internal stainless steel float and rod.
- G. A flange mounted butterfly isolation valve shall be supplied between suction side of condensate pump and cast iron receiver.

## 2.3 PUMP

- A. Provide pump of size and duty to meet design criteria as detailed on plan drawings.
- B. Provide centrifugal condensate pump that is flange mounted on the receiver.
- C. The pump shall be of close coupled vertical design, and shall have a cast bronze impeller that is bronze fitted to the cast iron pump housing with a removable bronze wearing ring.
- D. Pump shall have 250 F. rated mechanical seal.
- E. Pump shall be driven by a 1/3 H.P., 115/60/1, 3500 RPM industry standard motor available "off the shelf." The U.L. Listed motor shall have a NEMA standard shaft and built-in thermal overload protection.
- F. Pump shall produce 9 GPM at 20 PSIG
- G. Pump discharge shall be 3/4" and include a liquid filled discharge pressure gauge.
- H. Unit shall be provided with liquid tight conduit

## 2.4 TESTING

- A. The unit shall be factory tested at factory prior to shipment.
- B. The manufacturer shall furnish a certified pump performance test.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Equipment and materials shall be installed in an approved manner and in accordance with the condensate return system manufacturer's installation requirements.
- B. The installer shall construct a flat, level foundation designed to support the entire load. Calculations shall be based upon the maximum or filled weight of the system.
- C. Assemble unit sections and parts shipped loose or unassembled for shipment purposes. Follow manufacturer's installation recommendations and instructions.
- D. Install any electrical control items furnished by manufacturer per wiring diagram provided by manufacturer.
- E. Complete system piping installation as required by manufacturer for operation of system.

#### 3.2 FIELD QUALITY CONTROL

- A. After condensate return system installation is completed, the supplier shall provide the services of a field representative for starting the unit and training the operator(s).

END OF SECTION 235030

## SECTION 238000 - CLASSROOM UNIT VENTILATORS

### PART 1 GENERAL

#### 1.1 SECTION INCLUDES

- A. Vertical unit ventilators.
- B. Hot water heating/chilled water cooling coil.
- C. Control components.
- D. Delivery of equipment to the job site with a manufacturer's representative present.
- E. DX cooling coil for remote condensing unit.
- F. Parts and labor warranty.
- G. Unit ventilator accessories indicated.

#### 1.2 RELATED SECTIONS

- A. Section 23 09 23 – Direct Digital Control System for HVAC.
- B. Section 23 09 93 – Sequence of Operation.
- C. Section 23 40 00 – Air Cleaning Devices.
- D. Section 26 05 03 – Equipment Wiring Systems: Electrical Characteristics and Wiring.

#### 1.3 REFERENCES

- A. NFPA 70 - National Electrical Code.

#### 1.4 WORK INCLUDED

- A. Delivery of equipment to the job site with a manufacturer's representative present.
- B. Parts and labor warranty on Vertical floor mounted unit ventilators from date of Substantial completion.
- C. Start-up and Owner's Training on equipment being provided.

1.5 SUBMITTALS FOR REVIEW

- A. Equipment manufacturer shall submit eight (8) copies of complete submittal including but not limited to: Manufacturers literature and data indicating water, drain, and electrical characteristics and connection requirements.
- B. Submit under provisions of Division 1 General Requirements.

1.6 OPERATION AND MAINTENANCE

- A. Include manufacturer's descriptive literature, operating instructions, cleaning procedures, replacement parts list and maintenance and repair data.

1.7 REGULATORY REQUIREMENTS

- A. Conform to International Building Code 2012.
- B. Products Requiring Electrical Connection: Listed and classified by Underwriters' Laboratories, Inc. or CSA, as suitable for the purpose specified and indicated.
- C. The unit shall be constructed in accordance with ETL and CSA standards, and a label shall be affixed to the unit listing the product code under which it is registered.
- D. The unit shall be a product of the ISO 9001:2000 Quality Standard, or a facility that has manufactured specified product for over ten years, and be fully assembled and tested prior to shipment.

1.8 HANDLING AND STORAGE

- A. Comply with manufacturer's installation instruction for rigging, unloading and transporting units.
- B. Protect units from physical damage. Leave factory supplied shipping covers in place until installation.

1.9 WARRANTY

- A. Provide one (1) year non-prorated warranty on all parts and labor associated with the unit ventilator installation from Date of Substantial Completion.
- B. Warranty shall include all control components factory mounted on the unit.

1.10 EXTRA MATERIALS

- A. Manufacturer to provide three (3) sets of additional filters per unit for owners attic stock.

## PART 2 PRODUCTS

### 2.1 MANUFACTURER

- A. Carrier.
- B. Trane.
- C. York/JCI.
- D. Owner Approved Equal.

### 2.2 GENERAL

- A. Coils: Copper tubes mechanically expanded into evenly spaced aluminum fins tested to operate at 150 pi. Provide insulated drain pan under cooling coil, easily removable for cleaning, with drain connections on each side with one outlet capped. Refer to equipment schedule for left or right hand coil connection.
- B. Cabinet: 14 gauge steel on solid base pan with exposed edges rounded. Internal sheet metal parts of galvanized steel. Floor units shall have integral pipe tunnel for piping and electrical wiring. Unit to have insulated back. Unit to have continuous top with removable discharge grille constructed of bar stock. A ¼ inch debris screen to be mounted below discharge grille. Provide removable front panels with positive positioning threaded fasteners. All internal parts exposed to conditioned air stream to be insulated with moisture resistant insulation. Provide leveling legs. Unit ventilator and end compartments to be one piece construction.
  - 1. Horizontal unit ventilators as indicated on schedules shall include a ducted discharge connection or double deflection discharge grille as required/scheduled.
  - 2. Include a 12" utility compartment on coil connection side of unit where scheduled.
- C. Filters: Filter shall be one-piece design located to provide filtration on the outdoor air/return air mixture to assure even dust loading and balanced air flow in lieu of separate filters for outdoor air and return. Include one construction filter with unit and two additional filters per unit for final use. Filters to be 30% efficiency, 2" pleated type.
- D. Finish: Factory applied, baked alkyd enamel of color as selected by Architect on exterior surfaces of enclosure or cabinet.
- E. Fans: All metal, centrifugal forward-curved double-width wheels, statically and dynamically balanced, direct driven, arranged to draw air or blow through coil. Fan motor and shaft to have oilable sleeve bearings accessible from interior of unit ventilator.

- F. Wall Louvers: To be provided by Installing Contractor.
1. 12 gauge aluminum wall intake box and 16 gauge aluminum horizontal louvers removable from frame with ½ inch square mesh galvanized screen in back of louver. 16-gauge aluminum exterior grille mounted over louvers with tamperproof screws. Louver and grille to have factory baked enamel finish or color selected by Architect. Louver to be removable from frame. Provide lattice grille cover for louver. Field verify all existing opening sizes.
- G. Motor: Permanent split capacitor type, sleeve bearing resiliently mounted, multiple speed with 3-speed motor controller switch.
- H. Outdoor Air Dampers: Multi blade two piece, 20 gauge aluminum double wall (low leak) construction with ½ inch thick, 1.5 density fiberglass insulation sandwiched between 20 gauge welded galvanized blades. An additional ½ inch thick, 1.5 lb density elastomeric cellular foam adhered on the exterior of the blades and end partitions.
- I. Cabinet Accessories: Filler sections to have same exterior finish as unit ventilator. Cabinets to be 21-7/8 inches deep to match unit.
- J. Face and Bypass Dampers: Multi blade 20 gauge aluminum with sealed edges of silicone rubber impregnated glass cloth seals for positive sealing. A dead air space shall be provided to minimize pickup in the bypass position.
- K. Unit shall be listed by Underwriter's Laboratory, Inc.
- L. Unit ventilators shall not have a sound power rating greater than the following for the specified octave band.

OCTAVE BRAND	SOUND POWER RATING (DB10-12)
2	65
3	60
4	58
5	55
6	48
7	42
8	35

- M. Capacity: As scheduled.

N. Controls:

1. Unit to be provided with factory mounted DDC interface package as specified below. All other controls to be furnished and installed by BAS contractor in the field.
  - a. Electrical damper operators supplied by unit manufacturer.
  - b. Fused control transformer supplied by unit manufacturer.
  - c. Low limit thermostat.
  - d. All components wired and terminated in an isolated box. Box to have terminal strip connected.

O. Piping Package:

1. Where scheduled, provide units with factory mounted and tested piping package for heating and cooling coils. Piping package shall include the following:
  - a. Isolation automatic control valves wired to terminal strip for future control contractor connections (supply).
  - b. Ball valve manual shut-offs (supply and return).
  - c. Balancing valve with temperature and pressure ports (return).
  - d. Unions (supply and return).

2.3 MANUFACTURER'S FIELD SERVICES

- A. Contractor shall furnish a factory trained service engineer without additional charge to start the units. Unit ventilator manufacturers shall maintain service capabilities no more than 50 miles from the jobsite.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that surfaces are ready to receive work and opening dimensions are as indicated on shop drawings.
- B. Verify that required utilities are available, in proper location and ready for use.
- C. Beginning of installation means installer accepts existing surfaces.



### 3.2 INSTALLATION

#### A. Unit Ventilators (UV):

1. Install in accordance with manufacturer's instructions.
2. Locate all unit ventilators where indicated on the Drawings.
3. Coordinate exact location of all unit ventilators outside air openings and louver locations.
4. Protect all unit finished surfaces with cover during balance of construction.
5. Install all drain lines from drain pan to outside.
6. Install the following minimum trim on each unit, hot water coil. See drawings for unit ventilator piping details.
  - a. Inlet Side of Coil: Ball valve, union, pipe reducer, control valve.
  - b. Outlet Side of Coil: Pipe increaser, union, air vent, balancing valve and ball valve.
7. Provide interconnection copper tubing of the size recommended by the condenser manufacturer.
8. Charge system with refrigerant in accordance with manufacturers instructions.
9. Install level and shim units, and anchor to structure.

### 3.3 CLEANING

- A. Clean work under provisions of Division 1 General Requirements.
- B. After construction is completed, include painting, clean exposed surfaces of units. Vacuum clean coils and inside cabinets.
- C. Touch-up marred or scratched surfaces of factory finished cabinets, using finish materials furnished by manufacturer.

### 3.4 OWNER TRAINING BY EQUIPMENT SUPPLIER

- A. At the completion of the project, the installing contractor shall provide training for all pre-purchased equipment for the Owner's staff. Training shall consist of two parts. Part One is a classroom situation which describes the equipment's operation, maintenance and repair requirements. Part Two will be on-site (hands-on) training which will show the location of all devices and the operation and maintenance of all controls, devices, etc. Prior to commencement of training, installing contractor shall provide Architect/Engineer with a schedule of dates, times and agenda for each training session. Installing contractor shall provide a minimum of four (4) hours of training for work installed under this section of the contract. Installing contractor shall furnish a minimum of eight (8) equipment manuals, maintenance manuals and repair parts list for all equipment and systems reviewed.

END OF SECTION 238000

## SECTION 238300 - TERMINAL HEAT TRANSFER UNITS

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Steam suspended unit heater.

#### 1.2 RELATED SECTIONS

- A. Section 26 05 03 - Equipment Wiring Systems: Electrical characteristics and wiring connections. Installation of room thermostats. Electrical supply to units.

#### 1.3 REFERENCES

- A. NFPA 70 - National Electrical Code.

#### 1.4 SUBMITTALS FOR REVIEW

- A. Product Data: Provide typical catalog of information including arrangements.
- B. Shop Drawings:
  - 1. Indicate cross sections of cabinets, grilles, bracing and reinforcing, and typical elevations.
  - 2. Submit schedules of equipment and enclosures typically indicating length and number of pieces of element and enclosure, corner pieces, end caps, cap strips, access doors, pilaster covers, and comparison of specified heat required to actual heat output provided.
  - 3. Indicate mechanical and electrical service locations and requirements.
- C. Submit under provisions of Division 1 General Requirements.
- D. Indicate capacity and dimensions of manufactured products and assemblies required for this project. Indicate electrical service with electrical characteristics and connection requirements, and duct connections.
- E. Submit manufacturer's installation instructions. Indicate assembly, support details, connection requirements, and include start-up instructions.
- F. Contractor shall review all shop drawings prior to submitting them for Architect/ Engineer's review. Contractor shall stamp each shop drawing to certify that he has reviewed it. Engineer will not check shop drawings that contractor has not stamped with his review certification.

1.5 SUBMITTALS AT PROJECT CLOSEOUT

- A. Project Record Documents: Record actual locations of components and locations of access doors in radiation cabinets required for access or valving.
- B. Operation and Maintenance Data: Include manufacturers descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listings.
- C. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owners name and registered with manufacturer.

1.6 REGULATORY REQUIREMENTS

- A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.
- B. International Mechanical Code 2012.

1.7 WARRANTY

- A. Equipment manufacturer shall provide one (1) year warranty (parts and labor) on their equipment. Installing Contractor will provide one (1) year warranty on all parts and labor associated with the installation of the equipment. See Division 1 Sections for other requirements.

1.8 DELIVERY, STORAGE AND HANDLING

- A. Store and protect products under provisions of Division 1 General Requirements.
- B. Deliver and store material in shipping containers with labeling in place.
- C. Contractor shall store all materials shipped to the site in a protected area. If material is stored outside of the building, it must be stored off the ground a minimum of six inches set on 6 x 6 planks and/or wood pallets. All material must be completely covered with waterproof tarps or visquin. All piping will have the ends closed to keep out dirt and other debris. No equipment will be allowed to be stored on the site unless it is sitting on wood planks and is completely protected with weatherproof covers.

1.9 PROJECT RECORD DOCUMENTS

- A. Submit record documents under provisions of Division 1 General Requirements.

1.10 OPERATION AND MAINTENANCE DATA

- A. Submit operation and maintenance data under provisions of Division 1 General Requirements.
- B. Include manufacturer's descriptive literature, operating instructions, installation instructions, maintenance and repair data and parts listings.

PART 2 - PRODUCTS

2.1 STEAM SUSPENDED UNIT HEATERS

A. Acceptable Manufacturers:

- 1. Daikin/McQuay.
- 2. Modine.
- 3. Sterling.
- 4. Trane.

B. Fabrication:

- 1. Casing: Casing fabricated of die-formed, heavy-gauge steel and finished in high gloss, baked enamel. Supply air shall be drawn through a stamped louver periphery evenly across the heating element, and discharged through an outward drawn venturi. Adjustable discharge louvers shall be provided to control the direction of airflow. A large, hinged access door shall extend the width of the heater and locked in position by quarter-turn fasteners. Heater and supply wiring diagram shall be permanently attached to the inside of the access door.
- 2. Elements: Serpentine copper element with brazed copper fins.
- 3. Motors: Motors shall be totally enclosed, all angle industrial rated. All units will utilize sealed bearings to assure permanent lubrication.
- 4. Fan Blades: Fan blades shall be of the axial flow-type designed for quiet efficient operation. Fan speed does not exceed 1,600 rpm.
- 5. Wiring: Heaters designed for a single circuit, with elements, motor and control circuits subdivided with factory wired fuses to conform to the National Electrical Code and Underwriter's Laboratory, Inc., Standard 1025. All three-phase heaters shall have balanced phases.
- 6. Thermostat with remote fan switch shall be provided by unit manufacturer for installation by BAS contractor. Thermostat shall be wall mounted with adjustable setpoint.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Verify that surfaces are ready to receive work and opening dimensions are as indicated on shop drawings.
- B. Verify that required utilities are available, in proper location and ready for use.
- C. Beginning of installation means installer accepts existing surfaces.

#### 3.2 INSTALLATION

- A. Steam Suspended Unit Heater:
  - 1. Install in accordance with manufacturer's instructions.
  - 2. Hang units from building structure with steel hanger rods. Mount as high above the floor as possible to maintain greatest headroom.
  - 3. Refer to piping detail on drawings for valve and trap requirements.

#### 3.3 CLEANING

- A. Clean work under provisions of Division 1 General Requirements.
- B. After construction is completed, include painting, clean exposed surfaces of units. Vacuum clean coils and inside cabinets.
- C. Touch-up marred or scratched surfaces of factory finished cabinets, using finish materials furnished by manufacturer.

#### 3.4 OWNER TRAINING BY INSTALLING CONTRACTOR

- A. At the completion of the project, the Installing Contractor shall provide training of Owner's staff. Training shall consist of two parts. Part One will be a classroom situation which describes the equipment's operation, maintenance and repair requirements. Part Two will be on-site (hands-on) training which will show the location of all devices and the operation of all controls, devices, motors, etc. Prior to commencement of training, Contractor shall provide Architect/Engineer with a schedule of dates, times and agenda for each training session. This Contractor shall provide a minimum of two (2) hours of training for work installed under this Section of the contract.

END OF SECTION 238300

## SECTION 260500 - BASIC ELECTRICAL REQUIREMENTS

### PART 1 – GENERAL

#### 1.1 WORK INCLUDED

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and the General Requirement Specification, apply to this and the other sections of Division 23.
- B. The Section is hereby made a part of all other sections of Division 26 as fully as if repeated in each therein.

#### 1.2 SECTION INCLUDES

- A. Definitions.
- B. Quality assurance.
- C. Regulatory Requirements.
- D. Approvals.
- E. Permit and inspection.
- F. Fees.
- G. Submittals.
- H. Operation and Maintenance Instruction.
- I. Overtime Work.
- J. Alternates
- K. Guarantee.
- L. Warranty.
- M. Products
- N. Execution.

### 1.3 RELATED SECTIONS

- A. Substitutions: Refer to the General Requirements and 26 Sections.
- B. Shop Drawings: Refer to the General Requirements and 26 Sections.
- C. Operation and Maintenance Data: Refer to the General Requirements and 26 Sections.
- D. Coordination with Other Trades: Refer to the General Requirements, 23, and 26 Sections.

### 1.4 DEFINITIONS

- A. Provide all required products and execution for a complete and fully operational Electrical System. Such work includes, but is not limited to, that which is identified on the contract documents. For the purpose of this specification, the following terms are defined:
  - 1. "Contract documents" include the most current project drawings and specification.
  - 2. "Provide" includes furnishing and installation.
  - 3. "Furnish" includes purchasing and transporting new equipment, as specified, to the job site.
  - 4. "Install" includes mounting or setting equipment in place, in specified location, making all required electrical connections for a working product.
  - 5. "Electrical System" includes all distribution of power, lighting, fire protection, life safety, communications, security, special systems, and any other information, electrical in nature, identified on the Contract Documents, from the point(s) of service to utilization device(s).
  - 6. "Connecting" means providing a power source, overcurrent devices, raceways, conductors, terminations, insulation supports, and other materials and equipment required for the operation and control of the relevant operation.
- B. Provide materials, equipment, installation or testing identified on the drawings but not specified herein; or that which is specified herein, but not identified on the drawings shall be provided at no additional cost to the Owner.
- C. Provide materials or equipment including minor items, accessories, or devices reasonably inferable as necessary for the completion and proper operation of any systems or products identified on the Contract Documents.

### 1.5 QUALITY ASSURANCE

- A. Discovery of any conflicting design information or any design intentions which are not readily interpreted shall be referred to the Architect/Engineer for further description or illustration prior to any product selection or execution of work.
- B. Discovery of any materials or equipment which are damaged, unsuitable, incompatible, or non-compliant with any applicable codes, laws, ordinances, or other regulations shall be brought to the direct attention of the Architect/Engineer.

- C. Generally, the Drawings establish the location, quantity and relationship of the parts of the work, and the specifications define the type and quality of materials and workmanship. Work shown in the drawings and not mentioned in the specifications, or required by the specifications and not shown on the drawings, shall be provided as if fully provided for in both. In the case of conflicts between the drawings and specifications, or within either document, the Architect/Engineer shall determine the intent. In such cases, in general, the more stringent requirement concerning greater quantity, quality, and/or resulting in a higher cost shall govern without further cost to the Owner.
- D. The equipment list contained in this specification includes only the major equipment requirements. Verify the completeness and suitability of device to meet the intent of the specifications. Any additional equipment required, even if not specifically mentioned herein, shall be provided without claim for additional payment; it being understood that a complete operating system, satisfactory to the Engineer and the Owner, is required in all cases.

#### 1.6 REGULATORY REQUIREMENTS

- A. Where governing codes indicate the Drawings and Specifications do not comply with the minimum requirements of applicable codes, the Contractor shall either notify the Architect/Engineer in writing during the bidding period identifying the revisions required to meet code requirements or provide an installation which will comply with the code requirements.
- B. All material, equipment, installation and testing should be in accordance with all applicable codes, laws, and ordinances of Federal, State and local governing bodies having jurisdiction.
- C. In case of differences between building codes, Federal and State laws, local ordinances and utility company regulations and the Contract Documents, the most stringent shall govern.
- D. Where any materials, equipment or installation is not in compliance with the more stringent of the applicable codes, laws, ordinances, regulations and contract documents, they shall be entirely removed, replaced, modified or otherwise corrected at no additional cost to the Owner.
- E. Materials, equipment, installation and testing shall conform to the latest editions of the applicable following codes:
  - 1. NEC            National Electrical Code.
  - 2. State of Illinois Plumbing Code.
  - 3. NFPA 72      National Fire Protection Association
  - 4. IBC            International Building Code.



- F. All product materials and work shall comply with all local codes, including but not limited to the following codes and standards as applicable, in addition to any codes and standards referenced within individual specification sections. These codes and standards shall apply to all Division 26 Sections as applicable.
1. ANSI American National Standards Institute.
  2. ASTM American Society for Testing Materials.
  3. CBM Certified Ballast Manufacturers.
  4. ETL Electrical Testing Laboratories.
  5. IEEE Institute of Electrical and Electronic Engineers.
  6. NBS National Bureau of Standards.
  7. NEMA National Electrical Manufacturer's Association.
  8. NFPA National Fire Protection Association.
  9. OSHA Occupation Safety and Health Act.
  10. UL Underwriters Laboratories.
  11. ADA Americans with Disabilities Act.
  12. NEC National Electrical Code.
  13. IBC International Building Code.
  14. IEC International Electrical Code.
  15. IFC International Fire Code.
  16. IECC International Energy Conservation Code 2012
- G. Where a UL standard is available, the equipment supplied for the project shall be UL listed and shall bear the UL label.
- H. Notify the Architect/Engineer of any materials or apparatus believed to be inadequate, unsuitable, in violation of laws, ordinances, rules or regulations of authorities having jurisdiction.
- I. In every installation where regulations of electric utility, telephone and cable TV companies apply, conformance with their regulations is mandatory and any costs involved shall be included in the Contract, with the exception of extra facility and other charges which are directly paid by the Owner.

#### 1.7 APPROVALS

- A. Prepare shop drawings and obtain approvals from inspection authorities for emergency and exit lighting, fire alarm and life safety systems, and other electrical installations requiring specific approval.
- B. Prepare shop drawings and obtain approvals from governmental agencies and utility companies for applicable electrical installations requiring approval.
- C. Copies of the final approved drawings shall be delivered to the Architect/Engineer. Approvals shall be obtained before commencement of related work.

1.8 PERMIT AND INSPECTION

- A. Permit: Obtain and pay for all permits, bonds, license, tap-in fees, etc. Required by the City, State, or other authority having jurisdiction over the work.
- B. Inspections: Arrange and pay for all inspections required by the above when they become due as part of the work of sections affected. Conceal no work until approved by these governing authorities.

1.9 FEES

- A. Pay fees and other charges incidental to electrical work and obtain and pay for required insurance, permits, licenses, inspections and taxes. Arrange for required inspections and delivery certificates and approvals for same to the Architect/Engineer.

1.10 SUBMITTALS

- A. Shop Drawings: As soon as practical and before any material or equipment is purchased, the Contractor shall submit shop drawings. A complete list in one category (example: all fixtures) of all shop drawings catalog cuts, material lists, etc. are to be submitted by this Contractor at one time. No consideration will be given to partial shop drawings submitted from time to time.
  - 1. Extended time for submitting special shop drawings may be requested; however, any extension of time approved does not relieve this Contractor of his responsibility of executing his work in accordance with this contract.
  - 2. Any listed materials, fixtures, apparatus, or equipment that are not in accordance with specifications requirements can and will be rejected for use in this installation and construction. Substitutions will not be permitted.
  - 3. Any materials, fixtures, apparatus or equipment installed without stamped or written approval shall be removed by the Contractor and replaced with specified equipment at the direction of the Architect/Engineer and without recourse for additional compensation.
  - 4. Review of shop drawings does not relieve the Contractor from any responsibility for deviation from the Contract Documents unless the deviation is specifically identified on the shop drawings.
  - 5. Prior to ordering any switchboard, distribution panels, panelboards, or transformers, the contractor shall submit dimension drawings showing the switchboard will fit in the location shown on the drawings. In the event of conflicts, the contractor shall request a written clarification from the Architect/Engineer.

B. Coordination and Installation Drawings:

1. In addition to the preparation and submittal of Shop Drawings and product data for manufactured electrical equipment and materials, prepare and maintain in current status, a complete set of detailed, completely circuited, and dimensioned electrical coordination and record drawings for electrical work included under the Contract.
2. Coordination and installation drawings shall be made at the Contractor's expense on basic floor plan background. Electronic copies of the electrical drawings may be purchased from the Engineer for \$250.00 a copy.
3. Coordination and installation drawings shall be CAD drawings compatible with AutoCAD Version 2010 on the same size and with the same border lines and title blocks as the Architect/ Engineer's Drawings, with the Contractor's name added.
4. Coordinate electrical work with the work of all other trades affecting the electrical work and in preparing the coordination drawings; coordinate the work of other trades in order to avoid possible installation conflicts, which includes but is not limited to mechanical equipment and architectural design elements. In the event of conflicts, interferences or discrepancies that are discovered during the coordination phase of the project, the contractor shall request a written clarification from the Architect/Engineer. If conflicts, interferences or discrepancies arise after the coordination phase of the project and no written clarification was requested, then the work shall be removed, replaced, modified or otherwise corrected at no additional cost to the owner.
5. Record drawings shall indicate the electrical installation exactly as constructed and shall be periodically revised to reflect all changes, including those required by the Architect/Engineer, those which are or have been found necessary in the field and those which may be suggested by the Contractor and accepted by the Architect/Engineer. Drawings shall be revised when considered necessary by the Architect/Engineer or the Contractor in order to facilitate proper coordination.
6. If, in the opinion of the Architect/Engineer, the drawings are in acceptable condition after each has been finally revised, they may be submitted as the field record drawings.
7. Electrical contractor shall verify total connected load/HP with mechanical contractor prior to the installation of conduit and wiring of any mechanical or plumbing equipment. If any work is installed prior to verifying the load/HP of the mechanical or plumbing equipment, the contractor shall remove, replace, modify or otherwise correct the work at no additional cost to the Owner. Make any changes to overcurrent devices or feeder size per the local authority having jurisdiction.
8. Provide "as-built" drawings.

- C. Operation and Maintenance Data: Refer to the General Requirements and Division 26 Sections. Submit four copies of maintenance manuals in hardbound covers containing approved shop drawings and manufacturer's repair manuals, guarantees, operating instructions, wiring diagram and part lists.

1.11 OPERATION AND MAINTENANCE INSTRUCTION

- A. Provide operation and maintenance instruction for equipment and systems.
- B. Allow for 20 manhours of instruction time for electrical distribution system, emergency system, fire alarm system, communication systems, etc.

1.12 OVERTIME WORK

- A. All construction work shall be done on regular working hours and days, unless otherwise specified. If overtime work, other than specified, is required on the project, it shall be performed as indicated.
- B. System shutdown shall occur during off business hours and shall be done on over-time basis.
- C. The base bid shall include overtime work specified. No compensation shall be made for other work done on overtime basis, unless authorized.

1.13 ALTERNATES

- A. Accepted alternates, if any, may affect portions of the Base Bid Work.
- B. Acceptance of alternates shall include provisions necessary to alter, adjust or otherwise modify work affected by the alteration.
- C. Shop drawings shall include alternate work and shall reflect changes necessitated to other work.

1.14 GUARANTEE

- A. Electrical work shall be guaranteed for both materials and labor for a period of one year.
- B. On-the-premises maintenance shall be provided at no cost to the purchaser for one year from the date of an operational and accepted installation unless damage is caused by misuse or abuse.
- C. Guarantee all wiring and equipment to be free from inherent and mechanical defects due to workmanship and materials used for the period of one full year from date of operational and accepted installation. Replacement of all or part of the equipment and/or correction of such defects, including labor, shall be rendered without cost to the Owner with the guarantee period.
- D. Manufacturer's equipment guarantees or warranties for periods of more than one year shall be included in the Operation and Maintenance Data.

1.15 WARRANTY

- A. Warranty period shall be one year after final acceptance of the system. Repairs or replacements made under the warranty shall bear an additional 1-year warranty dated from final acceptance of the repair or replacement. The Owner shall receive the benefit of all warranties furnished by manufacturers.

1.16 PROJECT/SITE CONDITIONS

- A. Carefully examine the contract documents, visit the site, and thoroughly become familiar with the local conditions relating to the work prior to bidding. Failure to do so will not relieve the contractor of the obligations of the Contract.
- B. Install Work in locations shown on Drawings, unless prevented by Project conditions.
- C. Prepare drawings showing proposed rearrangement of Work to meet Project conditions, including changes to Work specified in other Sections. Obtain permission of Architect/Engineer before proceeding.

1.17 CONTRACTOR'S RESPONSIBILITY TO VERIFY EQUIPMENT DIMENSIONS

- A. The drawings, schedules and specifications have been prepared using one manufacturer for each piece of equipment as the basis for dimensional design. If the Contractor purchases equipment listed as a specified Acceptable Manufacturer but is not the scheduled manufacturer used for the base design, the Contractor shall be responsible for checking all the dimensions of the equipment to verify that it will fit in the space shown on the Drawings. Minor deviations in dimensions will be permitted, provided the ratings meet what was shown on the drawings and equipment will physically fit into the space allocated with suitable access around equipment for operation and maintenance on the equipment.
- B. Contractor and/or manufacturer shall verify that the capacity and duty specified meets the characteristics of the equipment he submits for review.
- C. If equipment is submitted for review and does not meet the physical size or arrangement of what was scheduled and specified, Contractor shall pay for all alternations required to accommodate such equipment at no additional cost to the Owner. Contractor shall also pay all costs for additional work required by other Contractors, Owner, Architect or Engineer to make changes which would allow the equipment to fit in the space.

1.18 CONTRACTOR'S RESPONSIBILITY TO VERIFY EXISTING CONDITIONS AND OPENINGS

- A. Contractor shall field verify the size of existing openings, windows, doors, corridors, rooms, etc. for access of the new equipment into the existing building. If openings are too small for access, then Contractor shall provide new or enlarged openings, at his own expense, to facilitate entrance into existing space or building. Contractor may elect to order the equipment disassembled and/or with split housing for entrance into the existing space or building. Contractor shall reassemble equipment after it is in the space at his own expense.

## PART 2 – PRODUCTS

### 2.1 MATERIALS AND EQUIPMENT

- A. Proposal shall be based upon the furnishing of all materials and equipment as specified, which in every case shall be new and, where not specifically referred to by manufacturer's name, of the best grade and quality available.
- B. Equipment and material shall be without blemish or defect and shall not be used for temporary light or power purposes, including lamps, without the Architect/ Engineer's written authorization.
- C. Items of equipment of one generic type (such as fuses), except conduit, conduit fittings, outlet boxes, wiring and cable, shall be the product of one manufacturer throughout, unless otherwise indicated or accepted by the Architect/Engineer.
- D. Where two or more makes or kinds of materials or equipment are specified, indicate which of these choices will be used. This information shall be included with the list of manufacturers for equipment and materials to be submitted to the Architect/Engineer.
- E. Manufacturers of equipment shall be firms regularly engaged in manufacturing factory-fabricated systems and equipment whose products have been in satisfactory use in similar service for not less than 5 years.

### 2.2 MANUFACTURERS NAMEPLATES

- A. Each major electrical component such as switchgear, transformers, motor control centers, panelboards, circuit breakers, disconnect switches, etc. shall have the manufacturer's name, address, catalog number, model number, rating, and any other required specified markings on a plate or label located inside the cover or otherwise inconspicuously but readily accessible.

## PART 3 – EXECUTION

### 3.1 DELIVERY AND STORAGE

- A. Receive, handle, and store electrical items and materials at the project site. Materials and electrical items shall be so placed that they are protected from damage and deterioration.
- B. Existing equipment which is to be reused shall be cleaned and protected against damage. Equipment which is removed and stored for reuse shall be stacked, boxed or crated in such a manner as to prevent damage. The cost to repair/replace this equipment due to damage incurred during its removal, storage or reinstallation shall be borne by the Contractor.
- C. The Contractor shall bear full responsibility for equipment judged unacceptable due to his failure to comply with these specifications.

### 3.2 INSTALLATION

- A. The Drawings for work under Division 26 are diagrammatic and are intended to convey the scope of work and indicate the general arrangement of conduit, boxes, equipment, fixtures and other work included in the Contract.
- B. Location of items required by the Drawings or specifications not definitely fixed by dimensions are approximate only and exact locations necessary to secure the best conditions and results shall be determined at the site and shall be subject to the approval of the Architect/Engineer.
- C. Follow Drawings in laying out work, check drawings of other trades to verify spaces in which work will be installed, and maintain maximum headroom and space conditions at all points.
  - 1. Where headroom or space conditions appear inadequate, the Architect/Engineer shall be notified before proceeding with installation.
  - 2. Minor conduit rerouting and changes shall be made at no additional cost to the Owner.
- D. Perform all work with skilled mechanics of the particular trade involved in a neat and workmanlike manner.
- E. Perform all work in cooperation with other trades and schedule.
- F. Perform all work in accordance with the manufacturer's recommendations.
- G. Furnish other trades advance information on locations and sizes of frames, boxes, sleeves and openings needed for the work, and also furnish information and shop drawings necessary to permit trades affected to install their work properly and without delay.
- H. Where there is evidence that work of one trade will interfere with the work of other trades, all trades shall assist in working out space allocations to make satisfactory adjustments and shall be prepared to submit and revise coordinated shop drawings.
- I. With the approval of the Architect/Engineer and without additional cost to the Owner, make minor modifications in the work as required by structural interferences, by interferences with work of other trades or for proper execution of the work.
- J. Work installed before coordinating with other trades so as to cause interference with the work of such other trades shall be changed to correct such condition without additional cost to the Owner and as directed by the Architect/Engineer.
- K. Architect/Engineer reserves the right to change location of electrical equipment or device within 10'-0" radius before work is installed without extra charge.

- L. Electrical Contractor shall cooperate with other trades and coordinate work so that conflicts with other work are eliminated.
- M. Equipment shall be installed with adequate space allowed for removal, repair or changes to equipment. Ready accessibility to removable parts of equipment and to wiring shall be provided without moving other equipment which is to be installed or which is in place. Electrical Contractor shall verify measurements. Discrepancies shall be brought to the Architect/Engineer's attention for interpretation.
- N. Determine temporary openings in the buildings that will be required for the admission of apparatus furnished under this Division, and notify the Architect/Engineer accordingly. In the event of failure to give sufficient notice in time to arrange for these openings during construction, assume all costs of providing such openings thereafter.
- O. Location of electrical outlets, lighting fixture, lighting panels, cabinets, equipment, etc. is approximate and exact locations shall be determined at the project.
- P. Electrical Contractor shall refer to contract documents for details, reflected ceiling plans, and large scale drawings.
- Q. Apparatus, lighting fixtures, material or work not shown on the drawings, but mentioned in the project specifications, or vice versa or any included accessories such as wiring, relays, switches, transformers (line voltage or low voltage), etc., necessary to make the work complete and ready for operating, even though not specified or shown on the electrical drawings shall be furnished and installed without additional expenses to the Owner. It is the Contractor's responsibility prior to bids to review all project documents.
- R. Verify final locations for rough-ins with field measurements of the actual equipment to be connected. Refer to equipment specifications in Division 2 through 26 for rough-in requirements.
- S. Equipment specified under other divisions and requiring electrical supply shall be erected, aligned, leveled and prepared for operation. Provide required controls and accessories along with installation instructions, diagrams, dimensions and supervision of installation and start-up. Provide the required electrical rough-ins and connections and confirm the electrical controls and accessories furnished under the specifications for the other divisions. Install those controls and accessories not located in the mechanical piping and ductwork. Provide additional electrical controls, accessories, fittings and devices not specified under the equipment but required for a finished, operating job. Make all final electrical connections. Participate in the start-up and test procedure.
- T. Where surface raceway is specifically called out on drawings, provide factory color as indicated coordinate specific routing with Owner in field prior to installing.



- U. Electrical Contractor shall weatherproof all openings and penetrations through foundations and exterior walls created by fixtures and conduits to prevent moisture from entering through.
- V. Contractor shall furnish other trades advance information and/or shop drawings on locations and sizes of conduits, raceways, equipment, frames, boxes, sleeves and openings, etc. needed for their work to install their work properly and without delay.
- W. Contractor shall provide sleeves in beams, floors, columns and walls as shown on the drawings, as required by job site conditions, and/or as specified, when installing their work. All beams and columns which are required to be sleeved shall be cut and reinforced as required by field conditions and locations and sizes shall be checked and approved by Architect before contractor cuts any structural building member.
- X. Contractor shall refer to the architectural and structural contract drawings (before submitting their bids) to familiarize themselves with the extent of the general contractors work, ceiling heights and clearance for installing their work.
- Y. Contractor shall install all auxiliary supporting steel as required for the supporting of their conduit, fixtures, devices, equipment, etc. All supporting steel for items above a suspended ceiling shall be from new building structure members only. All supports in the existing building shall be from walls. No connection to wood, roof deck or structure is allowed.
- Z. The locations shown for all lighting fixtures and ceiling mounted electrical equipment are diagrammatic. Exact location shall be determined from the reflected ceiling plans and/or on the job site by the construction manager. It shall be the contractor's responsibility to maintain code required spacing for items such as fire alarm devices.
- AA. Contractor shall be required to maintain the fire rated integrity of floors and/or wall partitions. All penetrations through fire rated building elements shall be effectively sealed using approved materials and methods.
- BB. Unless indicated otherwise, the Architect/Engineer makes no representation as to whether or not any hazardous or contaminated materials (including but not limited to asbestos, PCB's, contaminated soils, etc.) are present within the existing building or on the site. Work shown on the drawings and/or indicated in the specifications shall not be construed to call for contact with any of these materials. If these materials are encountered or suspected, the contractor shall not disturb them and shall contact the architect/engineer immediately.
- CC. Contractor shall store all materials and equipment shipped to the site on a protected area. If material is stored outside the building, it must be stored off the ground a minimum of six inches (6") set on 6 x 6 planks and/or wood pallets. All material and equipment must be completely covered with waterproof tarps or visquin. All conduit will have the ends closed to keep out dirt and other debris. No equipment will be allowed to be stored on the site unless it is sitting on wood planks and completely protected with weatherproof covers.
- DD. This contractor shall be responsible for furnishing all labor and material required to patch all openings in existing floors, walls, ceilings and fire separations created by the removal of this trades material and equipment where these openings are not to be reused.

### 3.3 PROTECTION

- A. Protect conduit and wireway openings against the entrance of foreign matter by means of plugs or caps. Cover fixtures, materials, equipment and devices or otherwise protect against damage from any cause, both before and after installation. Fixtures, materials, equipment, or device damaged prior to final acceptance of the work shall be restored to their original condition or replaced, all at no additional cost to Owner.
- B. Equipment shall be inherently safe and moving parts shall be covered with guards.

### 3.4 COOPERATION

- A. Where jurisdictional rules require the assistance of electrical mechanics in the moving and setting of electrically power equipment, provide such assistance.
- B. Where work covered by this section connects to equipment furnished under other sections, verify electrical work involved in the field and make proper connection to such equipment.

### 3.5 CUTTING AND PATCHING

- A. Do drilling, cutting, fitting and patching necessary for the installation of conduits, wireways, and other electrical equipment, and provide supports necessary for same and for bracing and anchorage of work. No cutting of structural work or of fireproofing shall be done without the written consent of the Architect/Engineer.
- B. Conduits passing through roofs or other surfaces exposed to weather shall be properly flashed as specified in roofing and waterproofing sections. This flashing work shall be paid for as part of the electrical work.

### 3.6 WALL CHASES

- A. Provide templates or details of wall chases, where conduits, pull boxes, cabinets, and other items of equipment are to be concealed or recessed, before the work of other trades is performed in the respective areas. Show exact locations and sizes of such equipment.

### 3.7 SLEEVES AND OPENINGS

- A. Provide sleeves and openings for exposed wires, cables, and wireways where they pass through walls and floors.
- B. Sleeves for individual cables shall be hot-dip galvanized inside and outside. Sleeve shall be equal in gauge to heavy wall steel conduit and extended 3 inches above finished surface or wall.
- C. Furnish complete dimensioned drawings of openings required through walls and floors, for conduits, or busways, or wireways, before the work of other sections is performed in the respective areas.
- D. Installation of 3 inch high concrete curbs around openings through concrete slabs in electrical closets and other openings, shall be provided under Division 3.
- E. Pack or fill sleeves and openings after the completed work is in place. Filling shall comply with U.L., match rating of original construction and shall provide a waterproof and fireproof packing to prevent leakage of liquid, smoke, or fire through the sleeve or opening.

### 3.8 EQUIPMENT NOISE LIMITATION

- A. Noise levels of electrical devices and equipment shall be within acceptable limits as established by NEMA or other valid noise rating agencies. Noise levels shall be subject to the Architect/Engineer's acceptance, based on practical and reasonable consideration of occupancy requirements.
- B. Check and tighten the fastenings of sheet metal plates, covers, doors, and trims to prevent vibration isolation and chatter under normal conditions of use.
- C. When located elsewhere than in high-noise-level equipment rooms, the enclosures of solenoid-operated switching devices and other noise-producing device shall have anti-vibration mountings and non-combustible sound-absorbing linings.
- D. Reactors, dimmers, lamp ballasts, and solenoids shall be designed and rated for "quiet" operation.
- E. Remove and replace any individual electrical item or device that is found to produce a sound energy output exceeding that of other identical devices installed at the project.

### 3.9 EXECUTION, CORRELATION AND INTENT OF DOCUMENTS

- A. In the event that conflicts, if any, cannot be settled promptly and amicably between the affected trades, with work proceeding in a workmanlike manner, then the Architect/Engineer shall decide which work is to be relocated and his judgment shall be final and binding on this Contractor.

3.10 ADJUSTMENTS

- A. The primary adjustments of the system(s) shall be accomplished by the Contractor to the complete satisfaction of the Owner and Architect/Engineer at the time of completion of the installation.

3.11 ACCESS PANELS

- A. Provide access panels as required. The access panels shall comply with Division 8.

3.12 TESTING

- A. General: Furnish meters, instruments, cable connections, equipment or apparatus necessary for making all tests.
- B. Insulation Tests:
  - 1. After being pulled in place and before being connected, test all service and feeder cables with 1000 volt, 60 Hz insulation tester for one minute to determine that conductor insulation resistance to ground is not less than that recommended by the manufacturer. Test all branch circuit conductors for lighting, receptacle and miscellaneous loads prior to connection of loads. Tests shall not register less than one megohm to ground during an insulation test as described above for service and feeder cables. Remove, replace and retest all cable failing insulation test.
  - 2. Measure insulation resistance of electrical wiring with a self-contained instrument such as direct-indicating ohmmeter of the generator battery or electronic type.
  - 3. Unless otherwise specified, the insulation resistance shall be approximately one megohm for each 1000 volts of operating voltage with a minimum value of one megohm.
- C. Test all motors under load, with ammeter readings taken in each phase and the RPM of motors recorded at the time. Test all motors for correct direction of rotation.
- D. Documentation: Keep records of all tests, in tabulated, permanent, reproducible form, completely indexed and explained, indicating the specific test performed, environmental conditions such as temperature and humidity, date of performance, results obtained, corrective actions taken (if any), final results, and comments, if required. Copies of all tests shall be delivered to the Architect/Engineer prior to this final project review.

### 3.13 MOUNTING HEIGHTS

- A. Mounting heights of electrical items shall be as listed below, unless otherwise specified, or by the Architect/Engineer's field instructions. Dimensions are above finished floor, unless otherwise indicated. In areas where codes require different mounting heights, as in hazardous areas, comply with code requirements.

1. General Receptacles	- 18" to C.L.
2. Outdoor Receptacles	- 24" to C.L.
3. General Tele and Data Outlets	- 18" to C.L.
4. General Toggle Switches	- 44" to C.L.
5. Fire Alarm Pull Stations	- 44" to C.L.
6. Security and Intercom Call Stations	- 44" to C.L.
7. Clock and Paging Speaker Outlets	- 84" to C.L.
8. Fire Alarm AudioVisual Devices	- 80" to C.L.
9. Corridor Wall Sconces ( $\geq 4$ " deep)	- 66" to C.L.
10. Exit Signs	- 90" to C.L.
11. Volume Controls	44" to C.L.
12. T.V. Outlets	80" to C.L.
12. Individual Disconnects and Starters	- 60" to C.L.
13. Grouped Disconnects and Starters	$\geq 12$ " to C.L. $\leq 72$ " to C.L.
14. Panelboard Overcurrent Devices	$\geq 12$ " to C.L. $\leq 72$ " to C.L.

END OF SECTION 260500

## SECTION 260503 - EQUIPMENT WIRING

### PART 1 – GENERAL

#### 1.1 SECTION INCLUDES

- A. Electrical connections to equipment.

#### 1.2 RELATED SECTIONS

- A. Section 26 05 32 - Conduit.
- B. Section 26 05 19 - Building Wire and Cable.
- C. Section 26 05 33 - Boxes.

#### 1.3 REFERENCES

- A. Section 01090 - Reference Standards: Requirements for references and standards.
- B. NEMA WD 1 - General Purpose Wiring Devices.
- C. NEMA WD 6 - Wiring Devices - Dimensional Requirements.
- D. NFPA 70 - National Electrical Code.

#### 1.4 SUBMITTALS FOR REVIEW

- A. Submit under provisions of the General Requirements.

#### 1.5 SUBMITTALS FOR INFORMATION

- A. Submit under provisions of the General Requirements.

## 1.6 REGULATORY REQUIREMENTS

- A. Conform to requirements of local electrical code.
- B. Products: Listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

## 1.7 COORDINATION

- A. Section 26 05 00 - Basic Electrical Requirements.
- B. Obtain and review shop drawings, product data, manufacturer's wiring diagrams, and manufacturer's instructions for equipment furnished under other sections.
- C. Determine connection locations and requirements.
- D. Sequence rough-in of electrical connections to coordinate with installation of equipment.
- E. Sequence electrical connections to coordinate with start-up of equipment.

## PART 2 – PRODUCTS

Not Used.

## PART 3 – EXECUTION

### 3.1 EXAMINATION

- A. Section 26 05 00 - Basic Electrical Requirements: Verification of existing conditions prior to beginning work.
- B. Verify that equipment is ready for electrical connection, wiring, and energization.

### 3.2 ELECTRICAL CONNECTIONS

- A. Make electrical connections in accordance with equipment manufacturer's instructions.
- B. Make conduit connections to equipment using flexible conduit. Use liquidtight flexible conduit with watertight connectors in damp or wet locations.
- C. Connect heat producing equipment using wire and cable with insulation suitable for temperatures encountered.
- D. Provide receptacle outlet to match attachment plug.
- E. Provide cord and cap where field-supplied attachment plug is required.
- F. Install suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.
- G. Install disconnect switches, controllers, control stations, and control devices to complete equipment wiring requirements.
- H. Install terminal block jumpers to complete equipment wiring requirements.
- I. Install interconnecting conduit and wiring between devices and equipment to complete equipment wiring requirements.
- J. Seal roof penetrations properly and as recommended by roofing manufacturer.

### 3.3 MECHANICAL EQUIPMENT SCHEDULE

- A. As soon as practical and before any material or equipment is purchased or installed, the contractor shall submit for review, the mechanical equipment connection schedule for all mechanical equipment, completely filled in. The mechanical contractor shall stamp the mechanical equipment schedule to certify that he has coordinated and reviewed it. Any material or equipment installed without stamped or written approval of the mechanical equipment connection schedule shall be removed, modified or otherwise corrected at no additional cost to the Owner.



B.

MECHANICAL EQUIPMENT CONNECTION SCHEDULE						
EQUIPMENT DESIGNATION TAG	LOAD			BREAKER SIZE	FUSE SIZE	CONDUIT AND WIRE SIZE
	VOLTS	PHASE	H.P.			
STEAM BOILER						
HOT WATER PUMP						
BOILER CIRCULATION PUMP						
CONDENSATE PUMP						
VACUUM PUMP/RECEIVER						
FEED PUMP						
SUSPENDED UNIT HEATER						
CLASSROOM UNIT VENTILATOR						

END OF SECTION 260503

## SECTION 260519 - BUILDING WIRE AND CABLE

### PART 1 – GENERAL

#### 1.1 RELATED DOCUMENTS

- A. The General Provisions of the Contract, including Conditions of the Contract and the General Requirement Specification Sections, apply to the work in this Section.
- B. This Section is hereby made a part of all other sections of Division 26 as fully as if repeated in each therein.

#### 1.2 SECTION INCLUDES

- A. Building wire and cable.
- B. Wiring connectors and connections.

#### 1.3 RELATED SECTIONS

- A. Section 260553 - Electrical Identification.
- B. Section 260526 - Grounding and Bonding.

#### 1.4 REFERENCES

- A. NECA Standard of Installation (National Electrical Contractors Association).
- B. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems (International Electrical Testing Association).
- C. NFPA 70 - National Electrical Code.

#### 1.5 SUBMITTALS

- A. Submit under provisions of The General Requirement Specification Sections and Section 260500.
- B. Product Data: Provide for each cable assembly type.
- C. Test Reports: Indicate procedures and values obtained.

- D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements.
- E. Project Record Documents: Record actual locations of components and circuits.

## 1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years experience.

## 1.7 REGULATORY REQUIREMENTS

- A. Conform to requirements of local electrical code, unless otherwise specified.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

## 1.8 COORDINATION

- A. Coordinate under provisions of the General Requirement Specification Sections and Section 260500.
- B. Field Measurements: Verify that field measurements are as shown on Drawings.
- C. Where wire and cable routing is shown on Drawings, it is approximate unless dimensioned. Include wire and cable lengths within 10 ft of length where shown.
- D. Where wire and cable destination is indicated and routing is not shown on Drawings, determine exact routing and lengths required.

## PART 2 – PRODUCTS

### 2.1 BUILDING WIRE

- A. Manufacturers:
  - 1. American Insulated Wire Corp.
  - 2. Cerro.
  - 3. Collyer.
  - 4. Capitol Wire and Cable.
  - 5. Okonite.
  - 6. Senetor.
  - 7. South Wire.
  - 8. Triangle.
  - 9. Owner Approved Equal.

B. Description: Single conductor insulated copper wire.

1. AWG No. 12 minimum, unless otherwise specified.
2. AWG No. 10 and smaller may be solid or stranded, unless otherwise specified.
3. AWG No. 8 and larger shall be stranded.
4. AWG No. 14 stranded, for control and signal wire, unless otherwise specified.
5. Provide wire and cable suitable for the temperature, conditions and location where indicated.
6. Conductivity: Copper conductors shall have a conductivity of not less than 98% at 20°C (68°F). Conductor resistance values shall be in accordance with the values in NEMA WC 8.
7. Jackets: Factory-applied nylon or PVC external jacketed wires and cables for pulls in raceways over 100-feet in length, for pulls in raceways with more than three equivalent 90° bends, for pulls in conduits underground or under slabs on grade, and where indicated.

C. Insulation: 600 volts NFPA 70 Types as follows:

1. Wire Location	Line/Load terminations on OCP devices rated from 15A thru 600A	Line/Load Terminations on 100% rated OCP devices
Interior Locations	THHN/THWN XHHW	<45°C ambient XHHW >45°C ambient
Exposed Exterior	THHN/THWN	XHHW damp locations XHHW-2 wet locations
Concealed in Slab	THHN/THWN XHHW	<45°C ambient N/A >45°C ambient
Below Slab	THHN/THWN	XHHW-2
Below Grade	THHN/THWN	XHHW-2

## 2.2 WIRING CONNECTORS

A. Solderless Insulated Mechanical Connectors:

1. Manufacturers:
  - a. Burndy DUC.
  - b. Dossert GTC.
  - c. OZ/Gedney XTPC.
  - d. Thomas & Betts CTC.
  - e. Owner Approved Equal.

2. Provide parallel clamp connector with insulating cover.
3. Connector shall be constructed of an all copper alloy with bolted tangential plates which will receive the clamping pressure and redistribute the pressure uniformly over the entire surface of the clamping mechanism.
4. Insulating cover shall be of the same manufacturer as the connectors and shall have cable openings suitable for the cable insulation being installed. Where insulating covers do not completely seal taps, tape the installation. The insulating cover shall not kink or crimp the cable insulation when cover is completely closed.

B. Spring Wire Connectors:

1. Manufacturers:
  - a. Thomas & Betts PT.
  - b. 3M Scotchloc.
  - c. Owner Approved Equal.

C. Compression Connectors:

1. Manufacturers:
  - a. Burndy Hydent.
  - b. Thomas & Betts 54000.
  - c. Owner Approved Equal.
2. One-hole lugs for AWG No. 4/0 and smaller.
3. Two-hole lugs for AWG No. 250 kcmil and larger.
4. Feeders 1200 Amps and larger shall include cable limiter type lugs at each end of each phase conductor.

## 2.3 ADDITIONAL ACCESSORIES

- A. In the event that conduit and wire sizes increase beyond the motor or equipment manufacturer's normal provisions for conduit and wire terminations, due to voltage-drop or other considerations in motor branch-circuit designs, provide necessary auxiliary termination facilities with adequate boxes, lugs, terminals, and other components as may be required. Consult with the suppliers of motors and other items to insure that the equipment is furnished with suitable components to accept the required conduits and wires.
- B. Riser cables shall have cable supports as required by code.

## PART 3 – EXECUTION

### 3.1 EXAMINATION

- A. Verify that interior of building has been protected from weather.
- B. Verify that raceway installation is complete and supported.

### 3.2 PREPARATION

- A. Completely and thoroughly swab raceway before installing wire.
- B. Install wiring in conduits buried in plaster or in poured concrete after the encasing medium is set and dry.

### 3.3 INSTALLATION

- A. Route wire and cable as required to meet Project Conditions.
- B. Install cable in accordance with the NECA "Standard of Installation."
- C. Pull all conductors into raceway at same time.
- D. Use pulling means including fish tape, cable, rope and basket weave wire/cable grips which will not damage cables or raceways.
- E. Feeders shall be installed as continuous conductors without splices whenever possible. Where feeder splices are required, the contractor shall submit a request for approval in writing to the engineer indicating the feeder and splice location. Where splices are installed without written approval, the engineer reserves the right to have the contractor replace the spliced conductors with continuous conductors at no additional cost to the Owner.
- F. Use suitable wire pulling lubricant for building wire 4 AWG and larger.
  - 1. Cable lubricants shall be less than 6 percent solid residue after drying for 24 hours at 105°C. Cable lubricants shall not contain any waxes, greases, polyakylene glycol oils, or silicones. Manufacturer: Polywater J by American Polywater Corp.
- G. Protect exposed cable from damage. Install exposed cable, parallel and perpendicular to surfaces, or exposed structural members, and follow surface contours, where possible.
- H. Support signal cables above accessible ceiling, using cable ties to support cables from structure. Do not rest cable on ceiling grid.

- I. Use suitable cable fittings, connectors, and supports.
  - 1. Cable supports shall be as required by Code and shall be compatible with the wire and cable type and the associated conduit size.
    - a. Manufacturer: OZ/Gedney or Thomas & Betts.
    - b. Owner Approved Equal.
- J. Increase conductor size as required due to availability. Minimum feeder conductor sizes are shown on Drawings. If increased, be responsible for associated feeder conduit size and increased ground conductor size per NEC.
- K. Provide conductors of the same size from the protective device to the last load.
- L. Make conductor length identical for parallel feeders.
- M. Support conductors in vertical raceways. One cable support shall be provided at the top or as close to the top as practical, plus a support for each additional interval of spacing per Table 300-19a of the NEC.
- N. Provide slack wire for all future connections with ends of wires taped and blank box covers installed.
- O. Do not bend cables, either permanently or temporarily during installation, to radii less than that recommended by the manufacturer.
- P. Use conductors with 90°C insulation when wiring is within seven feet of, passing over or attached to the following:
  - 1. Boilers.
  - 2. Hot water heaters.
  - 3. Other heat producing equipment.
- Q. Neatly train and lace wiring inside boxes, equipment, and panelboards.
- R. Splices, Taps and Terminations
  - 1. Make splices and taps in wiring #10 AWG and smaller mechanically and electrically secure with mechanical pressure type splicing devices.
  - 2. Make splices and taps of conductors #8 AWG or larger and all splices in motor terminal boxes using compression connectors requiring the use of compression tools for securing the conductors in the connectors. Termination of conductors at all distribution equipment, except transformers, shall be made using mechanical lugs. Connectors shall be of high conductivity, corrosion-resistant material and have actual contact area that shall provide at least the current carrying capacity of the wire or cable. For conductors #1/0 and larger, connector lugs shall be of the two-hole type. Connector lugs shall be bolted to bussing using Belleville washers in combination with flat washers and nuts.

3. Each conductor lug or bus shall be individually made with separate lug and/or bolt as required for the termination.
  4. Provide insulated connectors for splices and taps with a self-fusing rubber insulating tape that is non-corrosive to the connector and the conductor. Insulation tape shall have a minimum of 350 volts per mil dielectric strength. Friction or vinyl tape shall be applied directly over rubber insulating tape equal to 3M Scotch 88 type.
- S. Tighten electrical connectors and terminals, including screws and bolts, in accordance with manufacturer's published torque tightening values. Where manufacturer's torquing requirements are not indicated, tighten connector and terminals to comply with tightening torques specified in UL Standards 486A and B.
- T. Identify and color code wire and cable under provisions of Section 260553. Identify each conductor with its circuit number or other designation indicated. Wire color coding shall be as follows or as required by local codes:

Normal Power

120/208 Volts:  
Phase A – Black  
Phase B – Red  
Phase C – Blue  
Neutral – White  
Ground – Green

### 3.4 MAXIMUM BRANCH CIRCUIT LENGTHS

- A. The following indicates maximum installed length a circuit can have and still maintain an adequate voltage level at the last point of use for 20 amp circuit. If the 20 amp circuit length exceeds the length listed, use the next larger wire sized. Multiple circuit runs in the same raceway shall have all conductors sizes the same based on worst case circuit lengths. Conductor sizes indicated on the drawings are for informational purposes only and must be confirmed by actual field condition distances.

### 3.5 BRANCH CIRCUIT LENGTH (IN FEET)

Wire Size	2 Wire 120 V	1 Phase 208V	3 Phase 208 V
12	0 to 61'	0 to 105'	0 to 122'
10	62' to 97'	106' to 168'	123' to 194'
8	98' to 154'	169' to 267'	195' to 309'
6	155' to 246'	268' to 426'	310' to 491'



### 3.6 FIELD QUALITY CONTROL

- A. Testing: Upon installation of wires and cables and before electrical circuitry has been energized, demonstrate product capability and compliance with requirements.
  - 1. Procedures: Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification, Section 7.3.1. Certify compliance with test parameters.
- B. Correct malfunctioning products at site, where possible, and retest to demonstrate compliance; otherwise remove and replace with new units, and retest.
- C. Inspection: Inspect wire and cable for physical damage and proper connection.
- D. Insulation Resistance Test: Prior to energization of circuitry, check installed wires and cables with megohm meter to ensure insulation resistance requirements are fulfilled.
- E. Continuity Test: Perform continuity test on all power and equipment branch circuit conductors. Verify proper phasing connections. Correct if necessary.
- F. Branch Circuits with Receptacles: Branch circuit receptacle wiring shall be tested using a Daniel Woodhead Co. circuit tester Model #1750.
- G. Torque Test: Torque test conductor connections and terminations to manufacturer's recommended values.

END OF SECTION 260519

## SECTION 260526 - GROUNDING AND BONDING

### PART 1 – GENERAL

#### 1.1 RELATED DOCUMENTS

- A. The General Provisions of the Contract, including Conditions of the Contract and the General Requirement Specification Sections, apply to the work in this Section.
- B. This Section is hereby made a part of all other sections of Division 26 as fully as if repeated in each therein.

#### 1.2 SECTION INCLUDES

- A. Grounding electrodes and conductors.
- B. Equipment grounding conductors.
- C. Bonding.

#### 1.3 REFERENCES

- A. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems (International Electrical Testing Association).
- B. NFPA 70 - National Electrical Code.

#### 1.4 SUBMITTALS

- A. Submit under provisions of the General Requirements and Section 260500.
- B. Product Data: Provide for grounding electrodes and connections.
- C. Test Reports: Indicate overall resistance to ground and resistance of each electrode.
- D. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.
- E. Project Record Documents: Record actual locations of components and grounding electrodes.

1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

1.6 REGULATORY REQUIREMENTS

- A. Conform to requirements of NFPA 70 - National Electrical Code.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

1.7 COORDINATION

- A. Coordinate under provisions of the General Requirements and Section 260500.

PART 2 – PRODUCTS

2.1 GROUNDING SYSTEM

- A. Description: Complete grounding system of rod electrodes, with connections to metal underground water pipe and building frame.
- B. Grounding System Resistance: 1-5 ohms.

2.2 ROD ELECTRODES

- A. Manufacturers:
  - 1. Harger Lightning Protection, Inc.
  - 2. Thompson Lightning Protection, Inc.
  - 3. Independent Protection Co., Inc.
  - 4. Owner Approved Equal.
- B. Material: Copper.
- C. Diameter: 3/4 inch.
- D. Length: 10 feet.

## 2.3 MECHANICAL CONNECTORS

### A. Manufacturers:

1. Appleton.
2. OZ/Gedney.
3. Thomas & Betts.
4. Harger Lightning Protection, Inc.
5. Thompson Lightning Protection, Inc.
6. Independent Protection Co., Inc.
7. Owner Approved Equal.

### B. Material: Bronze.

## 2.4 WIRE

### A. Material: Stranded copper.

### B. Grounding Electrode Conductor: Size to meet local code requirements.

### C. Grounding Conductors: Size to meet electrical code requirements. Green insulated, 600 volt minimum, stranded copper within raceway.

## 2.5 GROUNDING BUSHINGS

### A. Manufacturers:

1. Appleton GIB-50L.
2. OZ/Gedney IBC-50L.
3. Thomas & Betts 3870.
4. Owner Approved Equal.

### B. Material: Malleable iron, threaded, with insulated liner and solderless lug.

## PART 3 – EXECUTION

## 3.1 EXAMINATION

### A. Verify conditions under provisions of the General Requirement Specification Sections.

### B. Verify that final backfill and compaction has been completed before driving rod electrodes.

### 3.2 INSTALLATION

- A. Install rod electrodes at locations indicated. Install additional rod electrodes as required to achieve specified resistance to ground. Drive rod electrodes into permanent moisture where soil conditions permit. Rod spacing shall be minimum two and one half rod lengths to nearest electrode.
- B. Install bare copper wire in foundation footing where indicated.
- C. Provide grounding electrode conductor and connect to reinforcing steel in foundation footing where indicated.
- D. Provide bonding to meet Regulatory Requirements.
- E. Bond together metal components including supports, elevator rails, pipes, and ducts not attached to grounded structure.
- F. Provide isolated grounding conductor for circuits as indicated.
- G. Provide a separate ground conductor in each feeder and branch circuit wiring.
  - 1. The Equipotential Grounding System shall consist of grounding and bonding conductors connected to ground bars arranged to minimize potential differences between exposed conductive surfaces of electrical and non-electrical equipment.
  - 2. All bonding and grounding conductors shall be installed in one continuous length, without splice, to ground bar.
  - 3. Minimum size:
    - a) No. 12 AWG to receptacles, light switches, and light fixtures.
- H. Equipment Ground Bus: Provide ground bus within each switchboard, motor control center, and panelboard.
- I. Equipment Grounding Conductor: Provide separate, insulated conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing.
- J. Flexible Conduit Connections: Provide separate, insulated ground bonding-jumper conductor within each flexible conduit.
- K. Interface with site grounding system installed under the General Requirement Specification Sections.
- L. Bond together metal sides not attached to grounded structure; bond to ground.
- M. Provide red plastic sign at main water service meter indicating "main ground location".

END OF SECTION 260526

## SECTION 260529 - SUPPORTING DEVICES

### PART 1 – GENERAL

#### 1.1 RELATED DOCUMENTS

- A. The General Provisions of the Contract, including Conditions of the Contract and the General Requirement Specifications, apply to the work in this Section.
- B. This Section is hereby made a part of all other sections of Division 26 as fully as if repeated in each therein.

#### 1.2 SECTION INCLUDES

- A. Conduit and equipment supports.
- B. Anchors and fasteners.
- C. Vibration Isolation.
- D. Equipment Bases.

#### 1.3 RELATED SECTIONS.

- A. Section 260526 - Grounding and Bonding.

#### 1.4 REFERENCES

- A. NECA - National Electrical Contractors Association.
- B. National Electrical Code.

#### 1.5 SUBMITTALS

- A. Submit under provisions of the General Requirements and Section 260500.
- B. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.

1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing Products specified in this Section with minimum three years experience.

1.7 REGULATORY REQUIREMENTS

- A. Conform to requirements of National Electrical Code.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

1.8 COORDINATION

- A. Coordinate under provisions of the General Requirement Specification Sections and Section 260500.

PART 2 – PRODUCTS

2.1 PRODUCT REQUIREMENTS

- A. Materials and Finishes: Provide adequate corrosion resistance.
- B. Provide materials, sizes, and types of anchors, fasteners and supports to carry the loads of equipment and conduit. Consider weight of wire in conduit when selecting products. Design of supports and methods of fastening to building structures shall be acceptable to the Architect/Engineer.
- C. Anchors and Fasteners: For point of attachment weight of 100 pounds or less.
  - 1. Concrete Structural Elements: Use precast insert system, expansion anchors, and preset inserts.
  - 2. Steel Structural Elements: Use beam clamps.
  - 3. Concrete Surfaces: Use self-drilling anchors and expansion anchors.
  - 4. Hollow Masonry, Plaster, and Gypsum Board Partitions: Use toggle bolts.
  - 5. Solid Masonry Walls: Use expansion anchors and preset inserts.
  - 6. Sheet Metal: Use sheet metal screws.
  - 7. Wood Elements: Use wood screws.
- D. Anchors and Fasteners: For point of attachment weight of 100 pounds or more, obtain direction and approval from Architect/Engineer.

## 2.2 STEEL CHANNEL

### A. Manufacturer:

1. B-Line.
2. Unistrut.
3. Allied.
4. Owner Approved Equal.

### B. Description: Galvanized steel with baked enamel finish.

## 2.3 VIBRATION ISOLATION

- A. Suspended vibration producing equipment shall have spring elements in the hanger rods or isolation pads under the equipment.

## 2.4 EQUIPMENT BASES

- A. Provide 4" high concrete pads for floor mounted electrical equipment. The edge of the concrete pads shall have 1/4" chamfer. The pad dimensions shall be at least one inch greater on each side than the floor dimensions of the electrical equipment.
- B. Concrete pads shall include steel reinforcing and necessary bolts, anchors, etc. Where concrete pad is set directly on concrete floor, dowels in floor to tie base to floor shall be provided.

## PART 3 – EXECUTION

### 3.1 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Provide anchors, fasteners, and supports in accordance with NECA "Standard of Installation".
- C. Do not fasten supports to pipes, ducts, mechanical equipment, and conduit.
- D. Do not use ceiling system components for support.
- E. Connections to vibration producing equipment shall be made with flexible conduit.
- F. Obtain permission from Architect/Engineer before using spring steel clamps.
- G. Obtain permission from Architect/Engineer before using powder-actuated anchors.
- H. Obtain permission from Architect/Engineer before drilling or cutting structural members.



- I. Fabricate supports from structural steel or steel channel. Rigidly weld members or use hexagon head bolts to present neat appearance with adequate strength and rigidity. Use spring lock washers under all nuts.
- J. Install surface-mounted cabinets and panelboards with minimum of four anchors.
- K. In wet and damp locations use steel channel supports to stand cabinets and panelboards one inch off wall.
- L. Use sheet metal channel to bridge studs above and below cabinets and panelboards recessed in hollow partitions.
- M. Provide weight-distributing facilities, where required, so as not to exceed the load-bearing capabilities of floors or walls that bear the weight of, or support, electrical items.
- N. Exposed parts of hangers and supports shall be painted with one coat of rust-inhibiting primer.
- O. Equipment shall not be held in place by its own dead weight. Provide base anchor fasteners in each case.
- P. Vertical raceway shall be supported with spring type hangers.

END OF SECTION 260529

## SECTION 260532 - CONDUIT

### PART 1 – GENERAL

#### 1.1 RELATED DOCUMENTS

- A. The General Provisions of the Contract, including Conditions of the Contract and the General Requirement Specification Sections, apply to the work in this Section.
- B. This Section is hereby made a part of all other sections of Division 26 as fully as if repeated in each therein.

#### 1.2 SECTION INCLUDES

- A. Metal conduit.
- B. Flexible metal conduit.
- C. Liquidtight flexible metal conduit.
- D. Electrical metallic tubing.
- E. Fittings and conduit bodies.

#### 1.3 RELATED SECTIONS

- A. Section 260533 - Boxes.
- B. Section 260526 - Grounding and Bonding.
- C. Section 260529 - Supporting Devices.
- D. Section 260553 - Electrical Identification.

#### 1.4 REFERENCES

- A. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated.
- B. ANSI C80.3 - Electrical Metallic Tubing, Zinc Coated.
- C. ANSI/NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.
- D. National Electrical Code.

- E. NECA "Standard of Installation."
- F. NEMA RN 1 - Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit.
- G. NEMA TC 3 - PVC Fittings for Use with Rigid PVC Conduit and Tubing.

#### 1.5 SUBMITTALS

- A. Submit under provisions of the General Requirement Specification Sections and Section 260500.
- B. Product Data: Provide for metallic conduit, flexible metal conduit, liquidtight flexible metal conduit, metallic tubing, nonmetallic conduit, fittings, and conduit bodies.
- C. Project Record Documents: Accurately record actual routing of conduits 1 1/4 inches and larger.

#### 1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing Products specified in this Section with minimum three years experience.

#### 1.7 REGULATORY REQUIREMENTS

- A. Conform to requirements of National Electrical Code.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

#### 1.8 COORDINATION

- A. Coordinate under provisions of the General Requirement Specification Sections and Section 260500.
- B. Design Requirements: Conduit Size per National Electrical Code.
- C. Field Measurements: Verify that field measurements are as shown on Drawings.
- D. Field Locations: Verify routing and termination locations of conduit prior to rough-in.
- E. Where conduit routing is shown on Drawings, it is in approximate locations unless dimensioned. Include conduit lengths within 10 ft of length where shown.
- F. Where conduit destination is indicated and routing is not shown on Drawings, determine exact routing and lengths required.

## 1.9 DELIVERY, STORAGE, PROTECTION, AND HANDLING

- A. Accept Products and inspect for damage.
- B. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.
- C. Conduit that shows corrosion within the guarantee period shall be replaced.

## PART 2 – PRODUCTS

### 2.1 CONDUIT SCHEDULE

A. Conduit Location	From 0 V up thru 50V	Above 50V up thru 250V
Above an Accessible Ceiling	$\leq 2\frac{1}{2}"$ EMT $\geq 3"$ IMC	$\leq 2\frac{1}{2}"$ EMT $\geq 3"$ IMC
Concealed in Walls	$\leq 2\frac{1}{2}"$ EMT $\geq 3"$ IMC	$\leq 2\frac{1}{2}"$ EMT $\geq 3"$ IMC
Exposed Interior	$\leq 2\frac{1}{2}"$ EMT $\geq 3"$ IMC	$\leq 2\frac{1}{2}"$ EMT $\geq 3"$ IMC
Concealed in Slab	$\leq 1"$ EMT $\geq 1\frac{1}{4}"$ IMC	$\leq 1"$ EMT $\geq 1\frac{1}{4}"$ IMC
Below Slab	IMC/PVC	IMC/PVC
Hazardous Areas	IMC	IMC
Exposed Exterior	HWG	HWG
Below Grade	HWG/PVC	HWG/PVC

\* All voltages are line-to-line or line-to-neutral.

## 2.2 CONDUIT REQUIREMENTS

- A. Minimum Size: 3/4 inch except conduits to switches and receptacles having 5 or less #12 conductors shall be 1/2" C unless noted otherwise. All remaining conduits shall be minimum of 3/4" including conduits for telephone, data, any other control, intercom device, etc.
- B. Final connections to motors shall be made through UL listed liquid tight flexible steel conduits, 1/2 inch minimum size unless otherwise indicated.
- C. Flexible connections, where required, shall be made with flexible metallic tubing 1/2 inch minimum size or sized in accordance with code, except in areas where such connections will be exposed to oil, grease, water, or where installed out of doors. In those areas of adverse exposure, flexible connections shall be made with UL listed liquid tight flexible steel conduit. Grounding conductors with green colored insulation shall be extended through all flexible connections including fixture "whips", and fastened to terminals within the first junction boxes on either side of the flexible length. Refer to Section 265100 for flexible connections to lighting fixtures

## 2.3 METAL CONDUIT

- A. Manufacturers:
  - 1. Allied.
  - 2. LTV/Republic.
  - 3. Steelduct.
  - 4. Wheatland.
  - 5. Owner Approved Equal.
- B. Rigid Steel Conduit: ANSI C80.1; hot dipped galvanized or electro-galvanized steel.
- C. Intermediate Metal Conduit (IMC): Rigid steel.
- D. Fittings and Conduit Bodies: ANSI/NEMA FB 1; all steel fittings of threaded joints.

## 2.4 FLEXIBLE METAL CONDUIT

- A. Description: Interlocked galvanized steel construction.
- B. Fittings: ANSI/NEMA FB 1; steel or malleable iron.
- C. Minimum Size: 1/2 inch (13 mm), unless otherwise specified.

## 2.5 LIQUIDTIGHT FLEXIBLE METAL CONDUIT

### A. Manufacturers:

1. Anaconda.
2. American Brass.
3. Electri-Flex Company.
4. Owner Approved Equal.

B. Description: Interlocked galvanized steel construction with UL PVC jacket.

C. Fittings: ANSI/NEMA FB 1; steel or malleable iron.

## 2.6 ELECTRICAL METALLIC TUBING (EMT)

### A. Manufacturers:

1. Allied.
2. LTV/Republic.
3. Steelduct.
4. Wheatland.
5. Owner Approved Equal.

B. Description: ANSI C80.3; hot dipped or electro-galvanized tubing.

## 2.7 EMT FITTINGS AND CONDUIT BODIES

### A. Manufacturers:

1. Appleton.
2. Crouse Hinds/Midwest.
3. OZ/Gedney.
4. Racor.
5. Steel City.
6. T&B
7. Owner Approved Equal.

B. Description: ANSI/NEMA FB 1; steel or malleable iron, compression type with insulated throat.

1. Set-screw type fittings are not acceptable.
2. Die-cast fittings of pot metal are not acceptable.

## 2.8 EXPANSION FITTINGS

- A. Provide a suitable expansion fitting in each concealed or exposed electrical raceway crossing a building expansion joint. Fittings shall be complete with bonding jumper and clamps.
- B. Manufacturers: OZ/Gedney, Crouse-Hinds and Appleton.

## 2.9 BUSHINGS

- A. Bushings for conduits 1 inch and smaller shall be self-extinguishing thermoplastic grounding type – 150 degrees C. and insulating type.
- B. Bushings for conduits 1 ¼ inch and larger shall be malleable iron body with 150 degree C. insulating ring and shall be grounding type. Insulating material shall be locked in place and non-removable.

## PART 3 – EXECUTION

### 3.1 INSTALLATION - CONDUIT

- A. Install conduit in accordance with NECA "Standard of Installation."
- B. Arrange conduit to maintain headroom and present neat appearance.
- C. Route conduit parallel and perpendicular to walls.
- D. Route conduit installed above accessible ceilings parallel and perpendicular to walls.
- E. Maintain adequate clearance, minimum of 12 inches, between conduit and piping.
- F. Maintain 12 inch clearance between conduit and surfaces with temperatures exceeding 104 degrees F.
- G. Cut conduit square using saw or pipecutter; de-burr cut ends.
- H. Install no more than equivalent of three 90-degree bends between boxes. Use conduit bodies to make sharp changes in direction, as around beams. Use hydraulic one-shot bender to fabricate bends in metal conduit larger than 2 inch size, or provide factory elbows.
- I. Provide suitable pull string in each empty conduit except sleeves and nipples.
- J. Ground and bond conduit under provisions of Section 260526.
- K. Identify conduit under provisions of Section 260553.
- L. In general, conduits shall be run concealed. Where exposed conduit runs are shown or required, they shall be run parallel to building construction and shall be suitably supported at required intervals.

- M. Conduits run to and from cabinets shall be run neatly, in accurate manner, and shall emerge from the floors and ceilings at right angles thereto.
- N. Conduit stub-ups and stub-downs shall be arranged in a neat and orderly manner and shall emerge at right angles to floors or ceilings.
- O. In equipment spaces, such as fan rooms, plenums, etc., conduits and outlets may be exposed, but shall avoid interference with ventilating ducts, piping, etc.
- P. Exposed conduit installed on or adjacent to ventilating ducts shall be installed after the ducts are in place, and shall be run from ceiling or wall junction boxes in such manner as to retain accessibility to junction box covers and to permit future removal or replacement of ducts.

### 3.2 INSTALLATION - FITTINGS

- A. Use conduit hubs or sealing locknuts to fasten conduit to sheet metal boxes in damp and wet locations and to cast boxes.
- B. Avoid moisture traps; provide junction box with drain fitting at low points in conduit system.
- C. Provide conduit seals for conduits and ducts entering/exiting hazardous locations.
- D. Provide suitable fittings to accommodate expansion and deflection where conduit crosses expansion joints and in each uninterrupted run of horizontal or vertical conduit in excess of 100 feet. Fittings shall be complete with bonding jumpers and clamps.
- E. Use suitable caps to protect installed conduit against entrance of dirt and moisture.
- F. Double locknuts shall be used at termination of IMC and HWG conduit in knock-out openings.
- G. Ends of conduits shall be equipped with insulating bushings for 1 inch and smaller and insulated metallic bushings for 1-1/4 inches and larger. Ends of conduit shall be temporarily capped prior to installation and during construction to exclude foreign material.
- H. Provide wall flanges and gasketing on conduits entering fan housings to minimize air leakage at points of penetration of housing.
- I. No running threads shall be cut or used.

### 3.3 INSTALLATION - SUPPORTS

- A. Arrange supports to prevent misalignment during wiring installation.
- B. Support conduit using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.
- C. Group related conduits; support using conduit rack. Construct rack using steel channel.



- D. Fasten conduit supports to building structure and surfaces under provisions of Section 260529.
- E. Do not support conduit with wire or perforated pipe straps. Remove wire used for temporary supports
- F. Do not attach conduit to ceiling support wires.
- G. Bring conduit to shoulder of fittings; fasten securely.
- H. Conduit risers shall be rigidly supported on the building structure, using appropriate supports only.
- I. Conduits and other electrical items shall not be fastened to or supported from ventilating ducts, but shall be separately supported. The method of supporting and details of the supporting members shall be reviewed by the Architect/Engineer. In no case shall screws penetrate the sheet metal of the ducts.
- J. Exposed conduits run on surfaces shall be supported according to code and within 3 feet of each outlet, junction box, or cabinet, by galvanized malleable conduit clamps and clamp backs. Suspended conduits shall be supported every 5 feet by conduit hangers and round rods, or where 2 or more conduits are run parallel, by trapeze hangers suitably braced to prevent swaying.
- K. Screws for exposed work shall be stainless steel.
- L. Cadmium plated steel screws may be used for interior unexposed dry locations only.
- M. All trenching, coring, backfilling and compacting for the electrical installation is by the electrical contractor. All excess debris from trenching and coring shall be removed from the site by the electrical contractor.

#### 3.4 INTERFACE WITH OTHER PRODUCTS

- A. Install conduit to preserve fire resistance rating of partitions and other elements, using materials and methods under the provisions of the General Requirements.
- B. Route conduit through roof openings for piping and ductwork or through suitable roof jack with pitch pocket. Coordinate location with roofing installation.

END OF SECTION 260532

## SECTION 260533 - BOXES

### PART 1 – GENERAL

#### 1.1 RELATED DOCUMENTS

- A. The General Provisions of the Contract, including Conditions of the Contract and the General Requirement Specification Sections, apply to the work in this Section.
- B. This Section is hereby made a part of all other sections of Division 26 as fully as if repeated in each therein.

#### 1.2 SECTION INCLUDES

- A. Wall and ceiling outlet boxes.
- B. Pull and junction boxes.

#### 1.3 RELATED SECTIONS

- A. Section 260925 - Wiring Devices.
- B. Section 260526 - Grounding and Bonding.
- C. Section 260529 - Supporting Devices.
- D. Section 260553 - Electrical Identification

#### 1.4 REFERENCES

- A. NECA (National Electrical Contractor's Association) Standard of Installation.
- B. NEMA FB 1 - Fittings and Supports for Conduit and Cable Assemblies.
- C. NEMA OS 1 - Sheet-steel Outlet Boxes, Device Boxes, Covers, and Box Supports.
- D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
- E. National Electrical Code.

## 1.5 SUBMITTALS

- A. Submit under provisions of the General Requirement Specification Sections and Sections 260500.
- B. Product Data: Provide for outlet boxes.
- C. Project Record Documents: Record actual locations and mounting heights of outlet boxes, floor boxes, junction boxes, and pull boxes.

## 1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing Products specified in this Section with minimum three years experience.

## 1.7 REGULATORY REQUIREMENTS

- A. Conform to requirements of National Electrical Code.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

## 1.8 COORDINATION

- A. Coordinate under provisions of the General Requirement Specification Sections and Section 260500.
- B. Field Measurements: Verify that field measurements are as shown on Drawings.
- C. Field Locations: Verify locations of boxes prior to installation.

## PART 2 – PRODUCTS

### 2.1 OUTLET BOXES

- A. Manufacturers:
  - 1. Appleton
  - 2. Raco
  - 3. Steel City
  - 4. Owner Approved Equal.

- B. Sheet Metal Outlet Boxes: NEMA OS 1, galvanized steel with knockouts.
  - 1. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; include 1/2 inch male fixture studs where required.
  - 2. Concrete Ceiling Boxes: Concrete type.
- C. Cast Boxes: NEMA FB 1, Type FD, cast ferrous alloy. Provide gasketed cover and threaded hubs.
- D. Wall Plates for Finished Areas: As specified in Section 262726.

## 2.2 PULL AND JUNCTION BOXES

- A. Sheet Metal Boxes: NEMA OS 1.
  - 1. Material: Hot-dipped galvanized steel.
  - 2. Covers: Secured with stainless steel screws.
  - 3. Finish: Paint interior and exterior with rust-inhibitive paint.
  - 4. Gaskets: Provide in accordance with applicable Code.
- B. Hinged Enclosures: As specified.
- C. Surface Mounted Cast Metal Box: NEMA 250, flat-flanged, surface mounted junction box:
  - 1. Material: Galvanized cast iron.
  - 2. Cover: Furnish with ground flange, neoprene gasket, and stainless steel cover screws.

## PART 3 – EXECUTION

### 3.1 EXAMINATION

- A. Verify locations and mounting heights of boxes and outlets prior to rough-in.

### 3.2 INSTALLATION

- A. Install boxes in accordance with NECA "Standard of Installation."
- B. Install in locations as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections and compliance with regulatory requirements.
- C. Set wall mounted boxes at elevations to accommodate mounting heights indicated.
- D. Electrical boxes are shown on Drawings in approximate locations unless dimensioned. Adjust box location up to 10 feet if required to accommodate intended purpose.

- E. Box sizes shall not be smaller than that required by Code for the number and size of wires and/or conduits to be installed.
- F. Orient boxes to accommodate wiring devices oriented as specified in Section 262726.
- G. Maintain headroom and present neat mechanical appearance.
- H. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.
- I. Inaccessible Ceiling Areas: Install outlet and junction boxes no more than 6 inches from ceiling access panel or from removable recessed luminaire.
- J. Plenum Ceiling Areas: Install boxes in accordance with applicable Code.
- K. Install boxes to preserve fire resistance rating of partitions and other elements, using materials and methods specified in the General Requirements.
- L. Coordinate mounting heights and locations of outlets mounted above counters, benches, and backsplashes.
- M. Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices.
- N. Outlet boxes for toggle switches shall be located on the strike side of the door.
- O. Use flush mounting outlet box in finished areas.
- P. Locate flush mounting box in masonry wall to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening.
- Q. Do not install flush mounting box back-to-back in walls; provide minimum 6 inches separation. Provide minimum 24 inches separation in acoustic rated walls.
- R. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.
- S. Use stamped steel bridges to fasten flush mounting outlet box between studs.
- T. Install flush mounting box without damaging wall insulation or reducing its effectiveness.
- U. Use adjustable steel channel fasteners for hung ceiling outlet box.
- V. Do not fasten boxes to ceiling support wires.
- W. Support boxes independently of conduit.
- X. Use gang box where more than one device is mounted together. Do not use sectional box.
- Y. Use gang box with plaster ring for single device outlets.
- Z. Use cast outlet box in exterior locations and wet locations.

3.3 INTERFACE WITH OTHER PRODUCTS

- A. Coordinate installation of outlet box for equipment connected under Section 260503.

3.4 ADJUSTING

- A. Adjust installed work under the provisions of the General Requirements.
- B. Adjust flush-mounting outlets to make front flush with finished wall material.
- C. Install knockout closures in unused box openings.

3.5 CLEANING

- A. Clean installed work under the provisions of the General Requirements Specification Sections.
- B. Clean interior of boxes to remove dust, debris, and other material.
- C. Clean exposed surfaces and restore finish.

END OF SECTION 260533

## SECTION 260539 - SURFACE RACEWAYS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. The General Provisions of the Contract, including Conditions of the Contract and the General Requirements, apply to the work in this Section.
- B. This Section is hereby made a part of all other sections of Division 26 as fully as if repeated in each therein.

#### 1.2 SECTION INCLUDES

- A. Surface metal raceways.
- B. Wireways.

#### 1.3 RELATED SECTIONS

- A. Section 26 27 23 - Wiring Devices: Receptacles.

#### 1.4 REFERENCES

- A. NECA (National Electrical Contractor's Association) Standard of Installation.
- B. NEMA WD 6 - Wiring Device Configurations.
- C. National Electric Code.

#### 1.5 SUBMITTALS

- A. Submit under provisions of the General Requirements and Section and 26 05 00.
- B. Product Data: Provide for surface metal raceways, wireways, finishes, and accessories.
- C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.
- D. Project Record Documents: Record actual locations of surface raceway and record actual circuiting arrangements in project record documents.

1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing Products specified in this Section with minimum three years experience.

1.7 REGULATORY REQUIREMENTS

- A. Conform to requirements of the National Electrical Code, unless otherwise specified.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

1.8 COORDINATION

- A. Coordinate under provisions of the General Requirements and Section 26 05 00.
- B. Field Meetings: Coordinate within pre-installation meeting.
- C. Field Measurements: Verify that field measurements are as shown on Drawings.

PART 2 – PRODUCTS

2.1 SURFACE METAL RACEWAY

- A. Manufacturers:
  - 1. Wiremold, Mono-Systems, Hubbell or owner approved equal.
- B. Description: Steel channel with fitted cover, suitable for use as surface metal raceway.
- C. Size: As indicated or required.
- D. Finish: Buff enamel
- E. Fittings, Boxes, and Extension Rings: Furnish manufacturer's standard accessories.



## 2.2 WIREWAY

- A. Manufacturers:
  - 1. Wiremold, or owner approved equal
- B. Description: General purpose type wireway.
- C. Knockouts: Manufacturer's standard.
- D. Size: As required to accommodate number of wires.
- E. Cover: Screw cover.
- F. Connector: Flanged.
- G. Fittings: Lay-in type with removable top, bottom, and side; captive screws.
- H. Finish: Rust inhibiting primer coating with gray enamel finish.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install Products in accordance with manufacturer's instructions.
- B. Use flat-head screws, clips, and straps to fasten raceway channel to surfaces. Mount plumb and level.
- C. Use suitable insulating bushings and inserts at connections to outlets and corner fittings.
- D. Wireway Supports: Provide steel channel.
- E. Close ends of wireway and unused conduit openings.
- F. Ground and bond raceway and wireway.

END OF SECTION 260539

## SECTION 260553 - ELECTRICAL IDENTIFICATION

### PART 1 – GENERAL

#### 1.1 RELATED DOCUMENTS

- A. The General Provisions of the Contract, including Conditions of the Contract and the General Requirement Specifications, apply to the work in this Section.
- B. This Section is hereby made a part of all other sections of Division 26 as fully as if repeated in each therein.

#### 1.2 SECTION INCLUDES

- A. Nameplates and labels.
- B. Wire and cable markers.
- C. Conduit and Pullbox markers.
- D. Directories.
- E. Signs and Diagrams.

#### 1.3 RELATED SECTIONS

- A. Division 09 - Painting.

#### 1.4 REFERENCES

- A. National Electrical Code.

#### 1.5 SUBMITTALS

- A. Submit under provisions of the General Requirements and Section 260500.
- B. Product Data: Provide for nameplates, labels, and markers.
- C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under regulatory requirements. Include instructions for storage, handling, protection, examination, preparation and installation of Product.

## 1.6 REGULATORY REQUIREMENTS

- A. Conform to requirements of the National Electrical Code, unless otherwise specified.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

## PART 2 - PRODUCTS

### 2.1 NAMEPLATES

- A. Normal System Nameplates: Engraved three-layer laminated plastic, black letters on white background, identification as shown.
  - 1. Size: 1 1/4 inch by 3 inch minimum.
  - 2. Location: Each normal electrical distribution and control equipment enclosure: switchboards, panelboards, motor starters, disconnect switches, circuit breakers, contactors, relay panels, control panels, and associated apparatus.
- B. Letter Size:
  - 1. Use 3/16 inch height lettering for identifying equipment and loads.
- C. Identification: Engraving marking.
  - 1. Switchboard, distribution panel: Equipment name and load device names.
  - 2. Branch circuit panelboard, relay panel, control panel, control cabinet: name.
  - 3. Motor starter, disconnect switch, individual circuit breaker, contactor: name, equipment served, service from.

### 2.2 LABELS

- A. Labels: Engraved device plates for individual wall switches, receptacles, and other electrical devices as shown.
- B. Locations: special purpose switches, receptacles, and other electrical devices.
- C. Identification: Engraved device covers.
  - 1. Individual switches and receptacles: use or as indicated on drawings.

## 2.3 WIRE AND CABLE MARKERS

- A. Description: Tape type wire markers.
- B. Locations: Each conductor at panelboard gutters, pull boxes, and each load connection.
- C. Legend:
  - 1. Power Circuits: Branch circuit or feeder number indicated on drawings.
- D. Color: As indicated in Section 260519.

## 2.4 BUS IDENTIFICATION

- A. Description: Stamped phase identification letters.
- B. Location: Switchboard and panelboard bus, in readily visible locations.

## 2.5 CONDUIT MARKERS

- A. Description: Alkyd stenciled paint.
- B. Location: Each power conduit, except branch lighting and receptacle conduits, longer than 6 feet.
- C. Spacing: At intermediate pull boxes, enclosures, etc.
- D. Legend:
  - 1. 208 Volt System: 208 – panel name – panel number.

## 2.6 FEEDER INTERMEDIATED BOX MARKERS

- A. Description: Alkyd stenciled paint.
- B. Location: On pull box, splice box, and junction box covers.
- C. Color:
  - 1. Grounding System: Green cover.
  - 2. Fire Alarm System: Red cover.

2.7 PANELBOARD DIRECTORIES

- A. Description: Type written directory of branch circuit loads.
- B. Location: At branch circuit panelboards.
- C. Legend: circuit number - load location and description.

PART 3 - EXECUTION

3.1 PREPARATION

- A. De-grease and clean surfaces to receive nameplates and labels.

3.2 APPLICATION

- A. Install nameplate and label parallel to equipment lines.
- B. Secure nameplate to equipment front using screws or rivets.
- C. Secure nameplate to inside surface of door on panelboard that is recessed in finished locations.

END OF SECTION 260553

## SECTION 260810 - ELECTRICAL DEMOLITION FOR REMODELING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. The General Provisions and Supplementary Conditions of the Contract of the General Requirement Specifications, apply to the work in this Section.
- B. This Section is hereby made a part of all other sections of Division 26 as fully as if repeated in each therein.

#### 1.2 SECTION INCLUDES

- A. Electrical demolition: The work specified in this section includes providing labor, material, equipment, and services necessary for electrical demolition as shown on the drawings and as herein specified to accommodate new construction. The project includes demolition, relocation and replacement of existing electrical equipment, feeders, branch wiring, signal cables, etc. with new work. Contractor shall remove, reinstall or relocate that portion of the existing equipment, system, wiring, fixtures and drawings which are a part of or which applies to the electrical trade.
- B. Selective demolition including:
  - 1. Non-destructive removal of materials and equipment for reuse or salvage as indicated.
  - 2. Dismantling electrical materials and equipment made obsolete by these installations.

#### 1.3 RELATED SECTIONS

- A. Section 260500 – Basic Electrical Provisions.

#### 1.4 REQUIREMENTS

- A. Contractor shall provide caution and warning signs at all hazardous areas and at all door entries to construction rooms and areas during the entire construction period per IEPA law and regulations.

## 1.5 SEQUENCING

- A. Sequence the Work in the following order:
  - 1. Complete new or temporary system as specified.
  - 2. Cut-over to new or temporary system.
    - a. Schedule with Owner at least one week in advance.
    - b.
  - 3. Remove items specified.

## 1.6 SCHEDULING

- A. Schedule work to coincide with other trades and project schedule.
- B. Cease operations immediately when structure appears to be in danger and notify Architect/Engineer. Do not resume operations until directed.

## 1.7 COORDINATION

- A. Conduct demolition to minimize interference with adjacent and occupied building areas.
- B. Coordinate demolition work with the construction manager and other related trades.
- C. Coordinate and sequence demolition so as not to cause shutdown of operation of surrounding areas.
- D. Shut-down periods:
  - 1. Arrange timing of shut-down periods of system, service with Owner. Do not shut down any service, without prior written approval.
  - 2. Keep shut-down period to minimum or use intermittent period as directed by the Owner.
  - 3. Maintain life-safety system in full operation in occupied facilities, or provide notice minimum 15 working days in advance.

## 1.8 MAINTAIN CONTINUITY OF SERVICE

- A. Any downtime time period shall be at the convenience of the Owner and approved by the General Contractor. Contractor shall give a minimum of 15 working days prior written notice to the General Contractor in advance of any desired shutdown. Prior written notice shall include a schedule for downtime, work to be performed. All downtime period shall be on weekends or off hours with exact time period approved in advance in writing by the General Contractor. Coordinate an overall schedule that is to be submitted and approved by the General Contractor.

- B. An electrician shall be on the premises when any trade is working in close proximity to live equipment or within electric rooms during renovation by any trade.
- C. All premium time, overtime, labor, material and equipment costs required to accomplish the above shall be included in the Contractor's bid proposal.

## 1.9 PROTECTION

- A. Perform removal of equipment and related components, in such manner as to eliminate hazards to persons and property; to minimize interference with use of adjacent areas, utilities and structures or interruption of use of such utilities; and to provide free passage to and from such adjacent areas of structures.
- B. Provide safeguards, including warning signs, barricades, temporary fences, warning lights, and other similar items that are required for protection of all personnel during demolition and removal operations.

## PART 2 - PRODUCTS

### 2.1 MATERIALS AND EQUIPMENT

- A. Materials and equipment for patching and extending work: As specified in individual Sections.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify field measurements and circuiting arrangements.
- B. Verify that abandoned wiring and equipment serve only abandoned facilities.
- C. Demolition Drawings are based on casual field observation and existing record documents. Contractor may purchase a copy of existing record documents for reference during bidding or construction. Report discrepancies to Architect/Engineer before disturbing existing installation. Verify existing conditions before performing any work.
- D. Beginning of demolition means installer accepts existing conditions.



- E. Where work is concealed above ceiling spaces which are to be removed, cut opening in ceiling and examine condition above the ceiling. If work requires certain devices to remain and the ceiling is supporting the device, contractor shall support device adequately from floor slab above, prior to ceiling demolition or at his option, remove the device and reinstall completely.
- F. Contractor shall verify existing circuit feeding each receptacle in demolition and remodeled area and document in the panelboard directory on record drawings. Contractor shall identify to Architect/ Engineer any wiring in poor condition or overload condition which exists.

### 3.2 PREPARATION

- A. Disconnect electrical systems in walls, floors, and ceilings scheduled for removal.
- B. Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations.
- C. Existing Electrical Service: Maintain existing system in service until new system is ready for installation. Obtain permission from Owner at least 15 working days before completely disabling system. If outage lasts more than 24 hours, Contractor shall provide and install a generator for temporary service. Temporary service shall be provided until new service is in operation. Refer to Division 1 for temporary power. Make temporary connections to maintain service in areas adjacent to work area while switchovers are completed.
- D. Coordinate utility service outages with Utility Company.
- E. Existing Suspended Ceiling System: Disconnect and remove light fixtures, fire alarm devices, speakers and conduit, etc. to facilitate demolition work.
- F. Protect adjacent materials that are to remain. Install and maintain dust and noise barriers to keep dirt, dust and noise from being transmitted to adjacent areas. Remove protection and barriers after demolition operations are complete.
- G. Locate, identify, and protect electrical services passing through demolition areas and serving other areas outside the demolition limits. Maintain services to areas outside demolition lines. When services must be interrupted or relocated, install temporary and/or permanent services for affected areas. Services originating within demolition limits and serving areas outside demolition limits shall be maintained.

### 3.3 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

- A. Demolish and extend existing electrical work under provisions of the General Requirement Specification Sections and this Section.
- B. Remove, relocate, and extend existing installations to accommodate new construction.
- C. Remove abandoned wiring to source of supply.

- D. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes to source of supply. Cut concealed conduit flush with walls and floors, and patch surfaces. Remove conduit within walls to be removed. Provide cap on abandoned conduits on each end. If the existing concealed conduits are in conflict with new work remove them.
- E. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank stainless steel cover for abandoned outlets which are not removed.
- F. Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.
- G. Disconnect and remove abandoned panelboard and distribution equipment.
- H. Maintain access to existing electrical installations which remain active. Modify installation or provide access panel as appropriate.
- I. Extend existing installations and provide alterations using acceptable materials and methods compatible with existing electrical installations and in accordance with the equipment manufacturers recommendations.
- J. Remove, demount, and disconnect existing electrical materials and equipment indicated to be moved and salvaged, and deliver materials and equipment to the location designated for storage. Salvaged material shall be stacked, boxed or crated in such a manner as to prevent damage.
- K. Any existing circuits or equipment not shown on drawings and which are logically expected to be continued in service and which may be interrupted or disturbed during construction shall be reconnected in an approved manner. Check and maintain continuity for all existing devices/equipment to remain. In addition, any existing circuits or equipment which may require relocation or rerouting as a result of the work of this project shall be done by the this Contractor with no additional compensation. Provide blank cover plates on empty outlets which are to remain.
- L. Provide code required disconnects to existing and relocated, equipment when affected by new work.
- M. Where existing equipment, devices and fixtures are to remain but are affected by new work such as replacement of ductwork and piping, reconditioning of walls, ceilings, roofs and floors of relaminating of counters, cabinets and casework, disconnect these items and add extension rings, clean and reinstall same in line with new walls, ceilings and surfaces. Note that certain work (such as replacement of piping, ductwork, etc) may be outside the limit to direct renovation. Electrical contractor shall review drawings of other trades for such work and incorporate that in his scope of work. Provide all necessary materials and labor and rewire in accordance with present code requirements.
- N. Owner shall have the option of selecting any or all of the items, including copper wiring, which are designated to be removed by the contractor as salvage for the Owner. Contractor shall remove such items with extreme care and return such items to the Owner. Any equipment which the Owner does not want will become the property of the contractor and promptly removed from the site.

- O. All cutting and patching, relocating of any equipment, conduit, piping, etc., necessary for any work under this contract will be by the respective contractors unless noted otherwise in the architectural sections.
- P. Reference shall be given to Owner to keep any removed device, fixture or equipment. If Owner does not want to keep any of them, dispose them as required.
- Q. Before disconnecting, verify with Owner removal or relocation of all existing devices/equipment. No additional cost will be permitted for lack of such verification.
- R. All existing outlet, junction boxes, conduit and wire which is supported by the existing ceiling system will be resupported to the building construction. New wiring and outlets will be supported from the building construction.
- S. This contractor shall coordinate all his work with the other contractors at the job site before removing existing electrical and installing new items.
- T. Equipment removal in certain locations may require the installation of a junction box to reconnect circuits that remain in operation. Extend conduit and wiring as required to maintain power to remaining equipment.
- U. It is the intent of the electrical demolition drawing(s) to indicate areas in which electrical equipment, conduit, lighting fixtures, devices, etc. are to be removed to allow for the renovation phase of construction. The electrical demolition plan is for reference purposes only and it is not intended to be the sole source of existing conditions.
- V. Electrical Contractor shall be responsible for his own clean-up throughout the course of the demolition work. In the event he fails to provide such clean-up the Architect/Engineer will direct the clean-up to be performed by another contractor and the electrical contractor will be back-charged as deemed appropriate by Architect/Engineer.
- W. The contractor performing the demolition work, shall remove no more than 8" of building material around each device being demolished.
- X. Disconnect all electrical connections to mechanical, plumbing and architectural equipment for removal by others. Remove all starters, disconnect switches and related conduit and wiring serving such equipment which is indicated to be removed. Refer to mechanical, plumbing and architectural drawings for exact requirements.
- Y. It shall be the contractors option to reuse existing concealed conduit and flush mounted backboxes where applicable. If existing conduit and/or backboxes are utilized it shall be the electrical contractor's responsibility to provide additional supports and fittings required to conform to the specification.
- Z. Remove all exposed abandoned and exposed non-required conduits together with their associated wires. Remove inaccessible conduits together with all their wires if they are in conflict with renovation work.

### 3.4 CLEANING AND REPAIR

- A. Clean and repair existing materials and equipment which remain or are to be reused.
- B. Panelboards: Clean exposed surfaces and check tightness of electrical connections. Replace damaged circuit breakers and provide closure plates for vacant positions. Provide typed circuit directory showing revised, existing circuiting arrangement and room numbers served.
- C. Cabinets and Cover Plates: Where existing cabinets and cover plates are to be used for installation of new panelboard interiors, contractor shall clean exposed surfaces and paint area near cabinet and cover plates, removed from panelboard, to match existing condition. Contractor shall replace cabinet or coverplate if necessary to accommodate new work.

### 3.5 FLOOR AND WALL OPENINGS

- A. Opening through floors and walls where piping or equipment has been removed shall be sealed to maintain any fire ratings and to seal off cold, smoke and toxic fumes. Use appropriate sealing materials and methods to maintain existing rating of the floor and wall.

### 3.6 DAMAGE TO OTHER WORK

- A. The Contractor shall be held responsible for any damage caused to existing installations not pertinent to the Contract. The cost of repairs to such damaged work shall be charged against the Contractor.

### 3.7 CLEAN-UP

- A. On completion of work of this section and after removal of all debris, site shall be left in clean condition satisfactory to the Construction Manager. Clean-up shall include off the premises disposal of all items and materials not required to remain the property of the Contractor as well as all debris and rubbish resulting from demolition operations.
- B. Debris, including brick, asphalt, concrete, stone and similar materials shall become property of Contractor and shall be disposed of by the Contractor, off the property. Remove concrete foundations, conduits, anchor bolts, and all appurtenances.

### 3.8 INSTALLATION

- A. Install relocated materials and equipment under the provisions of the General Requirement Specification Sections.

END OF SECTION 260810

## SECTION 262413 - FUSES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. The General Provisions of the Contract, including Conditions of the Contract and the General Requirement Specifications, apply to the work in this Section.
- B. This Section is hereby made a part of all other sections of Division 26 as fully as if repeated in each therein.

#### 1.2 SECTION INCLUDES

- A. Fuses.

#### 1.3 REFERENCES

- A. National Electric Code.
- B. NEMA FU 1 - Low Voltage Cartridge Fuses.

#### 1.4 SUBMITTALS

- A. Submit under provisions of the General Requirements and Section 260500.
- B. Product Data: Provide data sheets showing electrical characteristics including time-current curves.
- C. Manufacturers Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.
- D. Project Record Documents: Record actual fuse sizes in project record documents.
- E. Maintenance Data: Include spare parts listing; source and current prices of replacement parts and supplies; and recommended maintenance procedures and intervals.

#### 1.5 QUALIFICATIONS

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

1.6 REGULATORY REQUIREMENTS

- A. Conform to requirements of the National Electrical Code.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

1.7 COORDINATION

- A. Coordinate under provisions of the General Requirements and Section 260500.

1.8 EXTRA MATERIALS

- A. Provide two fuse pullers.
- B. Provide spare fuses as specified.

PART 2 - PRODUCTS

2.1 FUSES

- A. Dimensions and Performance: NEMA FU 1, Class as specified or indicated.
- B. Voltage: Provide fuses with voltage rating suitable for circuit phase-to-phase voltage.
- C. Interrupting Rating: 200,000 rms amperes.
- D. Coordination: Provide fuses for properly coordinated system of overcurrent protection.

2.2 MOTOR LOAD FUSES

- A. Description: 600 amperes and smaller, 250 volts or less, Class RK5.

- 1. Manufacturers (RK5):
  - a. Bussmann Fusetron FRN-R
  - b. Gould Shawmut.
  - c. Owner Approved Equal.

- B. Description: 601 amperes and larger, 250 volts or less, Class L.

- 1. Manufacturers (L):
  - a. Bussmann KRP-C
  - b. Gould Shawmut
  - c. Owner Approved Equal.

C. Description: 600 amperes and smaller, 600 volts or less, Class RK5.

1. Manufacturers (RK5):
  - a. Bussmann Fusetron FRS-R
  - b. Gould Shawmut
  - c. Owner Approved Equal.
2. Manufacturers (J):
  - a. Bussmann Low Peak LPJ
  - b. Gould Shawmut
  - c. Owner Approved Equal.

D. Description: 601 amperes and larger, 600 volts or less, Class L.

1. Manufacturers (L):
  - a. Bussmann KRP-C
  - b. Gould Shawmut
  - c. Owner Approved Equal.

## 2.3 HEATING LOAD FUSES

A. Description: 600 amperes and smaller, 250 volts or less, Class RK1, RK5.

1. Manufacturers (RK5-time delay):
  - a. Bussmann Fusetron FRN-R
  - b. Gould Shawmut
  - c. Owner Approved Equal.
2. Manufacturers (J-time delay):
  - a. Bussman LPJ
  - b. Gould Shawmut
  - c. Owner Approved Equal.

B. Description: 601 amperes and larger, 250 volts or less, Class L.

1. Manufacturers (L-time delay):
  - a. Bussmann KRP-C
  - b. Gould Shawmut
  - c. Owner Approved Equal.

2. Manufacturers (L-non-time delay):
    - a. Bussmann KTU
    - b. Gould Shawmut
    - c. Owner Approved Equal.
- C. Description: 600 amperes and smaller, 600 volts or less, Class RK1, RK5.
1. Manufacturers (RK1-time delay):
    - a. Bussmann Low Peak LPS-RK
    - b. Gould Shawmut
    - c. Owner Approved Equal.
  2. Manufacturers (RK5-time delay):
    - a. Bussmann Fusetron FRS-R
    - b. Gould Shawmut
    - c. Owner Approved Equal.
  3. Manufacturers (J-time delay):
    - a. Bussmann LPJ
    - b. Gould Shawmut
    - c. Owner Approved Equal.
- D. Description: 601 amperes and larger, 600 volts or less, Class L.
1. Manufacturers (L-time delay):
    - a. Bussmann KRP-C
    - b. Gould Shawmut
    - c. Owner Approved Equal.
  2. Manufacturers (L-non-time delay):
    - a. Bussmann KTU
    - b. Gould Shawmut
    - c. Owner Approved Equal.



PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install fuses in accordance with manufacturer's instructions.
- B. Install fuse with label oriented such that manufacturer, type, and size are easily read.
- C. Do not install parallel sets of fuses for any single phase.
- D. Replace fuses blown during construction and during testing.

END OF SECTION 262413

## SECTION 26 24 15 - SWITCHBOARDS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. The General Provisions of the Contract, including Conditions of the Contract and Division 1 of the Specifications, apply to the work in this Section.
- B. This Section is hereby made a part of all other sections of Division 26 as fully as if repeated in each therein.

#### 1.2 SECTION INCLUDES

- A. Switchboards.
- B. Switchboard accessories.

#### 1.3 RELATED SECTIONS

- A. Section 26 05 26 - Grounding and Bonding.
- B. Section 26 05 29 - Supporting Devices
- C. Section 26 05 53 - Electrical Identification.

#### 1.4 REFERENCES

- A. NECA - (National Electrical Contractors Association) Standard of Installation.
- B. NEMA AB 1 - Molded Case Circuit Breakers.
- C. NEMA KS 1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).
- D. NEMA PB 2 - Dead Front Switchboards.
- E. NEMA PB 2.1 - Instructions for Safe Handling, Installation, Operation and Maintenance of Deadfront Switchboards Rated 600 Volts or Less.
- F. National Electrical Code.

- G. UL 98 - Performance Requirements, 30-1200 amp switches.
- H. 489 – Molded Case Circuit Breakers.
- I. UL 891 – Dead front Switchboards.

#### 1.5 SUBMITTALS

- A. Submit under provisions of Division 1 and Section 26 05 00.
- B. Product Data: Provide electrical characteristics including voltage, frame size and trip ratings, fault current withstand ratings, and time-current curves of all equipment and components. Provide manufactures written recommendations for storage and protection, and installation and field test requirements.
- C. Shop Drawings: Indicate utility metering transformer compartment location and dimensions; outline and support point dimensions; front and side views of enclosure; overall dimensions; conduit entrance locations; overcurrent protective devices arrangement and sizes; nameplate legends; electrical ratings; size, number, and ampacity of bus bars per phase, neutral, and ground; switchboard bus diagrams indicating connections and instrument details; and concrete pad dimensions.
- D. Test Reports: Indicate results of factory production tests.
- E. Manufacturers Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.
- F. Project Record Documents: Record actual locations of switchboards in project record documents.
- G. Maintenance Data: Include spare parts listing; source and current prices of replacement parts and supplies; and recommended procedures and intervals for maintenance including bus connection tightening and cleaning of equipment.

#### 1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum fifteen years experience.

#### 1.7 REGULATORY REQUIREMENTS

- A. Conform to requirements of National Electrical Code, unless otherwise specified.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

1.8 COORDINATION

- A. Coordinate under provisions of Division 1 General Requirements and Section 26 05 00.
- B. Field Measurements: Verify that field measurements are as shown on Drawings. Contractor shall make necessary field measurements to verify that equipment shall fit in allocated space in full compliance with minimum required clearances specified in local electrical code. If the switchboard can not fit in the indicated space, the contractor shall obtain that from another specified manufacturer.
- C. Field Locations: Verify locations of switchboards prior to rough-in.

1.9 DELIVERY, STORAGE, PROTECTION, AND HANDLING

- A. Deliver in 48 inch maximum width shipping splits, individually wrapped for protection and mounted on shipping skids. Coordinate maximum shipping sizes with the electrical contractor.
- B. Contractor shall store, protect and handle products in accordance with recommended practices listed in manufacturer's Installation and Maintenance Manuals.
- C. Contractor shall inspect and report concealed damage to carrier within 48 hours.
- D. Contractor shall store in a clean, dry space. Cover with heavy canvas or plastic to keep out dirt, water, construction debris and traffic. Heat enclosures to prevent condensation.
- E. Contractor shall handle in accordance with manufacturer's recommendations to avoid damaging equipment, installed devices, and finish.

1.10 EXTRA MATERIALS

- A. Submit extra materials under provisions of Division 1 General Requirements and 26 05 00.

PART 2 - PRODUCTS

2.1 SWITCHBOARDS

- A. Switchboard shall have front access only.
- B. Load balance.
  - 1. Load balance: Distribute loads for maximum of 10 percent difference.
- C. Switchboard, and associated circuit breakers, shall be of the same manufacturer.

D. Switchboard Manufacturers:

1. Basis of Design: Square D.
2. Other acceptable manufacturers:
  - a. Cutler-Hammer/Westinghouse
  - b. GE.
  - c. Siemens.
  - d. Owner Approved Equal.

E. Circuit Breaker and Switch Manufacturers:

1. Basis of Design: Square D.
2. Other acceptable manufacturers:
  - a. Cutler-Hammer/Westinghouse
  - b. GE.
  - c. Siemens.
  - d. Owner Approved Equal.

## 2.2 COMPONENTS

- A. Refer to Contract Documents for actual layout and location of equipment and components; current ratings of devices, bus bars, and components; voltage ratings of devices, components and assemblies; interrupting and withstand of devices, buses and components and other required details.

B. Standard Features:

1. Switchboards shall be fully self-supporting structures with vertical sections bolted together to form required arrangement.
2. Switchboard(s) shall be NEMA 1 deadfront construction.
3. Switchboard frame shall be die formed, 12 gauge steel with reinforced corner gussets. Frame shall be rigidly bolted to support cover plates (code gauge steel), bus bars and installed devices during shipment and installation.
4. All sections may be rolled, moved or lifted into position. Switchboards shall be capable of being bolted directly to the floor without the use of floor sills.
5. All switchboard sections shall have open bottoms and removable top plate(s) to install conduit.
6. Switchboard sections shall be front access only, and rear aligned for placement against a wall.
7. Switchboards shall be UL listed to accept a combination of circuit breakers and fusible switches, factory or field installed.
8. Provide hinged doors over metering compartments and individually mounted device compartments. All doors shall have concealed hinges and be fastened by hex head bolts.
9. Switchboard protective devices shall be furnished as listed on drawings and specified herein, including interconnections, instrumentation and control wiring. Switchboards and devices shall be rated for voltage and frequency listed on the drawings.

10. Switchboard current ratings, including all devices, shall be based on a maximum ambient temperature of 25 degrees C per UL Standard 891. With no derating required, temperature rise of switchboards and devices shall not exceed 65 degrees C in a 25 degree C ambient environment.
11. Switchboard Service Entrance sections shall comply with UL Service Entrance requirements including a UL service entrance label, incoming line isolation barriers, and a removable neutral bond to switchboard ground for solidly grounded wye systems
12. Switchboard shall be of service entrance type.

C. Bus Bars:

1. Bus bars shall be copper. The bus bars shall be standard density rated for 1000 amperes per square inch copper. The neutral bus shall have the same ampacity as the phase bus.
2. Bus bars shall be mounted on high impact, non-tracking insulated supports. Joints in the vertical bus are not permitted.
3. Bus bars shall be braced to withstand mechanical forces exerted during short circuit conditions as indicated in drawings, but in no case less than 65KA RMS SYM.
4. Bus joints shall be bolted with high tensile steel. Welded connections are unacceptable. Contact area shall be fully overlapping. Minimum length of contact shall be with the width of the smallest bus.
5. Ground Bus shall be sized to meet UL 891. Ground bus shall extend full length of switchboard.
6. Neutral bus shall be connected to ground bus with removable link. Neutral bus shall be extended through full length of switchboard.
7. A-B-C bus arrangement (left to right, top to bottom, front to rear) shall be used throughout to assure convenient and safe testing and maintenance. Where special circuitry precludes this arrangement, bus bars shall be labeled.
8. All feeder device line and load connection straps shall be rated to carry current rating of device frame (not trip rating).
9. The main incoming bus bars shall be rated for the main protection device frame size or main incoming conductors, if there is no main device.
10. Main horizontal bus bars shall be fully rated and arranged for future extensions.
11. The phase shall be extended through each section at full capacity.

D. Line and Load Terminations: Copper lugs suitable for the conductor sizes indicated.

1. Provide one-hole lugs for 4/0 AWG and smaller.
2. Provide two-hole lugs for 250 kcmil and larger.

E. Main and Feeder Devices

1. Main device shall be individually mounted, insulated case circuit breaker when 1200 amp. or above or group mounted molded case circuit breaker when below 1200 amp. Provide device as specified in appropriate article below.
2. Feeder devices shall be group mounted molded case circuit breakers when it is 1200 amp or below. Provide devices as specified in appropriate article below.
3. All circuit protective devices shall have 65,000 amp minimum symmetrical current interrupting capacity or as listed on the contract drawings whichever is highest.

F. Molded Case Circuit Breakers

1. Molded case circuit breaker shall have minimum of 65,000 amp symmetrical current interrupting capacity or as listed on the contract drawings whichever is highest.
2. Furnish GE Spectra RMSTM Molded Case Circuit Breakers or equal. Thermal magnetic molded case circuit breakers may be provided for trip ratings 150 amps and below.
3. Group mounted breakers shall be modular mounted. The module shall be electrically connected to the switchboard bus by spring reinforced jaws. Mechanical connections to panel frame shall be separate from electrical connections. Mechanical connections shall be self aligning, spring loaded locking devices. Locking device handle shall be able to be bolted to each side of the device to prevent accidental release of electrical connection.
4. Circuit breaker frames shall be constructed of a high-strength, molded, glass-reinforced polyester case and cover. Breakers shall have an overcenter, toggle handle-operated, trip free mechanism with quick mate, quick break action independent of the speed of the toggle handle operation. The design shall provide common tripping of all poles. Breakers shall be suitable for reverse feeding.
5. Breakers shall have ON and OFF position clearly marked on escutcheon. Breakers shall include a trip-to-test means on the escutcheon for manual tripping the breaker and exercising the mechanism and trip latch.
6. Breakers shall include factory installed mechanical lugs. Lugs shall be UL listed and rated 75 or 60/75 degrees C. as appropriate.
7. Breakers larger than 150 amps shall use digital true RMS or equal sensing trip units and a rating plug to determine the breaker trip rating.
8. Circuit breakers with trip ratings 800 and greater shall be UL listed as 100 percent continuous duty rated.

G. Insulated Case Circuit Breakers

1. Insulated case circuit breakers shall be GE type Power Break II or equal. Breakers shall be individually mounted.
2. Insulated case circuit breakers 2000 amp and below shall be manually operated.
3. Breakers shall be constructed of a high dielectric strength, glass reinforced insulating case. The interrupting mechanism shall be arc chutes. Steel vent grids shall be used to suppress arcs and cool vented gases. Interphase barriers shall isolate completely each pole.
4. Breakers shall contain a true two-step stored energy operating mechanism which shall provide quick make, quick break operation with maximum five cycle closing time. Breakers shall be trip free at all times. Common tripping of all poles shall be standard.
5. Insulated Case circuit breakers shall be rated to carry 100 percent of their frame ampacity continuously.
6. A charging handle, close push-button, open push-button, and Off/On/Charger indicator shall be located on the breaker escutcheon and shall be visible with the breaker compartment door closed.
7. Where drawout breakers are specified, the drawout design shall permit the breaker to be withdrawn from an engaged position, to a test position, and to a disengaged position.

## 2.3 METERING TRANSFORMERS

- A. All instrument transformers shall be UL listed and classified as indicated on drawings.
- B. Current transformers shall be as shown on drawings with burden and accuracy to support connected meters and relays as required by ANSI/IEEE C57.13.
- C. Potential transformers shall be as shown on drawings with burden and accuracy to support connected meters and relays as required by ANSI/IEEE C57.13.

## 2.4 FINISH

- A. All steel surfaces shall be chemically cleaned prior to painting.
- B. Exterior paint color shall be ANSI 6 Light Gray over phosphate – type rust inhibitor.

## 2.5 ACCESSORIES

- A. Molded Case Circuit Breaker Accessories:
  - 1. Provide breaker accessories, UL listed for factory or field installation and common to all breaker frame sizes as indicated below.
    - a. shunt trip
    - b. undervoltage release.
    - c. auxiliary switch with 2 form “C” contacts
    - d. bell alarm

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Shop inspect and test switchboard according to NEMA standards.
- B. Provide uniform and leveled concrete equipment base for equipment installation.
- C. Verify area to assure there is enough clearance to install switchboard.



### 3.2 INSTALLATION

- A. Install switchboard in accordance with manufactures instructions, and NEMA and NECA standards.
- B. Tighten accessible bus connections and mechanical fasteners after placing switchboard.
- C. Make connections including incoming line side, outgoing load side, metering, and controls.
- D. Provide engraved plastic nameplates under the provisions of Section 26 05 53.
- E. Ground and bond switchboard enclosure according to Section 26 05 26.

### 3.3 FIELD QUALITY CONTROL

- A. Inspect and test switchboard in accordance with NETA ATS.

### 3.4 ADJUSTING

- A. Adjust all operating mechanisms for free mechanical movement.
- B. Tighten bolted bus connections in accordance with manufacturer's instructions.

### 3.5 CLEANING

- A. Clean installed work under the provisions of Division 1 General Requirements.
- B. Clean interior of cabinets and enclosures to remove dust, debris, and other material.
- C. Clean surfaces and touch up scratched or marred surfaces to match original finish.

END OF SECTION 262415

## SECTION 262416 - PANELBOARDS

### PART 1 – GENERAL

#### 1.1 RELATED DOCUMENTS

- A. The General Provisions of the Contract, including Conditions of the Contract and the General Requirement Specifications, apply to the work in this Section.
- B. This Section is hereby made a part of all other sections of Division 26 as fully as if repeated in each therein.

#### 1.2 SECTION INCLUDES

- A. Power panelboards.
- B. Branch circuit panelboards.

#### 1.3 RELATED SECTIONS

- A. Section 260526 - Grounding and Bonding.
- B. Section 260553 - Electrical Identification.
- C. Section 262420 - Transient Voltage Surge Suppression.

#### 1.4 DEFINITIONS

- A. Lighting and Appliance Panelboard: A panelboard with thermal magnetic circuit breaker branches, bolt-on type only, designed for heavy commercial use, operating at 600 V and below, 3-phase versions, equipped as either surface or flush mounting. Panelboard shall have more than 10% of its overcurrent devices rated 30 amperes or less for which neutral connections are provided.
- B. Power Panelboard: A panelboard with thermal magnetic circuit breakers or fusible switches, bolt-in type, designed for heavy commercial use, operating at 600V and below, 3-phase version, equipped as surface mounting with cabled connections between sections. Panelboard shall have less than 10% of its concurrent devices rated 30 amperes or less for which neutral connections are provided.
- C. Overcurrent Protective Devices – a circuit breaker pole or single fuse. Example: a 2-pole device is considered 2 protective devices.

1.5 REFERENCES

- A. ANSI 61.
- B. ANSI/NEMA KS 1, Enclosed and Miscellaneous Distribution Equipment Switches (600 volts).
- C. ANSI/NEMA PB 1, Panelboards.
- D. ANSI/NFPA 70, National Electrical Code.
- E. ASTM – American Society of Testing Materials.
- F. CSA C22.2 No. 29, Panelboards and Enclosed Panelboards.
- G. CSA C22.2 No. 5.1, Molded Case Circuit Breakers.
- H. Federal Specification W-C-375, Rev. B, Amend. 1, Circuit Breakers, Molded Case; Branch Circuit and Service.
- I. Federal Specification W-P 115, Rev. C, Panel, Power Distribution.
- J. NEMA AB1, Molded Case Circuit Breakers and Molded Case Switches.
- K. NEMA PB 1.1, General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less.
- L. UL 489, Molded-Case Circuit Breakers and Circuit-Breaker Enclosures.
- M. UL 50, Enclosures for Electrical Equipment.
- N. UL 67, Panelboards.
- O. UL 943, Ground-Fault Circuit-Interrupters.

1.6 SUBMITTALS

- A. Submit under provisions of the General Requirements and Section 260500.
- B. Product Data: Provide for fusible switches and circuit breakers.
- C. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, short circuit ampere rating, circuit breaker and fusible switch arrangement and sizes.
- D. Manufacturers Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.

- E. Project Record Documents: Record actual locations of panelboards and record actual circuiting arrangements in project record documents.
- F. Maintenance Data: Include spare parts listing; source and current prices of replacement parts and supplies; and recommended maintenance procedures and intervals.

#### 1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum twenty years experience.

#### 1.8 REGULATORY REQUIREMENTS

- A. Conform to requirements of NFPA 70, unless otherwise specified.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

#### 1.9 COORDINATION

- A. Coordinate under provisions of the General Requirements and Section 260500.
- B. Field Measurements: Verify that field measurements are as shown on Drawings.
- C. Field Locations: Verify locations of panelboards prior to rough-in.

#### 1.10 DELIVERY, STORAGE, PROTECTION, AND HANDLING

- A. Deliver, store, protect and handle products in accordance with recommended practices in manufacturer's Installation and Maintenance Manuals.
- B. Deliver each lighting panelboard in individual shipping cases for ease of handling. Each panelboard shall be wrapped for protection.
- C. Inspect and report concealed damage to carrier within specified time.
- D. Store in a clean, dry space. Maintain factory protective or cover with heavy canvas or plastic to keep out dirt, water, construction debris, and traffic. (Heat enclosures to prevent condensation).
- E. Handle in accordance with NEMA and manufacturer's written instructions to avoid damaging equipment, installed devices and finish.

1.11 OPERATION AND MAINTENANCE DATA

- A. Manufacturer shall provide copies of installation, operation and maintenance procedures to Owner in accordance with general requirements of the General Requirements and Division 26.
- B. Submit operation and maintenance data based on factory and field testing, operation and maintenance of specified product.

1.12 FIELD MEASUREMENTS

- A. Make all necessary field measurements to verify that equipment shall fit in allocated space in full compliance with minimum required clearances specified in National Electrical Code.

1.13 EXTRA MATERIALS

- A. Submit extra materials under provisions of the General Requirements and Section 260500.
- B. Furnish five of each panelboard key.

PART 2 – PRODUCTS

2.1 PANELBOARDS

- A. Phase sequence and balance.
  - 1. Phase sequence: A-B-C, left to right.
  - 2. Load balance: Distribute loads for maximum 10 percent difference.
- B. Each panelboard, and associated fused switches and circuit breakers, shall be of the same manufacturer.
- C. Each panelboard lock shall be operable by the same key.

D. Panelboard Manufacturers:

Square D products have been used as the basis for design. The following other manufacturers' products of equivalent quality, dimensions and operating features may be acceptable, at the Engineer's discretion, if they comply with all requirements specified or indicated in these Contract documents.

1. Chicago Switchboard
2. Eaton/Cutler Hammer
3. GE.
4. ITE/Siemens
5. Illinois Switchboard
6. General Electric.
7. Owner Approved Equal.

E. Fused Switch and Circuit Breaker Manufacturers:

Square D products have been used as the basis for design. The following other manufacturers' products of equivalent quality, dimensions and operating features may be acceptable, at the Engineer's discretion, if they comply with all requirements specified or indicated in these Contract documents.

1. Eaton/Cutler Hammer
2. GE.
3. ITE/Siemens
4. General Electric.
5. Owner Approved Equal.

2.2 DISTRIBUTION PANELBOARDS

- A. Description: NEMA PB 1, circuit breaker or fusible switch type as shown on drawings. Provide contactors as indicated.
- B. Panelboard Bus: 1000 amp per sq.in. Copper, ampere and voltage ratings as indicated. Provide copper ground bus in each panelboard.
- C. Minimum Short Circuit Rating: Fully rated, 42,000 amperes rms symmetrical for 240 volt panelboards; 65,000 amperes rms symmetrical for 480 volt panelboards, or as indicated, or as required to be greater than the available short circuit current.
- D. Interlocks: Disconnects shall have ON and OFF indication. Disconnect door or cover shall be interlocked mechanically with the disconnect device to prevent opening door with the disconnect device in ON position and application of power while the door is open. Means shall be provided for releasing the interlock for intentional access to the interior, and intentional application of power, if desired, while the door is open. Padlocking arrangements shall permit locking the disconnect device OFF with a maximum of 3 padlocks with door closed or open.

- E. Fusible Switch Assemblies: NEMA KS 1, quick-make, quick-break, load interrupter enclosed knife switch with externally operable handle. Quantity and ratings as indicated. Switches shall bolt directly onto bus, modular devices utilizing spring reinforcement jaws with pressure locked connections are not acceptable.
- F. Molded Case Circuit Breakers: NEMA AB 1, circuit breakers with integral thermal and instantaneous magnetic trip in each pole. Provide circuit breakers UL listed as Type HACR for air conditioning equipment branch circuits. Quantity and ratings as indicated. Circuit breakers shall bolt directly onto bus, modular devices utilizing spring reinforcement jaws with pressure locked connections are not acceptable.
- G. Controllers: NEMA ICS 2, AC general-purpose Class A magnetic controller for induction motors rated in horsepower, with bimetal overload relay. Size and ratings as indicated. Provide unit mounted control power transformer and HAND-OFF-AUTO selector switch and GREEN indicating light in front cover.
- H. Circuit Breaker Accessories: Trip units and auxiliary switches as indicated.
- I. Enclosure: NEMA PB 1, Galvanized steel finished inside and outside with manufactures standard gray enamel, fully flanged, fastened with quarter-turn trim clamps. Type 1 or 12 or 3R as suitable for the location, 12 inches deep, 35 inches wide, minimum, or as required to accommodate the number of outgoing conduits.
- J. Cabinet Front: Surface type, finished in manufacturer's standard gray enamel. Fasten doors 48 inches in height or less with concealed hinged door with flush catch lock. Fasten doors over 48 inches in height with three point catch lock and vault type handle.

## 2.3 BRANCH CIRCUIT PANELBOARDS

- A. Equipment:
  - 1. Furnish General Electric A-Series® Lighting Panelboards or equal as indicated in drawings.
  - 2. Minimum Short Circuit Rating: Fully rated, 22,000 amperes rms symmetrical for 240 volt panelboards; 22,000 amperes rms symmetrical for 480 volt panelboards, or as indicated, or as required to be greater than the available short circuit current.
- B. Enclosure
  - 1. Boxes shall be a nominal 20 inches wide and 6 inches deep with wire bending space per local electrical code.
  - 2. Fronts shall be reinforced steel with concealed hinges and concealed trim adjusting screws. Trim clamps are unacceptable.
  - 3. All door locks shall be corrosion proof Valox (or equal) with retractable latches. All door locks shall be keyed for a single key.
  - 4. Clean Lexan (or equal) directory card holders shall be permanently mounted on front door.
  - 5. All panelboard series ratings shall be prominently displayed on dead front shield.
  - 6. Interiors shall permit top or bottom incoming cables.
  - 7. Boxes shall be corrosion resistant, zinc finish galvanized.
  - 8. Fronts shall be powder finish painted ANSI G1 gray.

C. Bus bars

1. Bus bars shall be copper and phase sequenced, fully insulated and supported by high impact Noryl (or equal) interior base assemblies.
2. Panelboard Bus: 1000 amp per sq. in. Copper, ampere and voltage ratings as indicated. Provide copper ground bus in each panelboard. Provide insulated ground bus where identified. Provide 200% rated neutral where identified.
3. Bus bars shall be mechanically supported by zinc finished galvaneal steel frames to prevent vibration and damage from short circuits.
4. Terminations shall be UL tested and listed and suitable for UL copper wire.
5. Provide [1] continuous bus bar per phase. Each bus bar shall have sequentially phased branch circuit connectors for bolt-on branch circuit breakers. Bus bars shall be rated as indicated in drawings.
6. Split solid neutral bus shall be plated and located in main compartment for all incoming neutral cables to be same length.
7. Lugs shall be rated for 75 degree C terminations.
8. Main lugs for copper conductors shall be bolted lugs.
9. Lug bodies shall bolt in place.

D. Circuit Breakers

1. Molded case circuit breakers shall be bolt-on type.
2. All circuit breakers shall have thermal and magnetic type elements in each pole.
3. Two and three pole breakers shall have internal common trip crossbars for simultaneous tripping of each pole.
4. Circuit breakers shall not be restricted to any mounting location due to physical size.
5. All branch breakers 15 to 100 amperes shall be able to be mounted in any panel position for twin or double mounting without space penalty. Sum of ratings for 2 such twin mounted devices shall not exceed 180 amperes.
6. Main and sub-feed circuit breakers may be vertically or horizontally mounted.
7. Branch breaker panelboard connections shall be copper to copper.
8. All panelboard terminations shall be rated as indicated in drawings.
9. All breakers shall have an over center mechanism and be quick make and quick break.
10. All breakers shall have handle trip indication and a trip indicator in window of circuit breaker housing.
11. Breaker handle and faceplate shall indicated rated ampacity.
12. Circuit breaker escutcheon shall have standard ON/OFF markings.
13. Main breakers shall be UL listed for use with: Shunt, Under Voltage, and Ground Fault Shunt Trips; Auxiliary and Alarm Switches; and Mechanical Lug Kits. Provide these accessories as indicated on drawings.
14. Where indicated on drawings, the branch circuit breakers shall be SWD type, type HACR for air-conditioning equipment, ground fault circuit interrupter type, arc fault circuit interrupter type and shall have shunt trip accessories.

E. Contactors

1. Contactors shall be mechanically held GE type CR160MC, or ASCO Type 920 or approved equal.



## 2.4 ACCESSORIES

- A. Contactor control relays.
- B. Tork (or equal) time clocks.
- C. Locking devices for breakers and/or operating handles.
- D. Furnish nameplates for each device as indicated in drawings.
- E. Provide Transient Voltage Surge Suppression system as specified.

## PART 3 – EXECUTION

### 3.1 PREPARATION

- A. Provide concrete equipment base for floor mounted equipment installation.
- B. Verify field measurements.
- C. Verify that required utilities are available, in proper location and ready for use.
- D. Beginning of installation means installer accepts conditions.

### 3.2 INSTALLATION

- A. Install panelboards in accordance with NEMA and NECA standards and as instructed by manufacturer.
- B. Install panelboards plumb. Install recessed panelboards flush with wall finishes.
- C. Support free-standing panelboards with structural channel framework.
- D. Height: 6 feet to top of panelboard; install panelboards taller than 6 feet with lowest operating handle not lower than 18" above finished floor per NEC.
- E. Provide filler plates for unused spaces in panelboards.
- F. Provide typed circuit directory for each branch circuit panelboard under the provisions of Section 260553. Revise directory to reflect circuiting changes required to balance phase loads.
- G. Provide engraved plastic nameplates under the provisions of Section 260553.
- H. Provide 3-3/4" spare conduits out of each recessed panelboard to an accessible location above ceiling. Identify each as SPARE.

- I. Ground and bond panelboard enclosure according to Section 260526.
- J. Inspect installed panelboards for anchoring, alignment, grounding and physical damage.
- K. Check tightness of all accessible mechanical and electrical connections with calibrated torque wrench. Minimum acceptable values are specified in manufacturer's instructions.
- L. Test each key interlock system for proper functioning.

### 3.3 ADJUSTING

- A. Measure steady state load currents at each panelboard feeder; rearrange circuits in the panelboard to balance the phase loads to within 10 percent of each other. Maintain proper phasing for multi-wire branch circuits.
- B. Adjust all circuit breakers, access doors, operating handles for free mechanical and/or electrical operation as described in manufacturer's instructions.

### 3.4 CLEANING

- A. Clean installed work under the provisions of the General Requirements.
- B. Clean interior of cabinets and enclosures to remove dust, debris, and other material.
- C. Clean surfaces and touch up scratched or marred surfaces to match original finish.

END OF SECTION 262416

## SECTION 262726 - WIRING DEVICES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. The General Provisions of the Contract, including Conditions of the Contract and the General Requirements Specification Sections, apply to the work in this Section.
- B. This Section is hereby made a part of all other sections of Division 26 as fully as if repeated in each therein.

#### 1.2 SECTION INCLUDES

- A. Wall switches.
- B. Receptacles.
- C. Device plates.

#### 1.3 RELATED SECTIONS

- A. Section 260533 - Boxes.

#### 1.4 REFERENCES

- A. NECA - (National Electrical Contractors Association) Standard of Installation.
- B. NEMA WD 1 - General Requirements for Wiring Devices.
- C. NEMA WD 6 - Wiring Device Dimensional Requirements.
- D. NFPA 70 – National Electrical Code.

#### 1.5 SUBMITTALS

- A. Submit under provisions of the General Requirements and Section 260500.
- B. Product Data: Provide for wiring devices, device plates, and fittings. Include manufacturer's catalog information showing dimensions, colors, and configurations.

- C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.
- D. Project Record Documents: Record actual locations of devices and record actual circuiting arrangements in project record documents.

## 1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years experience.

## 1.7 REGULATORY REQUIREMENTS

- A. Conform to requirements of National Electrical Code, unless otherwise specified.
- B. Furnish Products listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

## 1.8 COORDINATION

- A. Coordinate under provisions of the General Requirements and Section 260500.

## PART 2 - PRODUCTS

### 2.1 WALL SWITCHES

- A. Manufacturers:
  - 1. Hubbell
  - 2. Leviton.
  - 3. Cooper Wiring Devices
  - 4. Pass and Seymour
  - 5. Owner Approved Equal.

- B. Specification Grade Toggle Style: 20A., 120-277V., back and side wired.

	<u>Hubbell</u>	<u>Leviton</u>	<u>Cooper</u>	<u>Pass and Seymour</u>
1P	CS120	CSB1-20	CSB120	CS20AC1
2P	CS1222	CSB2-20	CSB220	CSB20AC2
3W	CS1223	CSB3-20	CSB320	CSB20AC3
4W	CS 1224	CSB4-20	CSB420	CSB20AC4
1P-K	HBL1221-L	-----	2221L	PS20AC1-L
1P-PL	HBL1221 PL	1221-PL	2221PL	PS20AC1-RPL
3W-PL	HBL1223 PL	1223-PL	-----	PS20AC3-RPL

- C. Legend: 1P=single pole, 2P=double pole, 3W=three way, 4W=four way, K=keyed, PL=pilot light, MC=momentary contact.
- D. Color: Ivory or red, unless otherwise specified. Final color selection shall be by the Architect.

## 2.2 WALL RECEPTACLES

- A. Manufacturers:

1. Hubbell
2. Leviton.
3. Cooper Wiring Devices.
4. Pass and Seymour.
5. Owner Approved Equal.

- B. Description: Receptacles shall be constructed to include a grounding pole from which a wired connection to ground shall be provided.

- C. Specification Grade Traditional Style: 20A., 120V., NEMA 5-20R, back and side wired.

	<u>Hubbell</u>	<u>Leviton</u>	<u>Cooper</u>	<u>Pass and Seymour</u>
S	HBL5361	5361	5361	5361
D	CR5362	5362	CR5362	5362
C	HBL5235	5261-CH	93632	S3733-SS
GFI	GF20L	7899	VGF20	2095
IG	CR5352IG	5362-IG	IG5362	IG5362-OSP
HG-S	HBL8310	8310	8310	8301
HG-D	HBL8300H	8300	8300	8300
HG-GFI	GFR8300HL	7899HG	VHGF20	2095-HG
HG-IGI	IG8300	8300-IG	IG8300	IG8300
TR	HBL8300SGA	8300-SG	TR8300	TR63

- D. Range Outlet: 50A., 125/250V., NEMA 10-50R.

	<u>Hubbell</u>	<u>Leviton</u>	<u>Cooper</u>	<u>Pass and Seymour</u>
Single	HBL7962	5206	32B	3890

- E. Combination Outlet: 15A., 125/250V., NEMA 5-15R & 6-15R.

	<u>Hubbell</u>	<u>Leviton</u>	<u>Cooper</u>	<u>Pass and Seymour</u>
Duplex	5292	5031	829	5290

- F. Special NEMA configurations shall be specification grade, unless otherwise specified.
- G. Color: Ivory or red, unless otherwise specified. Isolated ground devices: Orange, unless otherwise specified. Final color selection shall be by the Architect.
- H. Legend: S=single, D=duplex, C=clock hanger, GFI=ground fault, IG=isolated ground, TR=tamper resistant, HG = Hospital Grade.

## 2.3 WALL PLATES

- A. Manufacture: Match switch and receptacle manufacture. Provide matching cover plates for switches and receptacles within same area, unless otherwise specified.
- B. Decorative Cover Plate: Ivory or red. Final selection shall be by the Architect.
- C. Jumbo Cover Plate: Ivory, brushed satin finish.
- D. Weatherproof Cover Plate: Gasketed corrosion resistant cast metal with hinged and gasketed device cover.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify that device types, traditional or designer, finishes, and colors are in conformance with the Architects direction.
- B. Verify that outlet boxes are installed at proper height.
- C. Verify that wall openings are neatly cut and will be completely covered by wall plates.
- D. Verify that floor boxes are adjusted properly.
- E. Verify that exterior, wet locations, and other locations required by authority having jurisdiction, are provided with GFI type devices.
- F. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

### 3.2 PREPARATION

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean debris from outlet boxes.

### 3.3 INSTALLATION

- A. Install in accordance with NECA "Standard of Installation."
- B. Install fittings in accordance with manufacturers instructions.
- C. Install devices plumb and level.
- D. Install switches with OFF position down.
- E. Install receptacles with grounding pole on right side.
- F. Connect wiring device grounding terminal to separate green branch circuit equipment grounding conductor.
- G. Install decorative plates on switch, receptacle, and blank outlets in finished areas.
- H. Connect wiring devices by wrapping conductor around screw terminal.
- I. Use jumbo size plates for outlets installed in masonry walls.
- J. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface mounted outlets.
- K. Install protective rings on active flush cover service fittings.

### 3.4 INTERFACE WITH OTHER PRODUCTS

- A. Coordinate locations of outlet boxes provided under Section 260533 to obtain mounting heights as specified.
- B. Coordinate the installation of wiring devices with furniture systems.

### 3.5 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of the General Requirements.
- B. Inspect each wiring device for defects.
- C. Operate each wall switch with circuit energized and verify proper operation.

- D. Verify that each receptacle device is energized.
- E. Test each receptacle device for proper polarity.
- F. Test each GFI receptacle device for proper operation.

3.6 ADJUSTING

- A. Adjust installed work under the provisions of the General Requirements.
- B. Adjust devices and wall plates to be flush and level.

3.7 CLEANING

- A. Clean installed work under the provisions of the General Requirements.
- B. Clean exposed surfaces to remove splatters and restore finish.

END OF SECTION 262726



## SECTION 262819 - ENCLOSED SWITCHES

### PART 1 – GENERAL

#### 1.1 RELATED DOCUMENTS

- A. The General Provisions of the Contract, including Conditions of the Contract and the General Requirement Specifications, apply to the work in this Section.
- B. This Section is hereby made a part of all other sections of Division 26 as fully as if repeated in each therein.

#### 1.2 SECTION INCLUDES

- A. Fusible switches.
- B. Nonfusible switches.

#### 1.3 RELATED SECTIONS

- A. Section 26 24 13 - Fuses.
- B. Section 26 05 53 - Electrical Identification.

#### 1.4 REFERENCES

- A. NECA - (National Electrical Contractors Association) Standard of Installation.
- B. NEMA FU1 - Low Voltage Cartridge Fuses.
- C. NEMA KS1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).
- D. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems (published by the International Electrical Testing Association).
- E. National Electrical Code.

#### 1.5 SUBMITTALS

- A. Submit under provisions of the General Requirements and Section 26 05 00.
- B. Product Data: Provide for enclosed switches.

- C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.
- D. Project Record Documents: Record actual locations of enclosed switches in project record documents.

## 1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years experience.

## 1.7 REGULATORY REQUIREMENTS

- A. Conform to requirements of the National Electrical Code.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. or suitable for the purpose specified and indicated.

## 1.8 COORDINATION

- A. Coordinate under provisions of the General Requirements and Section 26 05 00.
- B. Field Measurements: Verify that field measurements are as shown on Drawings.
- C. Field Locations: Verify locations of transformers prior to rough-in.

## PART 2 – PRODUCTS

### 2.1 ENCLOSED SWITCHES

- A. Manufactures:
  - 1. Eaton/Cutler-Hammer.
  - 2. GE.
  - 3. Siemens ITE.
  - 4. Square D.
  - 5. Owner Approved Equal.

## 2.2 FUSIBLE SWITCH ASSEMBLIES

- A. Description: NEMA KS 1, Type HD (Heavy Duty) type, horsepower rated, with operable handle interlocked to prevent opening front cover with switch in ON position. Handle lockable in OFF position.
- B. Fuse clips: Designed to accommodate NEMA FU1, Class R fuses only.

## 2.3 NONFUSIBLE SWITCH ASSEMBLIES

- A. Description: NEMA KS 1, Type HD (Heavy Duty) type, horsepower rated, with externally operable handle interlocked to prevent opening front cover with switch in ON position.

## 2.4 ENCLOSURES

- A. Description: Code gauge steel
- B. Finish: Phosphate coated, primed and finished with high grade lacquer, manufacturers standard color.
- C. Fabrication: NEMA KS 1.
  - 1. Indoor clean, dry locations: Type 1.
  - 2. Indoor dusty, dry locations: Type 12.
  - 3. Indoor wet locations: Type 4X.
  - 4. Outdoor locations: Type 3R.

## PART 3 – EXECUTION

### 3.1 INSTALLATION

- A. Install in accordance with NECA "Standard of Installation."
- B. Install fuses in fusible disconnect switches.
- C. Apply adhesive tag on inside door of each fused switch indicating NEMA fuse class and size installed.
- D. Apply Identification Tag.

3.2 CLEANING

- A. Clean installed work under the provisions of the General Requirements.
- B. Clean interior of enclosures to remove dust, debris, and other material.
- C. Clean surfaces and restore finish.

END OF SECTION 262819



PROJECT:

# KENNEDY MIDDLE SCHOOL

## Boiler Replacement Project

OWNER:



## ROCKFORD PUBLIC SCHOOL DISTRICT 205

501 7th STREET

ROCKFORD, IL 61104

ISSUANCE:

# 03.11.16 Issue For Bidding Only

HAGNEY  
ARCHITECTS  
LLC

ARCHITECT

**Hagney Architects LLC**  
4615 East State Street #206  
Rockford, IL 61108  
Phone: 815.397.3330  
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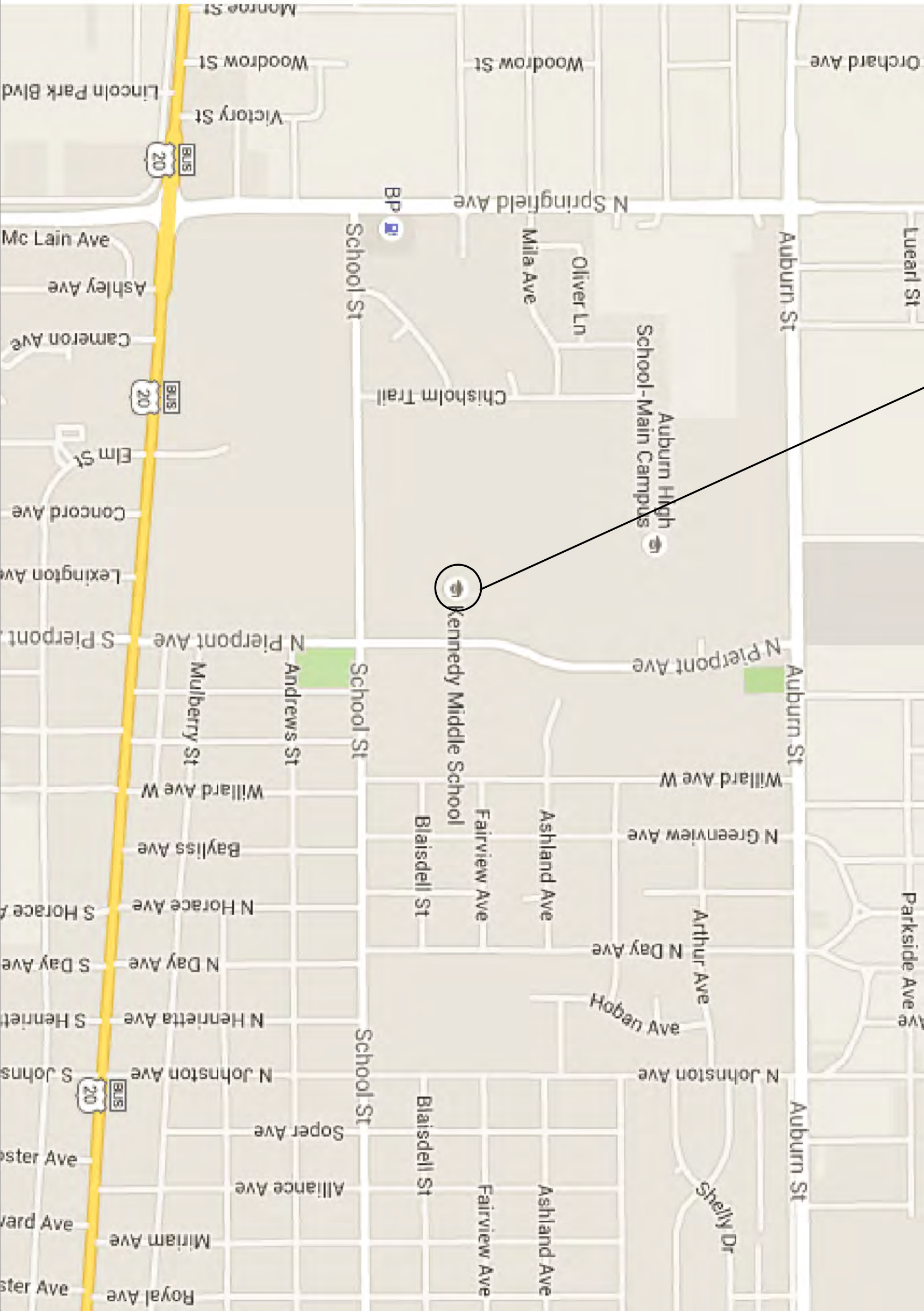
OAS, LLC

O'HIGGINS AND ARNOLD SUSTAINABILITY, LLC  
779 HARMON DR., UNIT A SPOKANE, IDAHO 83824

MECHANICAL - ELECTRICAL

**O'Higgins and Arnold Sustainability, LLC**  
769 Heartland Dr., Unit A  
Sugar Grove, Illinois 60554  
Phone: 630.538.1996  
Contact: Keith O'Higgins

KENNEDY MIDDLE SCHOOL  
520 North Pierpont Ave  
Rockford, IL 61101



KENNEDY LOCATION MAP

N.T.S.

BY REFERENCE: AIA DOCUMENT A201, "GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION", CURRENT EDITION, IS MADE A PART OF THESE DOCUMENTS.

"THE ARCHITECT WILL NOT HAVE CONTROL OVER, CHARGE OF, OR RESPONSIBILITY FOR, THE CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES OR PROCEDURES, OR FOR THE SAFETY PRECAUTIONS AND PROGRAMS IN CONNECTION WITH THE WORK, SINCE THESE ARE SOLELY THE CONTRACTOR'S RIGHTS AND RESPONSIBILITIES".

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BOILER AND ELECTRICAL UPGRADES FOR:  
**KENNEDY MIDDLE SCHOOL**  
ROCKFORD, ILLINOIS

G1.00

HAGNEY  
ARCHITECTS  
LLC

Architecture, Planning, & Interior Design  
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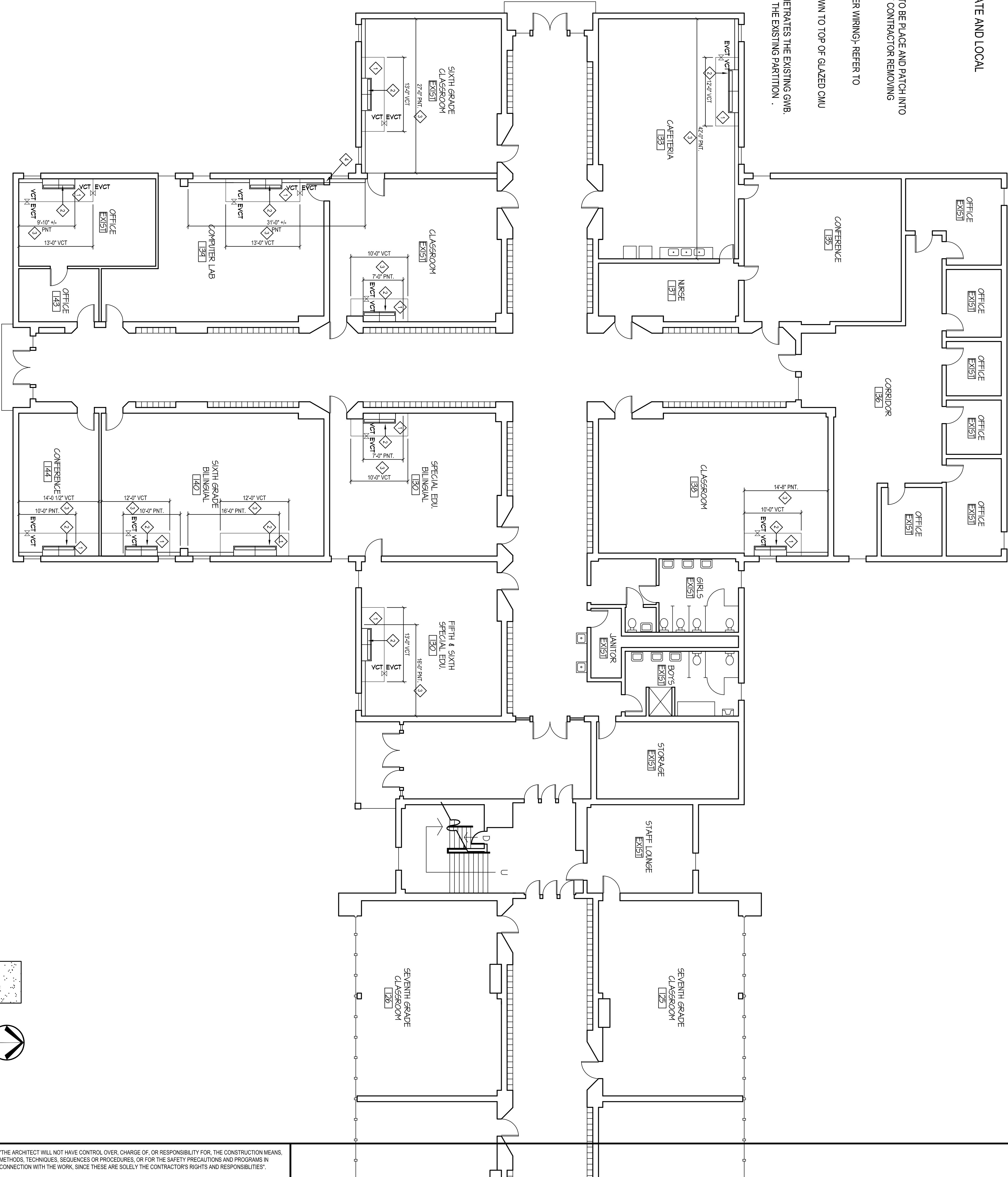


GENERAL FLOOR PLAN NOTES

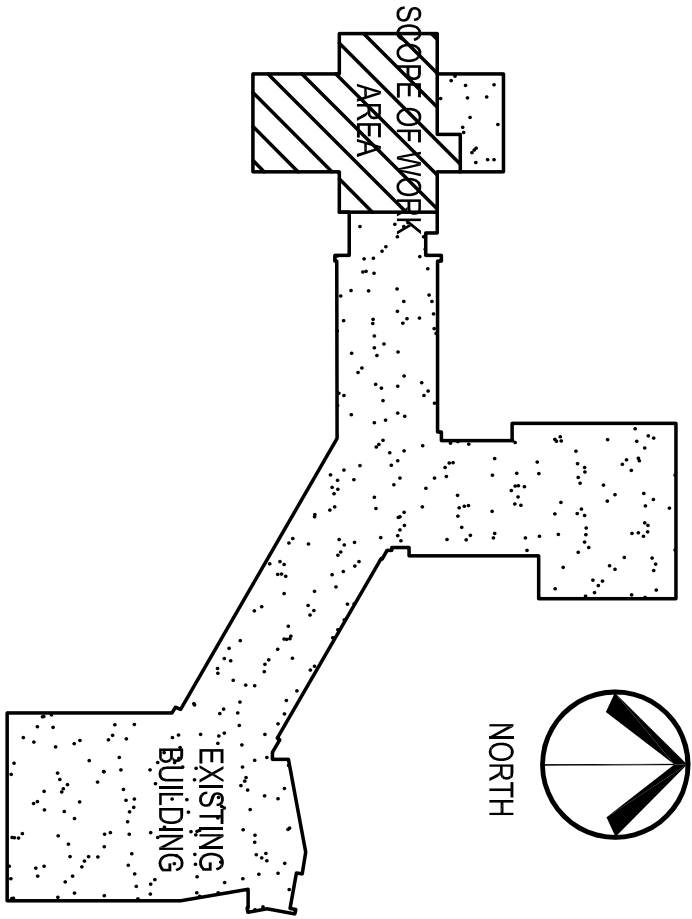
A. WORK SHALL BE DONE IN ACCORDANCE WITH ALL FEDERAL, STATE AND LOCAL CODES, LAWS, AND REGULATIONS.

ARCHITECTURAL KEYED NOTES

- 1
- FOR BIDDING PURPOSE INCLUDE THE COST OF 46 SQ. FT. OF NEW VCT FLOORING TO BE PLACED AND PATCH INTO EXISTING VCT FLOORING AS SHOWN AROUND NEW UNIT VENTS. (RPS ABATEMENT CONTRACTOR REMOVING EXIST. VCT. COORDINATE W/ RPS SUB-CONTRACTOR)
- 2
- NEW UNVENT AND WALL ENCLOSE (TO CONCEAL PIPING/ CONTROL WIRING/ POWER WIRING). REFER TO MECHANICAL & ELECTRICAL.
- 3
- REPAINT (PNT) INTERIOR SCORED CMU WALL LINE FROM WALL ELEV. OF +3'-2" DOWN TO TOP OF GLAZED CMU WALL BASE ELEV. @ +0'-0" ABOVE F.F.L.
- 4
- NOTE EXISTING WALL IS GWB PARTITION. DUE TO UNVENT WORK, THIS AREA PENETRATES THE EXISTING GWB. WALL LINE WILL BE REQUIRED TO BE PATCHED AND REPAINTED ON BOTH SIDE OF THE EXISTING PARTITION .



1 PARTIAL FLOOR PLAN LAYOUT  
SCALE 1/8" = 1'-0"



BY REFERENCE: AIA DOCUMENT A201, "GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION", CURRENT EDITION, IS MADE A PART OF THESE DOCUMENTS.

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BOILER AND ELECTRICAL UPGRADES FOR:  
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ROCKFORD, ILLINOIS

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HAGNEY  
ARCHITECTS  
LLC

REVISIONS:

DRAWN BY:


DATE: 03-11-2016

PROJECT NUMBER:  
C1825


SHEET NUMBER

A1.0




LIGHTING	
SYMBOL	DESCRIPTION
	1'x4' FLUORESCENT LTG. FIXTURE



  





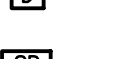



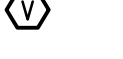
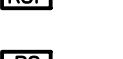



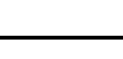

EMERGENCY LIGHTING	
SYMBOL	DESCRIPTION
	1'x4' FLUORESCENT LTG. FIXTURE




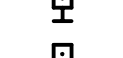












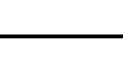

  
















MOTORS	
SYMBOL	DESCRIPTION
	MOTOR


  



























SWITCHES	
SYMBOL	DESCRIPTION
\$	SINGLE POLE SWITCH
\$ <sup>K</sup>	KEY OPERATED SWITCH
\$ <sup>3W</sup>	THREE WAY SWITCH
\$ <sup>4W</sup>	FOUR WAY SWITCH
\$ <sup>T</sup>	THERMAL OVERLOAD SWITCH
\$ <sup>P</sup>	SINGLE POLE SWITCH W/ PILOT LITE
\$ <sup>D</sup>	DIMMER SWITCH
\$ <sup>ST</sup>	SWITCH W/ INTEGRAL TIMER
\$ <sup>OS1</sup>	SWITCH W/ INTEGRAL INFRA-RED OCCUPANCY SENSOR
\$ <sup>OS2</sup>	SWITCH W/ INTEGRAL DUAL TECH OCCUPANCY SENSOR
\$ <sup>OS3</sup>	SWITCH W/ INTEGRAL ULTRA-SONIC OCCUPANCY SENSOR
	OCCUPANCY SENSOR
	EMERGENCY POWER OFF-PUSH-BUTTON

FIRE ALARM	
SYMBOL	DESCRIPTION
	FIRE ALARM CONTROL PANEL
	FIRE ALARM ANNUNCIATOR PANEL
	MANUAL PULL STATION
	WALL MOUNTED AUDIO/VISUAL DEVICE
	CEILING MTD. HEAT DETECTOR
	CEILING MOUNTED SMOKE DETECTOR
	WATER FLOW SWITCH
	VALVE SUPERVISORY SWITCH
	CARBON MONOXIDE (CO) DETECTOR
	VISUAL DEVICE
	RESCUE ASSISTANCE PANEL
	RESCUE ASSISTANCE STATION
	FAN SHUTDOWN RELAY
	KNOX BOX
	AUDIO DEVICE

POWER EQUIPMENT	
SYMBOL	DESCRIPTION
	ENCLOSED CIRCUIT BREAKER
	BRANCH CIRCUIT PANEL BOARD
	DISTRIBUTION PANEL BOARD
	TWO BUTTON START-STOP CONTROL BOX
	THREE BUTTON START-STOP CONTROL BOX
	CEILING MOUNTED JUNCTION BOX
	WALL MOUNTED JUNCTION BOX
	JUNCTION BOX W/ FLEXIBLE CONDUIT
	DOOR BELL
	TIME CLOCK
	NON-FUSED DISCONNECT SWITCH
	FUSED DISCONNECT SWITCH
	COMBO MOTOR STARTER WITH NON-FUSED DISCONNECT SWITCH
	COMBO MOTOR STARTER WITH FUSED DISCONNECT SWITCH
	MAGNETIC MOTOR STARTER
	PUSH PLATE
	GROUNDING
	BRANCH CIRCUIT WIRING LINE WITH DOT INDICATES GROUND WIRE.

TELEPHONE and DATA					DESCRIPTION
WALL MOUNTED	FLUSH IN FLOOR	ABOVE FLOOR OR POKE-THRU	CEILING MOUNTED	ABOVE COUNTER	
					TELEPHONE OUTLET
					DATA OUTLET
					COMBINATION PHONE AND DATA OUTLET

SUBSCRIPT INDICATES THE FOLLOWING FOR WALL MOUNTED OUTLETS (UNO):  
 WALL MOUNTED TELEPHONE OUTLET

RECEPTACLES					DESCRIPTION
WALL MOUNTED	FLUSH IN FLOOR	ABOVE FLOOR OR POKE-THRU	CEILING MOUNTED	ABOVE COUNTER	
					NORMAL SIMPLEX RECEPTACLE
					NORMAL DUPLEX RECEPTACLE
					NORMAL FOURPLEX RECEPTACLE
					DUPLEX RECEPTACLE FOR CRITICAL DISTRIBUTION SYSTEM
					FOURPLEX RECEPTACLE FOR CRITICAL DISTRIBUTION SYSTEM
					DUPLEX RECEPTACLE WITH GROUND FAULT CIRCUIT INTERRUPTER FEATURE

ABBREVIATION LIST	
AF	DENOTES AMPERE FUSE.
AFF	DENOTES ABOVE FINISHED FLOOR.
AFG	DENOTES ABOVE FINISHED GRADE.
AT	DENOTES AMPERE TRIP.
ATS	DENOTES AUTOMATIC TRANSFER SWITCH.
C/B	DENOTES CIRCUIT BREAKER.
CCT	DENOTES CIRCUIT.
COM ED	DENOTES COMMONWEALTH EDISON COMPANY.
C/T	DENOTES CURRENT TRANSFORMER.
CU	DENOTES COPPER.
EC	DENOTES ELECTRICAL CONTRACTOR.
EM	DENOTES DEVICE ON EMERGENCY POWER
FPC	DENOTES FIRE PROTECTION SYSTEM CONTRACTOR..
GC	DENOTES GENERAL CONTRACTOR.
GFCI	DENOTES GROUND FAULT CIRCUIT INTERRUPTER
GRD	DENOTES GROUND.
KWH	DENOTES KILOWATT HOUR.
MC	DENOTES MECHANICAL CONTRACTOR.
MCC	DENOTES MOTOR CONTROL CENTER.
MTS	DENOTES MANUAL TRANSFER SWITCH.
NL	DENOTES LIGHT FIXTURE CONNECTED TO A NIGHT LIGHT BRANCH CIRCUIT. PROVIDE CIRCUIT BREAKER LOCK-ON DEVICE.
PB	DENOTES PULL BOX
PC	DENOTES PLUMBING CONTRACTOR.
P/T	DENOTES POTENTIAL TRANSFORMER.
TVSS	DENOTES TRANSIENT VOLTAGE SURGE SUPPRESSION.
UON	DENOTES UNLESS OTHERWISE NOTED
VIF	DENOTES VERIFY IN FIELD. ①
WP	DENOTES EQUIPMENT IN A WEATHERPROOF ENCLOSURE.
XP	DENOTES EXPLOSION PROOF DEVICE OR EQUIPMENT.

GENERAL ELECTRICAL NOTES	
1. REFER TO ARCHITECTURAL PLANS AND SPECIFICATIONS FOR ADDITIONAL GENERAL NOTES WHICH WILL APPLY HERE.	24. PROVIDE DEEPER BACK BOX AS REQUIRED FOR EACH DEVICE; FOR EXAMPLE MINIMUM OF 2.5" DEEP FOR WALL BOX TYPE OCCUPANCY SENSOR.
2. DO NOT SCALE DRAWINGS.	25. PROVIDE SLEEVES THRU FLOOR AND WALLS AS REQUIRED FOR LOW VOLTAGE CABLES. COORDINATE ALL REQUIREMENTS WITH LOW VOLTAGE CONTRACTORS.
3. NOTES ON DRAWINGS SHALL APPLY TO ALL SIMILAR CONDITIONS WHETHER THEY ARE REPEATED OR NOT.	26. THE PANEL DIRECTORY SHALL HAVE SPECIFIC LIST OF LOAD SERVED. THE GENERIC OR BROAD LIST IS NOT ACCEPTABLE.
4. BOXES LOCATED ON OPPOSITE SIDES OF NON-FIRE RATED WALLS SHALL BE OFFSET A MINIMUM OF 6" HORIZONTALLY. BOXES ON OPPOSITE SIDES OF FIRE RATED WALL SHALL BE OFFSET A MINIMUM OF 24" HORIZONTALLY. THRU THE WALL" BOXES SHALL NOT BE ALLOWED WITHOUT PRIOR WRITTEN APPROVAL OF THE ARCHITECT/ENGINEER.	27. UNLESS NOTED OTHERWISE, ALL WIRING SHALL BE IN CONDUIT EXCEPT LOW VOLTAGE WIRING ABOVE ACCESSIBLE CEILING SPACE. LOW VOLTAGE WIRING EXCEPT FIRE ALARM SYSTEM WIRING ABOVE ACCESSIBLE CEILING SPACE SHALL BE EXPOSED. ALL FIRE ALARM SYSTEM WIRING SHALL BE IN CONDUIT.
5. ELECTRICAL CONTRACTOR SHALL VERIFY TOTAL CONNECTED LOAD/HP WITH ALL OTHER TRADES PRIOR TO WIRING OF ALL OTHER TRADES' EQUIPMENT. MAKE ANY CHANGES TO OVERCURRENT DEVICES AND FEEDER SIZE PER ELECTRICAL CODE AS REQUIRED.	28. THE CONTRACTOR MUST VISIT THE SITE TO FAMILIARIZE HIMSELF WITH THE EXISTING SITE AND BUILDING CONDITIONS WHICH WILL BE AFFECTED DURING CONSTRUCTION PRIOR TO SUBMITTING HIS BID PROPOSAL. CONTRACTOR IS CAUTIONED THAT THE PROJECT IS A REMODELING JOB AND IT IS ASSUMED THAT HE HAS INCLUDED FUNDS IN HIS BID TO COVER UNPREDSEEN ITEMS WHICH MUST BE MOVED, RELOCATED OR ADJUSTED TO FIT HIS WORK. NO EXTRA COMPENSATION WILL BE ALLOWED FOR ANY EXTRA WORK CAUSED BY FAILURE TO VISIT, EXAMINE OR VERIFY.
6. ELECTRICAL CONTRACTOR SHALL VERIFY ALL FURNITURE, MODULAR FURNITURE AND EQUIPMENT LOCATIONS WITH ARCHITECTURAL PLANS, ELEVATIONS AND REVENUED SHOP DRAWINGS. PRIOR TO MAKING THE ACTUAL ELECTRICAL INSTALLATION, THIS CONTRACTOR SHALL ADJUST RECEPTACLES, OUTLETS OR CONNECTION LOCATIONS TO ACCOMMODATE FURNITURE AND/OR EQUIPMENT.	29. THE ELECTRICAL DRAWINGS SHOW DIRECT PRINCIPLE WORK WHICH MUST BE ACCOMPLISHED UNDER THIS CONTRACT. INDIRECT AND INCIDENTAL WORK WILL ALSO BE NECESSARY DUE TO CHANGES AFFECTING EXISTING ARCHITECTURAL, MECHANICAL, PLUMBING OR OTHER SYSTEMS. SUCH INCIDENTAL WORK IS ALSO PART OF THIS CONTRACT. INSPECT THOSE AREAS, AND ASCERTAIN WORK NEEDED AND DO THAT WORK IN ACCORDANCE WITH THE CONTRACT REQUIREMENTS, AT NO ADDITIONAL COST.
7. ALL EXPOSED CABLES IN PLENUM CEILING SHALL BE APPROVED FOR PLENUM APPLICATION.	30. UNLESS NOTED OTHERWISE, THE CONDUITS AND BACK BOXES SHALL BE CONCEALED.
8. PROVIDE SLEEVES/CONDUITS FOR LOW VOLTAGE CABLES WHEN THEY TRAVERSE ABOVE NON ACCESSIBLE CEILING SPACE. ALSO, PROVIDE SLEEVES THROUGH MASONRY WALLS FOR LOW VOLTAGE CABLES. VERIFY SLEEVE/CONDUIT SIZE REQUIREMENTS AND LOCATION WITH THE CONTRACTOR INSTALLING LOW VOLTAGE SYSTEM.	31. ALL CABLES IN PLENUM CEILING SHALL BE RATED FOR PLENUM APPLICATION.
9. WHERE POWER AND LOW VOLTAGE OUTLETS (SUCH AS DATA OUTLETS) ARE SHOWN TOGETHER ON DRAWINGS, PROVIDE THEM ADJACENT TO EACH OTHER.	32. PROVIDE REMOTE TEST AND INDICATING STATION IN A READILY ACCESSIBLE AND VISIBLE SPACE FOR EACH DUCT SMOKE DETECTOR.
10. PROVIDE CONCRETE PAD FOR ALL FLOOR MOUNTED ELECTRICAL EQUIPMENT, (SUCH AS SWITCHBOARDS, PANELS, TRANSFORMER, ETC.)	33. ALL WORK SHALL COMPLY WITH ALL APPLICABLE CODES INCLUDING ORDINANCES OF CITY OF EVERGREEN PARK.
11. REFER TO ARCHITECTURAL DRAWINGS FOR EXACT LOCATIONS OF ELECTRICAL EQUIPMENT & DEVICES. THE ELECTRICAL DRAWINGS ARE FOR CONCEPT ONLY.	34. UNLESS NOTED OTHERWISE, ALL WIRING SHALL BE INSTALLED IN CONDUITS EXCEPT LOW VOLTAGE WIRING ABOVE ACCESSIBLE CEILING SPACE. LOW VOLTAGE WIRING (EXCEPT FOR FIRE ALARM SYSTEM) ABOVE ACCESSIBLE CEILING SPACE SHALL BE EXPOSED. ALL FIRE ALARM SYSTEM WIRING SHALL BE IN CONDUIT. PROVIDE J-HOOK OR SIMILAR SUPPORT 5' O.C. FOR EXPOSED CABLES.
12. THE SYSTEMS PROVIDED BY THIS CONTRACTOR SHALL BE COMPLETELY OPERATIONAL REGARDLESS OF OMISSION OF MINOR ITEMS, SUCH AS CIRCUIT NUMBER FOR RELAY, A CIRCUIT NUMBER NEXT TO A LIGHTING FIXTURE, POWER FOR CONTROL EQUIPMENT, ETC.	35. A COMMON JUNCTION BOX FOR A LOW VOLTAGE DEVICE (SUCH AS TV AND/OR RECEPTACLE) IS NOT ALLOWED. THEY MUST BE IN TWO SEPARATE JUNCTION BOXES. A COMMON JUNCTION BOX FOR LOW VOLTAGE DEVICES (SUCH AS TV AND PHONE) IS ACCEPTABLE AS LONG AS SEPARATE CONDUITS ARE USED FOR BOTH OF THEM. A COMMON CONDUIT FOR TELEPHONE AND DATA CABLES IS ACCEPTABLE.
13. PROVIDE LOOKING CLIPS ON CIRCUIT BREAKERS SERVING EMERGENCY LIGHTING, FIRE ALARM SYSTEM, PA/INTERCOMM, TELEPHONE SYSTEM AND SECURITY SYSTEM LOAD.	
14. IN CERTAIN CASES LARGER SIZE CABLES ARE SPECIFIED IN ORDER TO COMPENSATE FOR VOLTAGE DROP. PROVIDE OVERSIZE AND/OR MULTIPLE LUGS AT THE LINE AND LOAD SIDE OF EQUIPMENT TO INCORPORATE LARGER AND ADDITIONAL CABLES. IF REQUIRED, PROVIDE SPLICE BOXES AT EITHER END OF CABLE TO INTERCEPT CHANGE IN THE CABLES.	
15. UNO, ALL OVERCURRENT PROTECTION DEVICES 800 AMP AND LARGER SHALL BE 100% RATED.	
16. DUE TO THE SMALL SCALE AND INTERFERENCE OF EXISTING EQUIPMENT, EACH AND EVERY ITEM IS NOT SHOWN. SHOWN INFORMATION IS INTENDED AS A GUIDE. CONTRACTOR SHALL VERIFY INFORMATION AND CONDITIONS IN THE FIELD.	
17. RECONFIGURE LIGHTING FIXTURES AND OUTLETS IN MECHANICAL ROOMS TO BE COMPATIBLE WITH EQUIPMENT LAYOUT AS REQUIRED.	
18. ALL RECEPTACLES LOCATED WITHIN 6" OF SOURCE OF WATER (SUCH AS SINK) AND ALL OUTDOOR RECEPTACLES SHALL BE GFI TYPE, WHETHER SPECIFICALLY INDICATED OR NOT.	
19. PROVIDE EXPANSION FITTINGS FOR ALL ELECTRICAL BACKSHIPS AT EVERY EXPANSION JOINT. REFER TO ARCHITECTURAL AND STRUCTURAL DRAWINGS FOR LOCATION OF EXPANSION JOINTS.	
20. COORDINATE THE INSTALLATION OF ELECTRICAL PANELS, SWITCHBOARD, ETC. WITH OTHER TRADES SUCH THAT NO DUCTWORK, PIPING ETC. IS LOCATED ABOVE THEM.	
21. VERIFY QUANTITY AND SIZE OF LUGS PROVIDED IN OTHER TRADE'S EQUIPMENT (FOR EXAMPLE, CHILLER, ELEVATOR, FIRE PUMP ETC.) BEFORE STARTING ANY WORK ASSOCIATED WITH SUCH EQUIPMENT. IF THEIR LUGS CANNOT ACCOMMODATE THE CABLES INDICATED IN ELECTRICAL DOCUMENT, PROVIDE LUG FITTINGS TO ACCOMMODATE CHANGE IN THE CABLES. PROVIDE SUCH FITTINGS IN A JUNCTION BOX AS CLOSE AS POSSIBLE TO THEIR EQUIPMENT. IF ALLOWED BY THE EQUIPMENT MANUFACTURER, SUCH FITTINGS MAY BE INSTALLED IN THEIR EQUIPMENT RATHER THAN IN A SEPARATE JUNCTION BOX.	
22. MAIN SERVICE ENTRANCE EQUIPMENT SHALL HAVE LABEL FOR SERVICE ENTRANCE TYPE, AND SHALL BE GROUNDED PER ELECTRICAL CODE.	
23. PROVIDE SEPARATE DEDICATED GROUNDING CONDUCTOR IN EACH FEEDER AND BRANCH CIRCUIT WIRING CIRCUIT.	

ELECTRICAL KEY NOTES	
①	THIS INCLUDES VERIFICATION OF DEVICE TYPE, LOCATION, WIRING, CONDUIT AND CIRCUIT BREAKER REQUIREMENTS. PROVIDE APPROPRIATE DEVICE, WIRING, CONDUIT, BREAKER, ETC. AS REQUIRED.
②	PROVIDE AUDIBLE TYPE COVERS ON PULL STATIONS AS INDICATED IN SPECIFICATION.

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1 PARTIAL FIRST FLOOR PLAN - "ASPIRE" WING - DEMOLITION - ELECTRICAL  
 1/8"=1'-0"

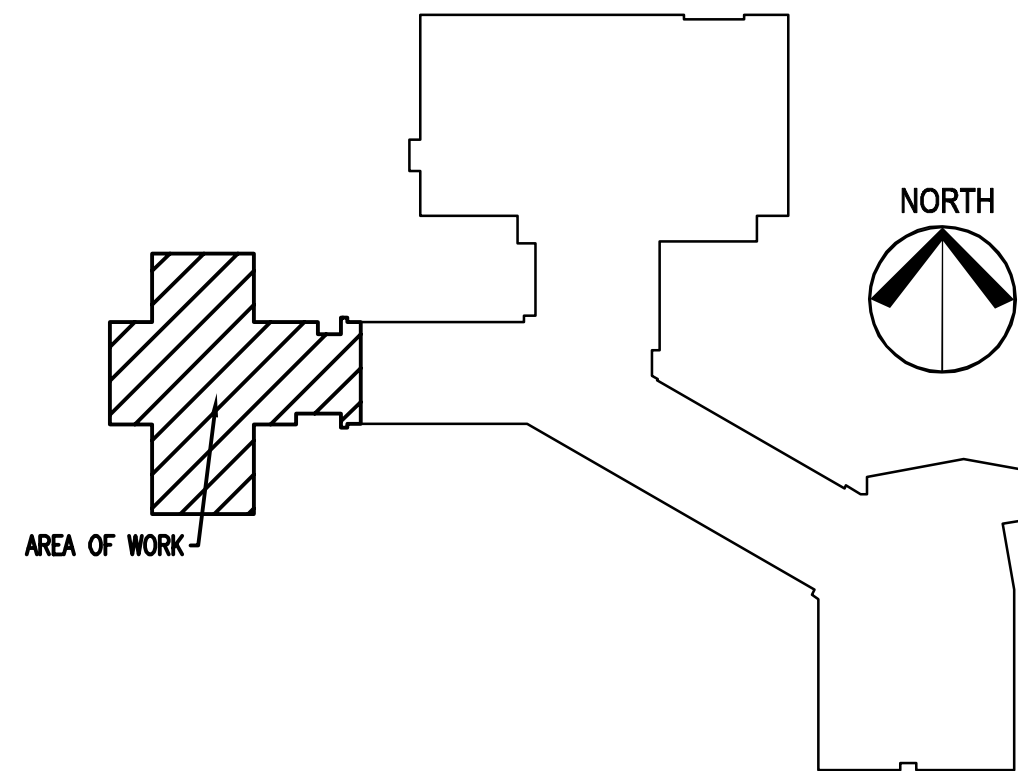


GENERAL DEMOLITION NOTES

1. PRIOR TO DEMOLITION, COORDINATE NEW CONNECTIONS OF INCOMING MECHANICAL EQUIPMENT WITH MECHANICAL CONTRACTOR AND EQUIPMENT MANUFACTURER TO DETERMINE SPECIFIC LOCATION OF NEW FINAL CONNECTION. TAKE THIS INFORMATION INTO ACCOUNT WHEN DISCONNECTING THE EXISTING MECHANICAL EQUIPMENT.

DEMOLITION KEY NOTES

- D1 DISCONNECT ELECTRICAL CONNECTION TO EXISTING MECHANICAL EQUIPMENT. CLEAN ENDS OF CONDUCTORS AS REQUIRED TO ACCOMMODATE RECONNECTION TO NEW EQUIPMENT, AS INDICATED IN NEW WORK PLAN.



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BOILER AND ELECTRICAL UPGRADES FOR:  
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 ROCKFORD, ILLINOIS

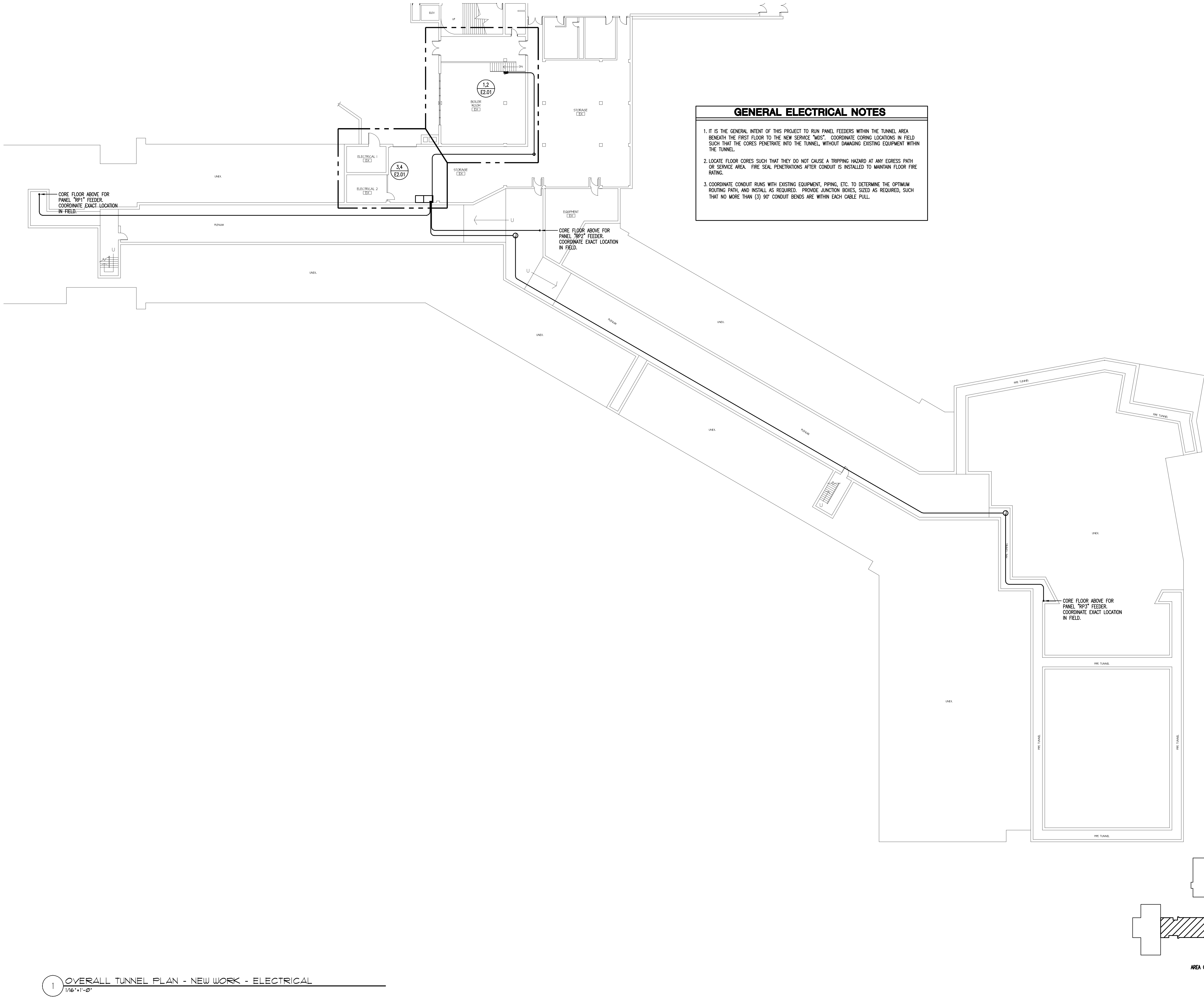
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1 OVERALL TUNNEL PLAN - NEW WORK - ELECTRICAL
 1/16"=1'-0"



- GENERAL ELECTRICAL NOTES**
1. IT IS THE GENERAL INTENT OF THIS PROJECT TO RUN PANEL FEEDERS WITHIN THE TUNNEL AREA BENEATH THE FIRST FLOOR TO THE NEW SERVICE "MDS". COORDINATE CORING LOCATIONS IN FIELD SUCH THAT THE CORES PENETRATE INTO THE TUNNEL, WITHOUT DAMAGING EXISTING EQUIPMENT WITHIN THE TUNNEL.
  2. LOCATE FLOOR CORES SUCH THAT THEY DO NOT CAUSE A TRIPPING HAZARD AT ANY EGRESS PATH OR SERVICE AREA. FIRE SEAL PENETRATIONS AFTER CONDUIT IS INSTALLED TO MAINTAIN FLOOR FIRE RATING.
  3. COORDINATE CONDUIT RUNS WITH EXISTING EQUIPMENT, PIPING, ETC. TO DETERMINE THE OPTIMUM ROUTING PATH, AND INSTALL AS REQUIRED. PROVIDE JUNCTION BOXES, SIZED AS REQUIRED, SUCH THAT NO MORE THAN (3) 90° CONDUIT BENDS ARE WITHIN EACH CABLE PULL.

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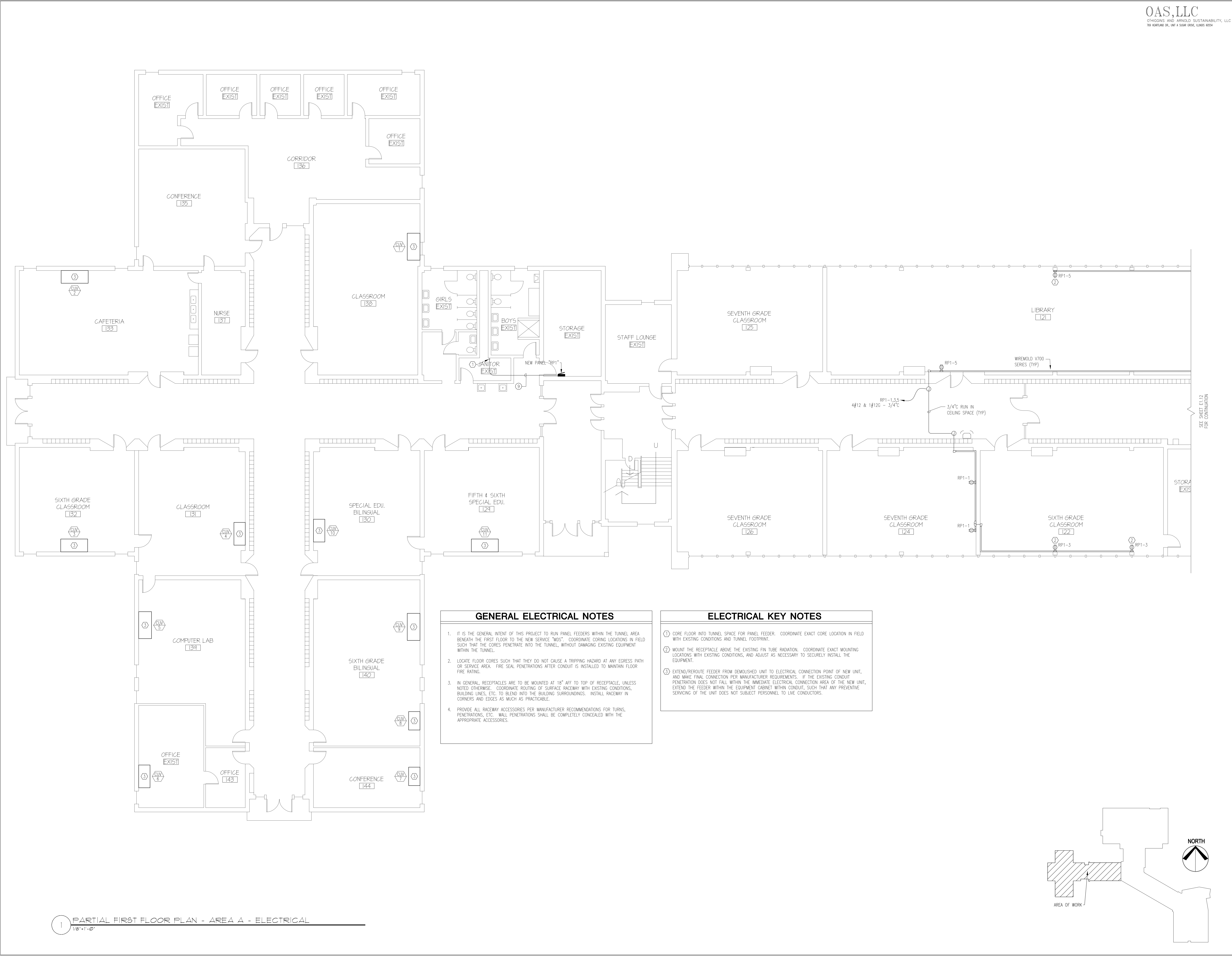
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GENERAL ELECTRICAL NOTES

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- LOCATE FLOOR CORES SUCH THAT THEY DO NOT CAUSE A TRIPPING HAZARD AT ANY EGRESS PATH OR SERVICE AREA. FIRE SEAL PENETRATIONS AFTER CONDUIT IS INSTALLED TO MAINTAIN FLOOR FIRE RATING.
- IN GENERAL, RECEPTACLES ARE TO BE MOUNTED AT 18" AFF TO TOP OF RECEPTACLE, UNLESS NOTED OTHERWISE. COORDINATE ROUTING OF SURFACE RACEWAY WITH EXISTING CONDITIONS, BUILDING LINES, ETC TO BLEND INTO THE BUILDING SURROUNDINGS. INSTALL RACEWAY IN CORNERS AND EDGES AS MUCH AS PRACTICABLE.
- PROVIDE ALL RACEWAY ACCESSORIES PER MANUFACTURER RECOMMENDATIONS FOR TURNS, PENETRATIONS, ETC. WALL PENETRATIONS SHALL BE COMPLETELY CONCEALED WITH THE APPROPRIATE ACCESSORIES.

ELECTRICAL KEY NOTES

- CORE FLOOR INTO TUNNEL SPACE FOR PANEL FEEDER. COORDINATE EXACT CORE LOCATION IN FIELD WITH EXISTING CONDITIONS AND TUNNEL FOOTPRINT.
- MOUNT THE RECEPTACLE ABOVE THE EXISTING FIN TUBE RADIATION. COORDINATE EXACT MOUNTING LOCATIONS WITH EXISTING CONDITIONS, AND ADJUST AS NECESSARY TO SECURELY INSTALL THE EQUIPMENT.
- EXTEND/REROUTE FEEDER FROM DEMOLISHED UNIT TO ELECTRICAL CONNECTION POINT OF NEW UNIT, AND MAKE FINAL CONNECTION PER MANUFACTURER REQUIREMENTS. IF THE EXISTING CONDUIT PENETRATION DOES NOT FALL WITHIN THE IMMEDIATE ELECTRICAL CONNECTION AREA OF THE NEW UNIT, EXTEND THE FEEDER WITHIN THE EQUIPMENT CABINET WITHIN CONDUIT, SUCH THAT ANY PREVENTIVE SERVICING OF THE UNIT DOES NOT SUBJECT PERSONNEL TO LIVE CONDUCTORS.

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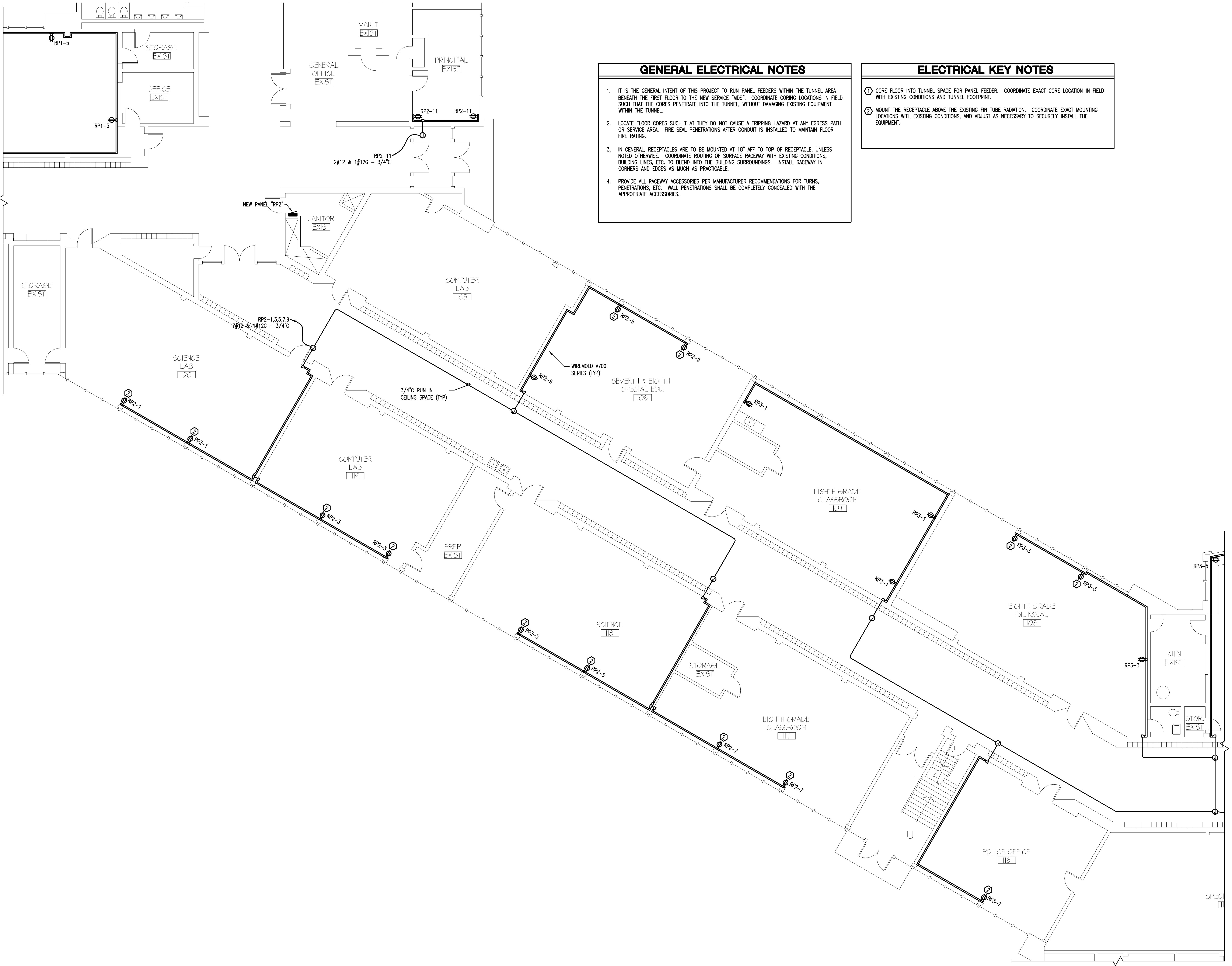
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KENNEDY MIDDLE SCHOOL

C1825

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GENERAL ELECTRICAL NOTES

1. IT IS THE GENERAL INTENT OF THIS PROJECT TO RUN PANEL FEEDERS WITHIN THE TUNNEL AREA BENEATH THE FIRST FLOOR TO THE NEW SERVICE "MDS". COORDINATE CORING LOCATIONS IN FIELD SUCH THAT THE CORES PENETRATE INTO THE TUNNEL, WITHOUT DAMAGING EXISTING EQUIPMENT WITHIN THE TUNNEL.
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ELECTRICAL KEY NOTES

- ① CORE FLOOR INTO TUNNEL SPACE FOR PANEL FEEDER. COORDINATE EXACT CORE LOCATION IN FIELD WITH EXISTING CONDITIONS AND TUNNEL FOOTPRINT.
- ② MOUNT THE RECEPTACLE ABOVE THE EXISTING FIN TUBE RADIATION. COORDINATE EXACT MOUNTING LOCATIONS WITH EXISTING CONDITIONS, AND ADJUST AS NECESSARY TO SECURELY INSTALL THE EQUIPMENT.

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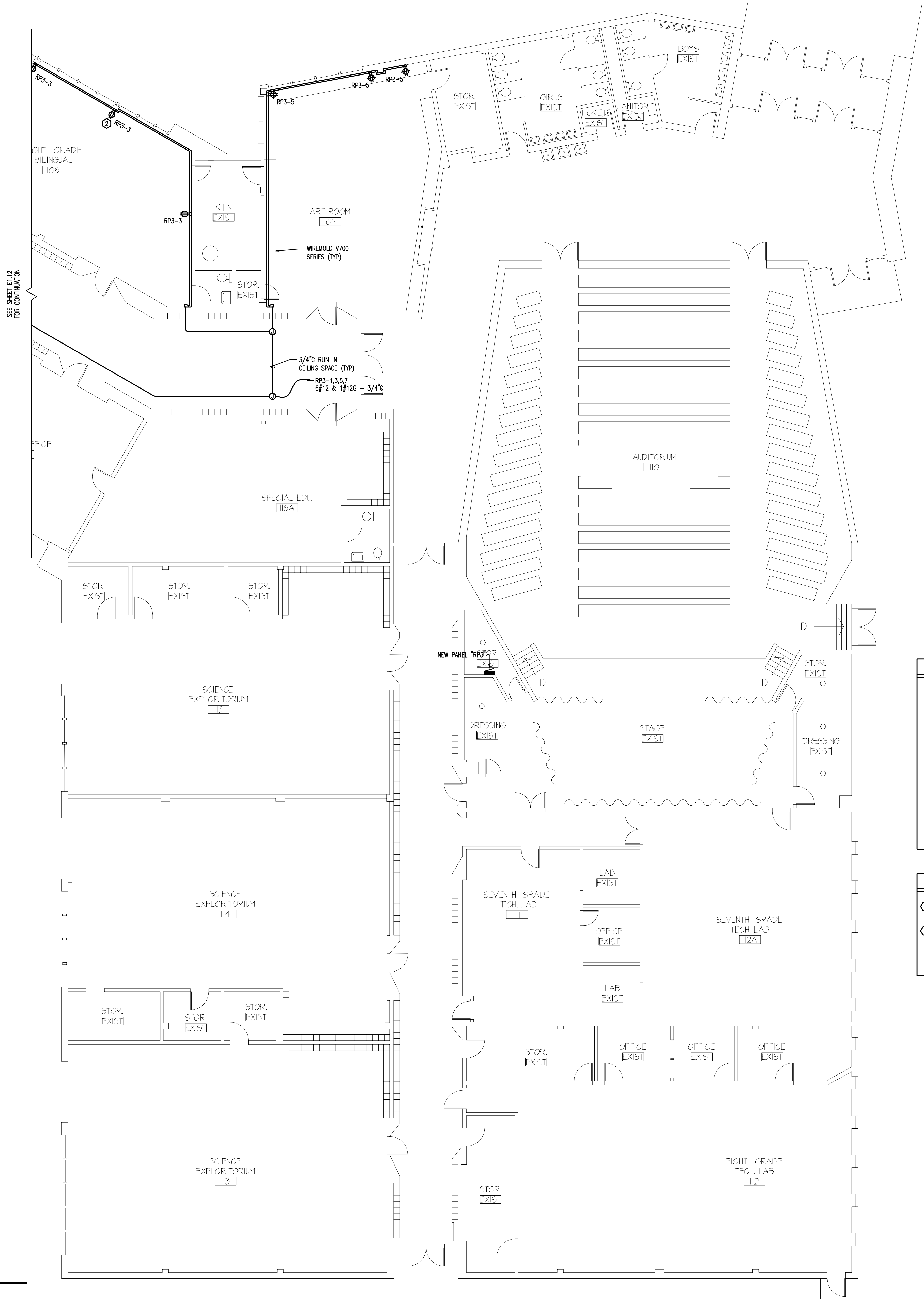
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KENNEDY MIDDLE SCHOOL

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1 PARTIAL FIRST FLOOR PLAN - AREA C - ELECTRICAL  
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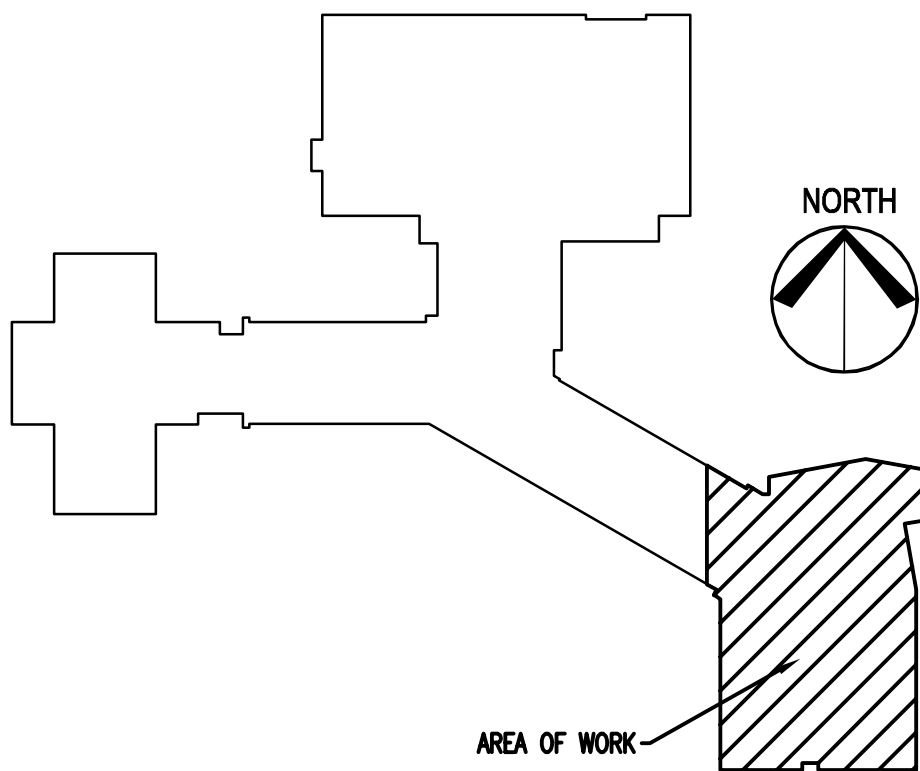


GENERAL ELECTRICAL NOTES

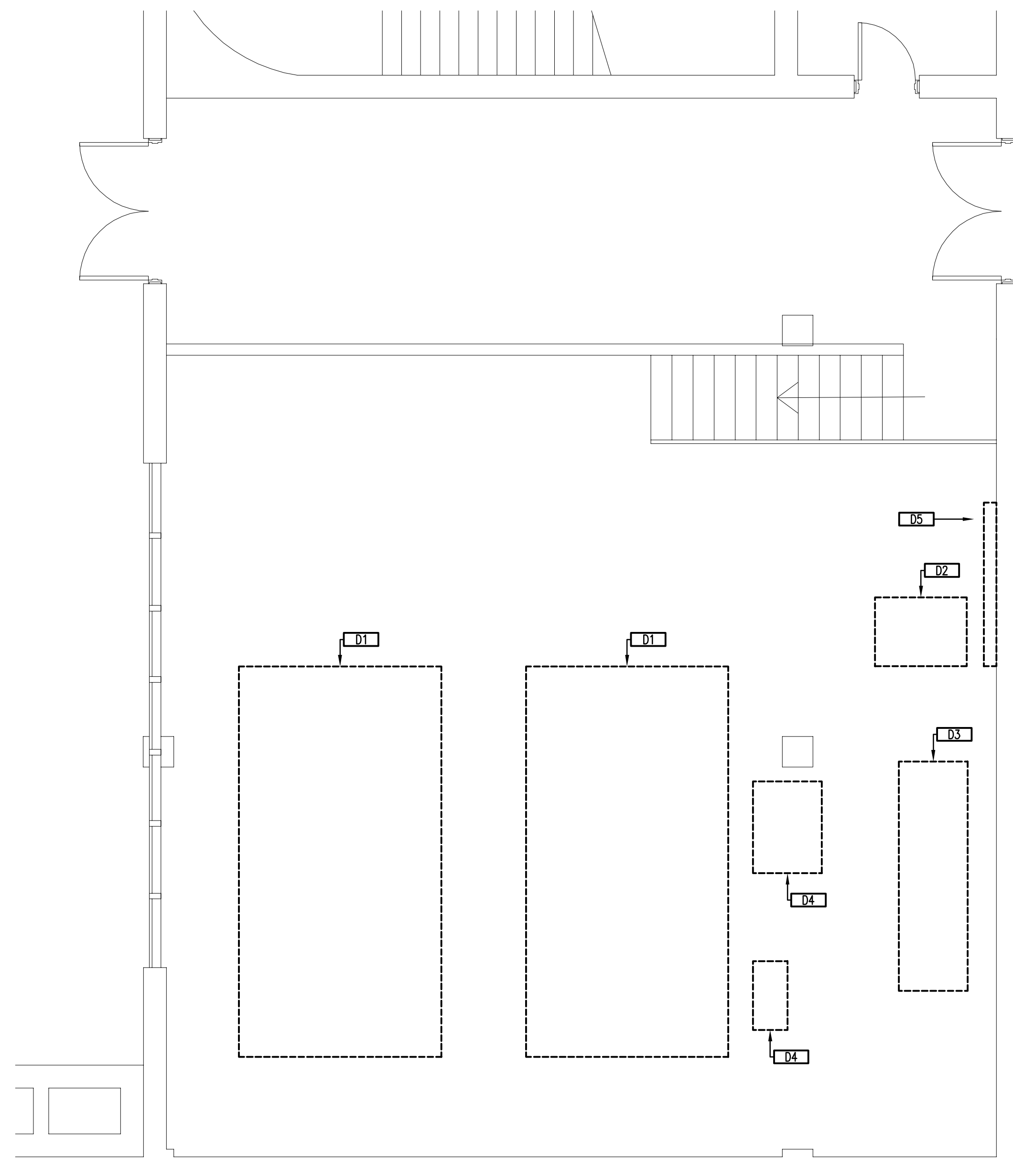
- IT IS THE GENERAL INTENT OF THIS PROJECT TO RUN PANEL FEEDERS WITHIN THE TUNNEL AREA BENEATH THE FIRST FLOOR TO THE NEW SERVICE "MDS". COORDINATE CORING LOCATIONS IN FIELD SUCH THAT THE CORES PENETRATE INTO THE TUNNEL, WITHOUT DAMAGING EXISTING EQUIPMENT WITHIN THE TUNNEL.
- LOCATE FLOOR CORES SUCH THAT THEY DO NOT CAUSE A TRIPPING HAZARD AT ANY EGRESS PATH OR SERVICE AREA. FIRE SEAL PENETRATIONS AFTER CONDUIT IS INSTALLED TO MAINTAIN FLOOR FIRE RATING.
- IN GENERAL, RECEPTACLES ARE TO BE MOUNTED AT 18" AFF TO TOP OF RECEPTACLE, UNLESS NOTED OTHERWISE. COORDINATE ROUTING OF SURFACE RACEWAY WITH EXISTING CONDITIONS, BUILDING LINES, ETC. TO BLEND INTO THE BUILDING SURROUNDINGS. INSTALL RACEWAY IN CORNERS AND EDGES AS MUCH AS PRACTICABLE.
- PROVIDE ALL RACEWAY ACCESSORIES PER MANUFACTURER RECOMMENDATIONS FOR TURNS, PENETRATIONS, ETC. WALL PENETRATIONS SHALL BE COMPLETELY CONCEALED WITH THE APPROPRIATE ACCESSORIES.

ELECTRICAL KEY NOTES

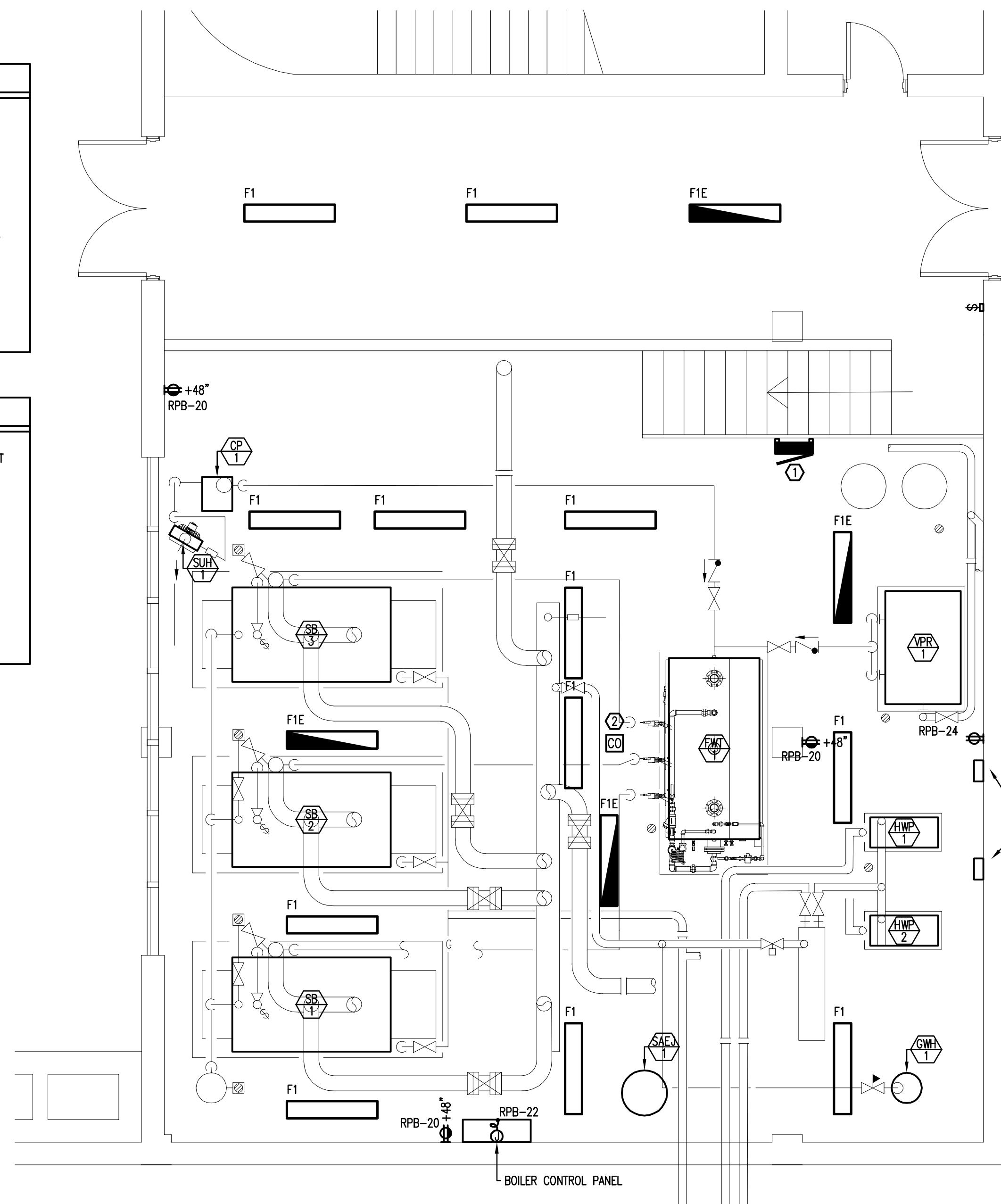
- CORE FLOOR INTO TUNNEL SPACE FOR PANEL FEEDER. COORDINATE EXACT CORE LOCATION IN FIELD WITH EXISTING CONDITIONS AND TUNNEL FOOTPRINT.
- MOUNT THE RECEPTACLE ABOVE THE EXISTING FIN TUBE RADIATION. COORDINATE EXACT MOUNTING LOCATIONS WITH EXISTING CONDITIONS, AND ADJUST AS NECESSARY TO SECURELY INSTALL THE EQUIPMENT.



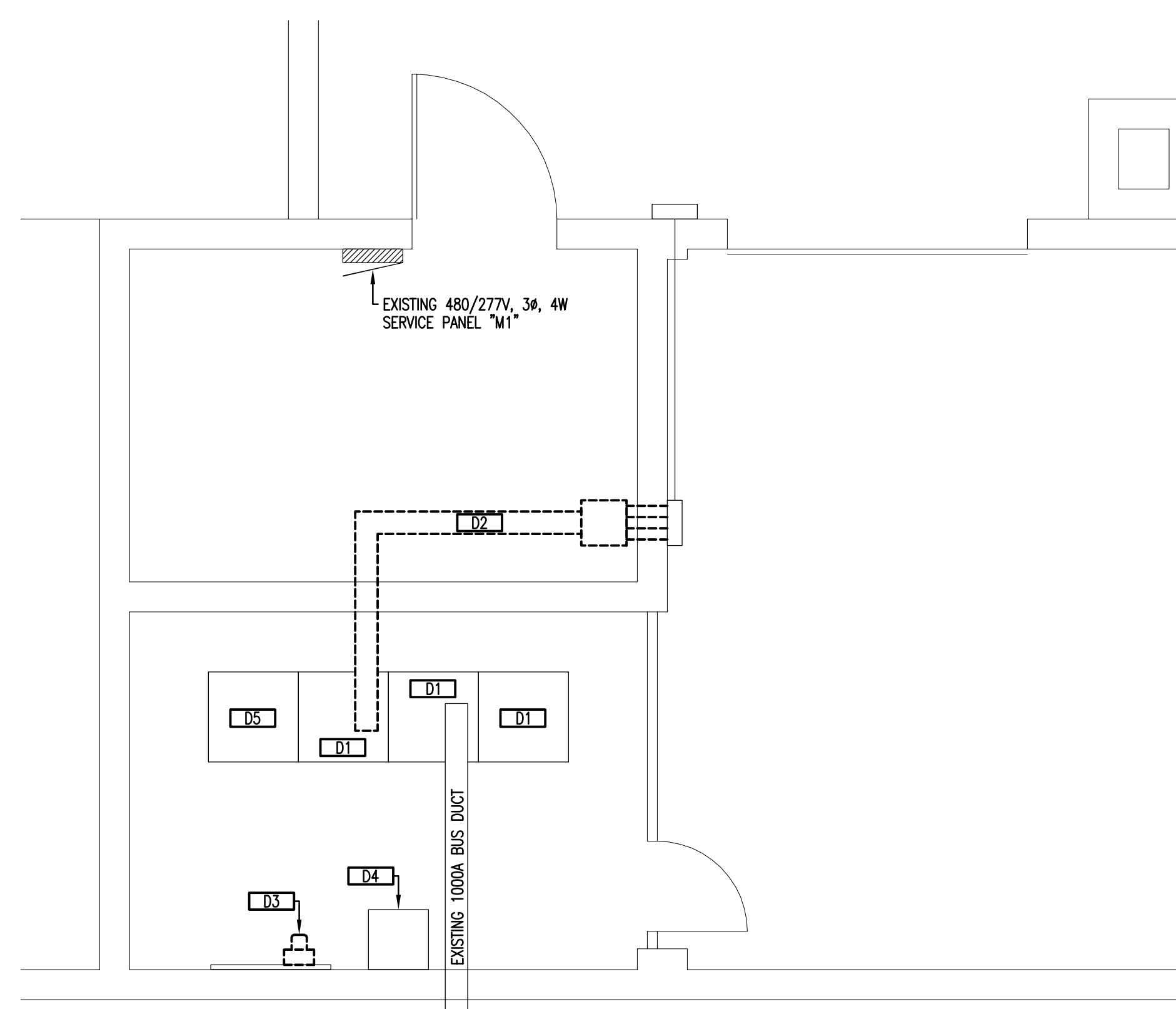




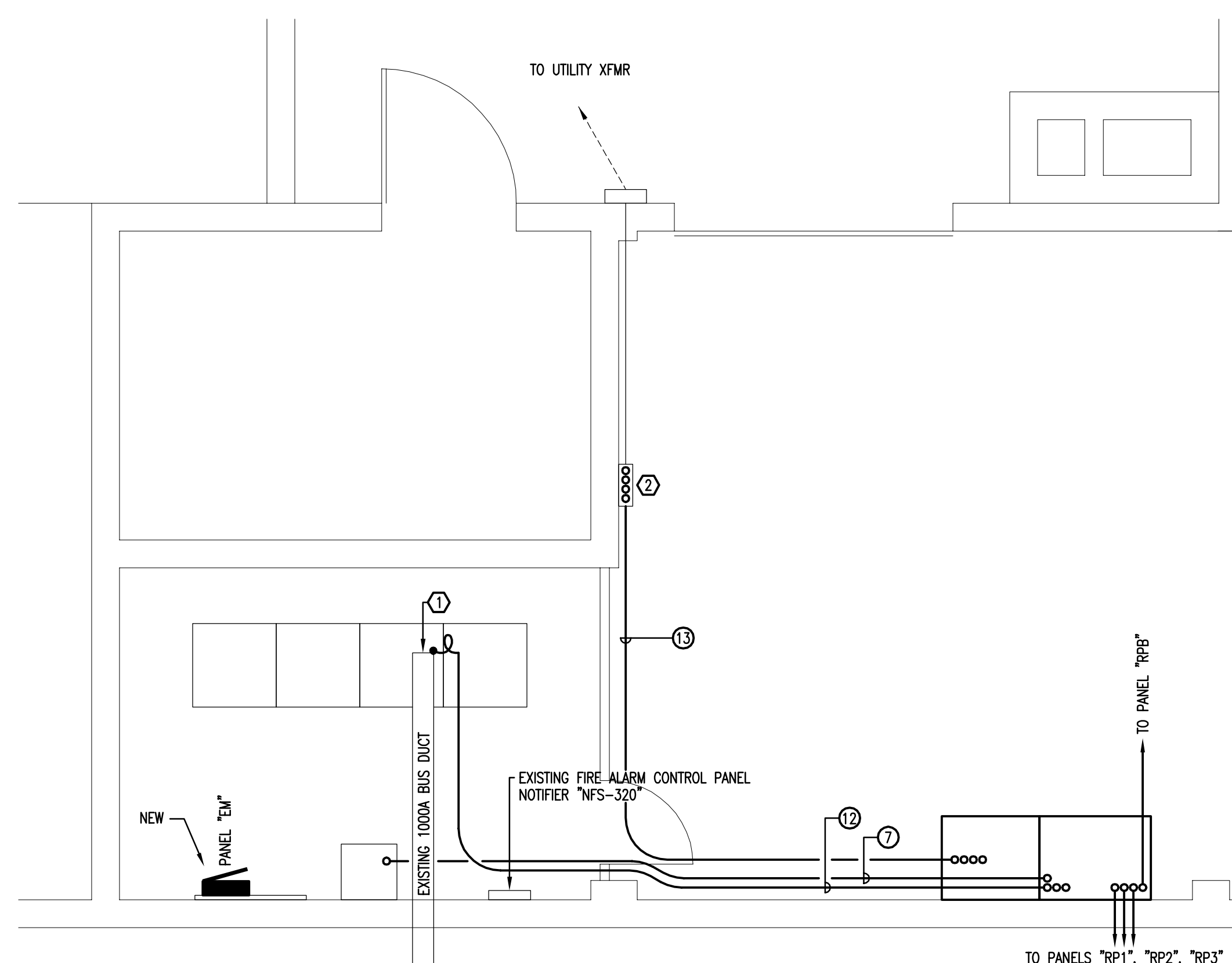
1 ENLARGED BOILER PLAN - DEMOLITION - ELECTRICAL  
1/4"=1'-0"



2 ENLARGED BOILER PLAN - NEW WORK - ELECTRICAL  
1/4"=1'-0"



3 ENLARGED MAIN ELECTRICAL AREA PLAN - DEMOLITION  
1/4" = 1'-0"



4 ENLARGED MAIN ELECTRICAL AREA PLAN - NEW WORK  
1/4" = 1'-0"

## GENERAL DEMOLITION NOTES

1. COORDINATE ALL ELECTRICAL DEMOLITION WORK WITH MECHANICAL DEMOLITION. IN GENERAL, REMOVE ALL ELECTRICAL COMPONENTS ASSOCIATED WITH THE MECHANICAL DEMOLITION. REMOVE ALL WIRING AND EXPOSED CONDUIT FOR DEMOLISHED EQUIPMENT. TRACE CIRCUIT BACK TO SOURCE PANEL, AND LABEL CIRCUIT BREAKER "SPARE" ON THE PANEL DIRECTORY. PROVIDE A NEW TYPED DIRECTORY FOR EVERY PANEL AFFECTED BY EITHER DEMOLITION OR NEW WORK. IF AN EXISTING LOAD DESCRIPTION IS NOT READILY APPARENT, LABEL IT "EXISTING LOAD TO BE VERIFIED".
2. DISCONNECT AND REMOVE ALL LIGHTING WITHIN THE BOILER ROOM. REFER TO THE NEW WORK LIGHTING LAYOUT TO DETERMINE AREA OF DEMOLITION.

## DEMOLITION KEY NOTES

- |    |  |
|----|--|
| 01 | DISCONNECT ELECTRICAL CONNECTION TO EXISTING STEAM BOILER. REMOVE DISCONNECT SWITCHES, WIRING AND CONDUIT BACK TO SOURCE.      |
| 02 | DISCONNECT ELECTRICAL CONNECTION TO EXISTING VACUUM PUMP. REMOVE DISCONNECT SWITCHES, WIRING AND CONDUIT BACK TO SOURCE.       |
| 03 | DISCONNECT ELECTRICAL CONNECTION TO EXISTING BOILER FEED PUMPS. REMOVE DISCONNECT SWITCHES, WIRING AND CONDUIT BACK TO SOURCE. |
| 04 | DISCONNECT ELECTRICAL CONNECTION TO EXISTING HOT WATER PUMPS. REMOVE DISCONNECT SWITCHES, WIRING AND CONDUIT BACK TO SOURCE.   |
| 05 | REMOVE ALL DISCONNECTS, WIRING AND CONDUIT FEEDING ALL EQUIPMENT IN BOILER ROOM BACK TO PANEL.                                 |

## GENERAL ELECTRICAL NOTES

1. COORDINATE LOCATIONS OF LIGHT FIXTURES WITH MECHANICAL EQUIPMENT AND PIPING LAYOUT, AND MOUNT APPROXIMATELY EVEN WITH THE BOTTOM OF THE HORIZONTAL PIPING ELEVATION. MODIFY LOCATIONS AS REQUIRED TO OPTIMIZE ILLUMINATION ON THE FLOOR.
2. FIXTURE TYPE "F1" - PHILIPS DAY-BRITE #0WL440,840-UNV-DIM-(EMLED) 4' SUSPENDED WRAPAROUND FIXTURE, MOUNTED EVEN WITH THE BOTTOM OF HORIZONTAL PIPING ELEVATION (BUT NOT BELOW 8'-0" AFT). PROVIDE "-EMLED" OPTION FOR THE FIXTURES DESIGNATED AS "F1E".

## ELECTRICAL KEY NOTES

- ① PROVIDE NEW PANEL "RPSB", MOUNTED ON UNISTRUT FRAME, SECURED TO CONCRETE FLOOR.
- ② PROVIDE NEW CARBON MONOXIDE DETECTOR WITHIN 20'-0" OF BOILERS AND GAS FIRED WATER HEATER, AND CONNECT TO EXISTING NOTIFICATION RPS-320T FIRE ALARM SYSTEM. COORDINATE REQUIREMENTS WITH FIRE ALARM MANUFACTURER AND PROVIDE ALL PERIPHERAL COMPONENTS AND PROGRAMMING TO ADD CO DETECTOR. DETECTION OF CARBON MONOXIDE ABOVE THE INDUSTRY-STANDARD MINIMUM THRESHOLD SHALL ANNUNCIATE AS A "TROUBLE" SIGNAL TO THE FIRE ALARM SYSTEM.
- ③ VARIABLE FREQUENCY DRIVE FURNISHED BY MECHANICAL, INSTALLED BY ELECTRICAL.

## GENERAL DEMOLITION NOTES

1. IT IS THE GENERAL INTENT OF THIS PROJECT TO REMOVE THE EXISTING MAIN DISTRIBUTION SWITCHBOARD CONNECTIONS, AND EXTEND THEM TO NEW MAIN SWITCHBOARD "MDS". AS THE MAJORITY OF EXISTING FEEDERS HAVE BEEN RUN BELOW SLAB, THE EXISTING MAIN CABINET WILL REMAIN, TO BE UTILIZED AS A "PULL BOX" TO EXTEND THE EXISTING DISTRIBUTION FEEDERS THAT ARE TO REMAIN TO NEW "MDS". PROVIDE ALL BLANK COVER PLATES REQUIRED TO COVER ANY/ALL OPENINGS CREATED BY THE REMOVAL OF EXISTING SWITCHES AND CIRCUIT BREAKERS.

## DEMOLITION KEY NOTES

- |    |  |
|----|--|
| 01 | DISCONNECT AND REMOVE EXISTING OVERCURRENT PROTECTION DEVICES FROM WITHIN MAIN SWITCHBOARD. EXTEND EXISTING FEEDERS OVERHEAD TO NEW MAIN "MDS" AS REQUIRED.  |
| 02 | DISCONNECT AND REMOVE EXISTING SERVICE BUS DUCT BACK TO EXISTING JUNCTION BOX. SEAL PENETRATIONS INTO JUNCTION BOX PER NEC REQUIREMENTS.   |
| 03 | DISCONNECT AND REMOVE UTILITY METER SOCKET. COORDINATE WITH UTILITY COMPANY TO REMOVE METER, AND DETERMINE WHETHER EXISTING METER CAN BE RE-USED IN NEW METER SOCKET. COORDINATE WIRING REQUIREMENTS WITH UTILITY COMPANY AND SCHEDULE UTILITY WORK WELL IN ADVANCE. |
| 04 | EXISTING STS TO REMAIN. DISCONNECT FEEDER FROM EXISTING SERVICE DISTRIBUTION THAT CONTAINS EMERGENCY PANEL TO BE DEMOLISHED.   |
| 05 | DISCONNECT EXISTING EMERGENCY CIRCUITS FROM EMERGENCY PANEL TO BE DEMOLISHED. PREPARE TO EXTEND ALL CIRCUITS TO NEW EMERGENCY PANEL "EM".  |

## ELECTRICAL KEY NOTES

- ① PROVIDE CONNECTION TO EXISTING 1000A BUS DUCT WITHIN EXISTING MAIN ENCLOSURE. RUN INDICATED FEEDER OVERHEAD TO NEW "MDS". COORDINATE CONNECTION WITH EXISTING BUS DUCT TERMINATION.
- ② EXTEND INCOMING SERVICE FEEDER FROM EXISTING JUNCTION BOX UP AND OVERHEAD AS INDICATED, TO NEW 1600A MAIN CIRCUIT BREAKER, VIA NEW C/T CABINET. COORDINATE WITH UTILITY COMPANY TO EITHER RE-USE OR TO HAVE THEM FURNISH NEW METER.

"THE ARCHITECT WILL NOT HAVE CONTROL OVER, CHARGE OF, OR RESPONSIBILITY FOR, THE CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES OR PROCEDURES, OR FOR THE SAFETY PRECAUTIONS AND PROGRAMS IN CONNECTION WITH THE WORK, SINCE THESE ARE SOLELY THE CONTRACTOR'S RIGHTS AND RESPONSIBILITIES".

REVISIONS:

**DRAWN BY:**























DATE: 03-11-16

C1005

SHEET NUMBER

## E2.01

	FEEDER	SOURCE OF POWER	PROTECT. (AMPERES)	START
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EQUIPMENT DESIGNATED TAG	LOCATION	LOAD						FEEDER	SOURCE OF POWER		PROTECT. (AMPERES)	STARTER		DISCONNECT		REMARKS
		VOLTS	PHASE	H.P.	AMP	KW	PANEL		CCT. NO.	SIZE		TYPE	SIZE	TYPE		
 CP 1	CONDENSATE PUMP	BOILER ROOM	120	1	1/3	7.2	0.9	①	RPB	14	20A 1P	—	—	20A 1P	THERMAL OVERLOAD	—
 CUV 1	CLASSROOM UNIT VENTILATOR	—	120	1	1/2	9.8	1.2	①	RECONNECT TO EXISTING CIRCUIT		20A 1P	—	—	BY MANUFACTURER		—
 CUV 2	CLASSROOM UNIT VENTILATOR	—	120	1	1/2	9.8	1.2	①	RECONNECT TO EXISTING CIRCUIT		20A 1P	—	—	BY MANUFACTURER		—
 CUV 3	CLASSROOM UNIT VENTILATOR	—	120	1	1/3	7.2	0.9	①	RECONNECT TO EXISTING CIRCUIT		20A 1P	—	—	BY MANUFACTURER		—
 CUV 4	CLASSROOM UNIT VENTILATOR	—	120	1	1/2	9.8	1.2	①	RECONNECT TO EXISTING CIRCUIT		20A 1P	—	—	BY MANUFACTURER		—
 CUV 5	CLASSROOM UNIT VENTILATOR	—	120	1	1/3	7.2	0.9	①	RECONNECT TO EXISTING CIRCUIT		20A 1P	—	—	BY MANUFACTURER		—
 CUV 6	CLASSROOM UNIT VENTILATOR	—	120	1	1/3	7.2	0.9	①	RECONNECT TO EXISTING CIRCUIT		20A 1P	—	—	BY MANUFACTURER		—
 CUV 7	CLASSROOM UNIT VENTILATOR	—	120	1	1/3	7.2	0.9	①	RECONNECT TO EXISTING CIRCUIT		20A 1P	—	—	BY MANUFACTURER		—
 CUV 8	CLASSROOM UNIT VENTILATOR	—	120	1	1/3	7.2	0.9	①	RECONNECT TO EXISTING CIRCUIT		20A 1P	—	—	BY MANUFACTURER		—
 CUV 9	CLASSROOM UNIT VENTILATOR	—	120	1	1/2	9.8	1.2	①	RECONNECT TO EXISTING CIRCUIT		20A 1P	—	—	BY MANUFACTURER		—
 CUV 10	CLASSROOM UNIT VENTILATOR	—	120	1	1/2	9.8	1.2	①	RECONNECT TO EXISTING CIRCUIT		20A 1P	—	—	BY MANUFACTURER		—
 CUV 11	CLASSROOM UNIT VENTILATOR	—	120	1	1/2	9.8	1.2	①	RECONNECT TO EXISTING CIRCUIT		20A 1P	—	—	BY MANUFACTURER		—
 FWT 1	FEED WATER TANK FEED PUMP	BOILER ROOM	208	3	—	15.0	5.4	④	RPB	2-4-6	20A 3P (4W)	—	—	30A 3P	NEMA 1	RUN NEUTRAL WIRE WITH FEEDER.
 HWP 1	HOT WATER PUMP	BOILER ROOM	208	3	7 1/2	25.3	9.1	⑥	RPB	1-3-5	50A 3P	NEMA 1	FVNR	60A 3P	NEMA 1	—
 HWP 2	HOT WATER PUMP	BOILER ROOM	208	3	7 1/2	25.3	9.1	⑥	RPB	7-9-11	50A 3P	NEMA 1	FVNR	60A 3P	NEMA 1	—
 SB 1	STEAM BOILER	BOILER ROOM	208	3	—	7.5	2.7	③	RPB	13-15-17	20A 3P	—	—	30A 3P	NEMA 1	—
 SB 2	STEAM BOILER	BOILER ROOM	208	3	—	7.5	2.7	③	RPB	19-21-23	20A 3P	—	—	30A 3P	NEMA 1	—
 SB 3	STEAM BOILER	BOILER ROOM	208	3	—	7.5	2.7	③	RPB	25-27-29	20A 3P	—	—	30A 3P	NEMA 1	—
 SUH 1	SUSPENDED UNIT HEATER	BOILER ROOM	120	1	1/20	1.3	0.2	①	RPB	20	20A 1P	—	—	20A 1P	THERMAL OVERLOAD	—
 VPR 1	VACUUM PUMP/RECEIVER	BOILER ROOM	208	3	—	27.0	9.7	⑤	RPB	8-10-12	35A 3P	—	—	60A 3P	NEMA 1	—
 GWH 1	GAS WATER HEATER	BOILER ROOM	120	1	—	15.0	1.8	①	RPB	16	20A 1P	—	—	20A 1P	TOGGLE	—
 SE 1	SANITARY EJECTOR	BOILER ROOM	120	1	—	15.0	1.8	①	RPB	18	20A 1P	—	—	20A 1P	TOGGLE	—

ICAL CONTRACTOR (MARKED "E"), OR MECHANICAL CONTRACTOR (MARKED "M").

- NOTES: 1. DEVICES TO BE FURNISHED BY THE ELECTRICAL CONTRACTOR (MARKED "E"), OR MECHANICAL CONTRACTOR (MARKED "M").
2. ALL CONDUIT AND WIRING FOR TEMPERATURE CONTROL AND EQUIPMENT INTERLOCK SHALL BE BY BAS CONTRACTOR. OTHER CONTROLS AND CONTROL/CONDUIT/WIRING BY TRADE FURNISHING RESPECTIVE EQUIPMENT.
3. IT IS THE RESPONSIBILITY OF THE ELECTRICAL CONTRACTOR TO COORDINATE AND REVIEW THE ELECTRICAL CHARACTERISTICS, AMPACITY, AND OTHER REQUIREMENTS OF COMPONENTS BEFORE INSTALLATION OF WORK. ALL OTHER CONTRACTORS SHALL ADVISE ELECTRICAL CONTRACTOR OF ANY MOTOR/DEVICE CHANGES.
4. ALL LOOSE STARTERS SHALL INCLUDE HOA SWITCH, CONTROL TRANSFORMER, AND ONE N.O. AND ONE N.C. AUXILIARY CONTACTS. ALL SINGLE PHASE EXHAUST FAN CONTROL SWITCHES SHALL HAVE IDENTIFICATION NAMEPLATE AND PILOT LIGHT.
5. SEE SPECIFICATIONS AND DRAWINGS FOR TYPES AND LOCATIONS OF DEVICES SCHEDULED BELOW.

EQUIP. TAG	EQUIPMENT DESCRIPTION	UNIT MOUNTED DEVICES				REMOTE OR LOOSE DEVICES			REMARKS
		STARTER	DISCONNECT	OVERCURRENT PROTECTION	SINGLE POINT CONNECTION	STARTER	DISCONNECT	OVERCURRENT PROTECTION	
CP	CONDENSATE PUMP	-	-	-	YES	-	E	E	
CLV	CLASSROOM UNIT VENTILATOR	-	M	-	YES	-	-	E	
FWD	FEEDWATER TANK FEED PUMP	M	M	M	YES	-	E	E	
HWP	HOT WATER PUMP	-	-	-	YES	M	E	E	VARIABLE FREQUENCY DRIVE FURNISHED BY MECHANICAL INSTALLED BY ELECTRICAL
SR	STEAM BOILER	-	-	-	YES	-	E	E	
SHH	SUSPENDED UNIT HEATER	-	-	-	YES	-	E	E	
VR	VACUUM PUMP/ RECOVER	M	M	-	YES	-	E	E	

- NOTES: 1. VERIFY FINAL LOADS AND REQUIREMENTS OF ALL EQUIPMENT WITH FINAL MECHANICAL DRAWINGS.

## RE QTY. + SIZE

NO.	WIRE QTY. & SIZE	CONDUIT	CB
①	2#12 & 1#12G	3/4"	20A 1P
②	2#12 & 1#12G	3/4"	20A 2P
③	3#12 & 1#12G	3/4"	20A 3P
④	4#12 & 1#12G	3/4"	20A 3P (4W)
⑤	3#8 & 1#10G	3/4"	35A 3P
⑥	3#6 & 1#10G	3/4"	50A 3P
⑦	4#6 & 1#10G	1"	50A 3P (4W)
⑧	4#2 & 1#8G	1 1/4"	100A 3P (4W)
⑨	4#3/0 & 1#6G	2"	200A 3P (4W)
⑩	4#4/0 & 1#4G	2 1/2"	225A 3P (4W)
⑪	4-500Kcmil & 1#3G	3"	400A 3P (4W)
⑫	3 SETS OF 4-400Kcmil & 1#2/0G	3"	1000A 3P (4W)
⑬	4 SETS OF 4-600Kcmil & 1#4/0G	4"	1000A 3P (4W)

BY REFERENCE, AND DOCUMENT A201, "GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION," CURRENT EDITION, IS MADE A PART OF THESE DOCUMENTS.

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PANEL BOARD SCHEDULE "EM"													
VOLTAGE:		120/208VOLT 3PHASE 4WIRE				MAIN (A)		MGB		MLO		LOCATION: MAIN ELECTRICAL AREA	
				WITH GROUND BUS								MOUNT: SURFACE	
												TYPE: BOLT-ON	
USE AND/OR AREA SERVED				C/B	CIR. NO.	A	B	C	CIR. NO.	C/B	USE AND/OR AREA SERVED		
EXISTING LOAD		20	1	1000					20	1	EXISTING LOAD		
EXISTING LOAD		20	3	1000		1000			20	3	EXISTING LOAD		
EXISTING LOAD		20	5			1000			20	5	EXISTING LOAD		
EXISTING LOAD		20	7	1000				1000	20	7	EXISTING LOAD		
SPARE		20	9	1000		0			20	9	SPARE		
SPARE		20	11			0			20	11	SPARE		
SPARE		20	13	0				0	20	13	SPARE		
SPARE		20	15	0			0		20	15	SPARE		
SPARE		20	17				0		20	17	SPARE		
SPACE		20	19	0					20	19	SPACE		
SPACE		20	21			0			20	21	SPACE		
SPACE		20	23				0		20	23	SPACE		
SPACE		20	25	0				0	20	25	SPACE		
SPACE		20	27			0			20	27	SPACE		
SPACE		20	29				0		20	29	SPACE		
TOTAL LOAD PER PHASE					4000		2000		2000	TOTAL KVA: 8.0			
										AMPS: 22.2			

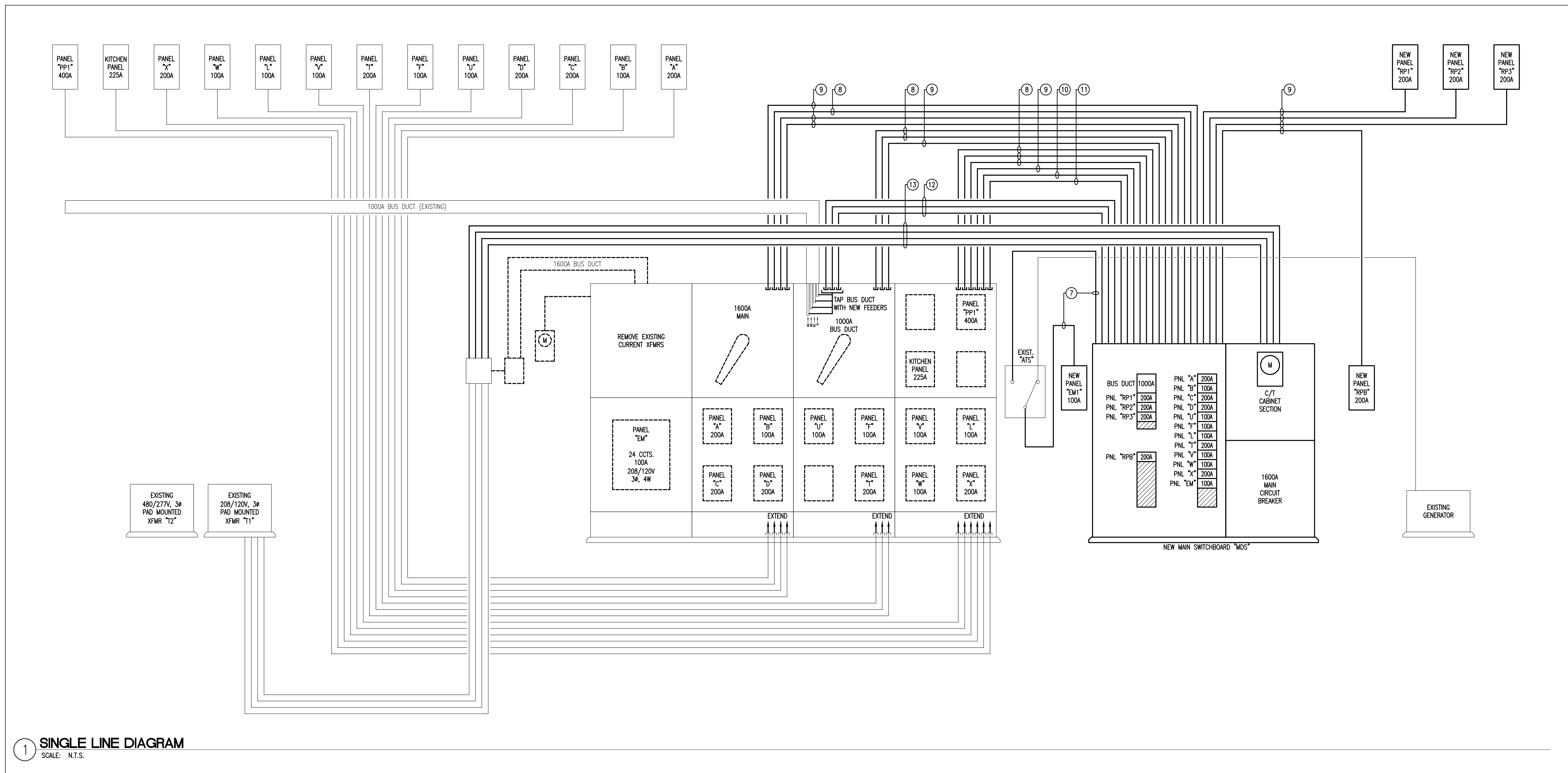
PANEL BOARD SCHEDULE "RPB"											
VOLTAGE: 120/208V, 3ø, 4W		MAIN (A)			MLO		LOCATION: BOILER ROOM				
		WITH GROUND BUS					MOUNT: SURFACE				
							TYPE: BOLT-ON				
USE AND/OR AREA SERVED		C/B	CIR. NO.	A	B	C	CIR. NO.	C/B	USE AND/OR AREA SERVED		
PUMP "HWP-1"	50	1	3000				20	1	FEED PUMP "FWT-1"		
			3	1800			3000	2			
					3000			4			
			5			3000	1800	6		3	
PUMP "HWP-2"	50	7	3000				35	3	VACUUM PUMP "VPR-1"		
				3200				8			
			9		3000			10			
			11			3000	3200	12		3	
BOILER "SB-1"	20	13	900				20	13	PUMP "CP-1"		
				900				14			
			15		900			16		1	
			17		1800		900	18		20	
BOILER "SB-2"	20	19	900				20	19	UNIT HEATER "SUH-1", BOILER RM. RECEPTACLES		
				1200				20		1	
			21		900			20		21	
			23		1000			22		1	
BOILER "SB-3"	20	25	900				20	25	CHEMICAL FEED PUMP		
				0				26		1	
			27		900			28		20	
			29		0		900	30		1	
SPACE	3	31	0				30	20	SPARE		
				0				32			
			33		0			34			
			35			0		36			
SPACE	3	37	0				38		SPACE		
				0				39			
					0			40			
			41			0		42			
TOTAL LOAD PER PHASE			15800	16500	15500	TOTAL KVA: 47.8			AMPS: 132.7		

PANEL BOARD SCHEDULE "RP1"											
VOLTAGE: 120/208V, 3ø, 4W		MAIN TO			MCB	MLO	LOCATION		STORAGE RM. (AREA "A")		
		200A			X	X	MOUNT		SURFACE		
		WITH GROUND BUS					TYPE		BOLT-ON		
USE AND/OR AREA SERVED		C/B	CIR. NO.	A	B	C	CIR. NO.	C/B	USE AND/OR AREA SERVED		
RECEPTACLES - CLASSROOM 124		20	1	1000			20	1	SPARE		
RECEPTACLES - CLASSROOM 122		20	3		1000		20	3	SPARE		
RECEPTACLES - LIBRARY 121		20	5			1000	20	5	SPARE		
SPARE		20	7	0			20	7	SPARE		
SPARE		20	9		0		20	9	SPARE		
SPARE		20	11		0		20	11	SPARE		
SPARE		20	13	0			20	13	SPARE		
SPARE		20	15		0		20	15	SPARE		
SPARE		20	17		0		20	17	SPARE		
SPARE		20	19	0			20	19	SPACE		
SPARE		20	21		0		20	21	SPACE		
SPARE		20	23		0		20	23	SPACE		
SPARE		20	25	0			20	25	SPACE		
SPARE		20	27		0		20	27	SPACE		
SPARE		20	29		0		20	29	SPACE		
SPARE		20	31	0			20	31	SPACE		
SPARE		20	33		0		20	33	SPACE		
SPARE		20	35		0		20	35	SPACE		
SPARE		20	37	0			20	37	SPACE		
SPARE		20	39		0		20	39	SPACE		
SPARE		20	41		0		20	41	SPACE		
TOTAL LOAD PER PHASE				1000	1000	1000	TOTAL KVA:		3.0		
							AMPS:		8.3		

PANEL BOARD SCHEDULE "RP2"											
VOLTAGE: 120/208V, 3ø, 4W		MAIN (A)			MLO		LOCATION: JANITOR CLOSET (AREA "B")				
		200A			X		MOUNT: SURFACE				
		WITH GROUND BUS					TYPE: BOLT-ON				
USE AND/OR AREA SERVED		C/B	CIR. NO.	A	B	C	CIR. NO.	C/B	USE AND/OR AREA SERVED		
RECEPTACLES - SCIENCE LAB 120		20	1	1000			20	1	SPARE		
RECEPTACLES - COMPUTER LAB 119		20	3		1000		20	3	SPARE		
RECEPTACLES - SCIENCE CLASSROOM 118		20	5			1000	20	5	SPARE		
RECEPTACLES - CLASSROOM 117		20	7	1000			20	7	SPARE		
RECEPTACLES - CLASSROOM 106		20	9		1000		20	9	SPARE		
RECEPTACLES - PRINCIPAL'S OFFICE		20	11			1000	20	11	SPARE		
SPARE		20	13	0			20	13	SPARE		
SPARE		20	15		0		20	15	SPARE		
SPARE		20	17			0	20	17	SPARE		
SPACE		20	19	0			20	19	SPACE		
SPACE		20	21		0		20	21	SPACE		
SPACE		20	23			0	20	23	SPACE		
SPACE		20	25	0			20	25	SPACE		
SPACE		20	27		0		20	27	SPACE		
SPACE		20	29			0	20	29	SPACE		
SPACE		20	31	0			20	31	SPACE		
SPACE		20	33		0		20	33	SPACE		
SPACE		20	35			0	20	35	SPACE		
SPACE		20	37	0			20	37	SPACE		
SPACE		20	39		0		20	39	SPACE		
SPACE		20	41			0	20	41	SPACE		
TOTAL LOAD PER PHASE				2000	2000	2000	TOTAL KVA: 6.0		AMPS: 16.7		

PANEL BOARD SCHEDULE "RP3"											
VOLTAGE: 120/208V, 3ø, 4W		MAIN (A)			MLO		LOCATION: STAGE STORAGE RM. (AREA "C")				
		WITH GROUND BUS					MOUNT: SURFACE				
							TYPE: BOLT-ON				
USE AND/OR AREA SERVED		C/B	CIR. NO.	A	B	C	CIR. NO.	C/B	USE AND/OR AREA SERVED		
RECEPTACLES - CLASSROOM 107	20	1	1000				20	1	SPARE		
RECEPTACLES - CLASSROOM 108	20	3		1000			20	3	SPARE		
RECEPTACLES - ART ROOM 109	20	5			1000		20	5	SPARE		
RECEPTACLES - POLICE OFFICE 116	20	7	1000				20	7	SPARE		
SPARE	20	9			0		20	9	SPARE		
SPARE	20	11			0		20	11	SPARE		
SPARE	20	13	0				20	13	SPARE		
SPARE	20	15		0			20	15	SPARE		
SPARE	20	17			0		20	17	SPARE		
SPARE	20	19	0				20	19	SPARE		
SPARE	20	21		0			20	21	SPARE		
SPARE	20	23			0		20	23	SPARE		
SPARE	20	25	0				20	25	SPARE		
SPARE	20	27		0			20	27	SPARE		
SPARE	20	29			0		20	29	SPARE		
SPARE	20	31	0				20	31	SPARE		
SPARE	20	33		0			20	33	SPARE		
SPARE	20	35			0		20	35	SPARE		
SPARE	20	37	0				20	37	SPARE		
SPARE	20	39		0			20	39	SPARE		
SPARE	20	41			0		20	41	SPARE		
TOTAL LOAD PER PHASE			2000		1000		1000	TOTAL KW:	4.0		
								AMPS:	11.1		





DEMOLITION NOTES

D-1] EXISTING WATER SOFTENER TO REMAIN.

D-2] EXISTING BFP TO REMAIN.

D-3] REMOVE EXPANSION TANKS, PIPING ETC IN THEIR ENTIRETY.

D-4] REMOVE STEAM BOILER IN ITS ENTIRETY AND ALL ASSOCIATED STEAM, CONDENSATE & FEED WATER PIPING.

D-5] REMOVE STEAM HEADER PIPING CONDENSATE PIPE, EQUALIZER LINE, BOILER SHUTDOWN PIPING AND ALL VALVING.

D-6] 8" LPS TO REMAIN.

D-7] REMOVE 8"BACK TO HEADER.

D-8] REMOVE VACUUM PUMP/ RECEIVER, INCOMING 4" CONDENSATE, CONDENSATE PUMPED DISCHARGE PIPING TO FEED WATER TANK.

D-9] EXISTING 4" CONDENSATE RETURN (C) TO REMAIN REMOVE CONNECTION AT VACUUM PUMP.

D-10] REMOVE 2" LPS TO DOMESTIC HOT WATER HEAT EXCHANGER.

D-11] REMOVE EXISTING STEAM TO DOMESTIC HOT WATER HEATER, ALL STEAM, AND CONDENSATE PIPING.

D-12] REMOVE STEAM TO HEATING HOT WATER, STEAM PIPING & CONDENSATE PIPING IN THEIR ENTIRETY. REMOVE HOT WATER PIPING BACK TO PUMP(S).

D-13] REMOVE BOILER FEED TANK, BOILER FEED PUMPS, ALL BOILER FEED PIPING, CONTROLS IN THEIR ENTIRETY.

D-14] REMOVE HOT WATER HEATING PUMP(S) (3 TOTAL) INCLUDING VALVES, PIPING, ETC.

D-15] REMOVE 2" LPS TO DOMESTIC HOT WATER HEAT EXCHANGER.

D-16] EXISTING 4" LPS TO HWS & HWR TO REMAIN.

D-17] REMOVE 4" HWS & HWR.

D-18] EXISTING 4", 2 PSI GAS TO REMAIN.

D-19] EXISTING 1 1/2" 2 PSI GAS TO NEW POOL TO REMAIN.

D-20] REMOVE GAS PIPING TO EXISTING BOILERS.

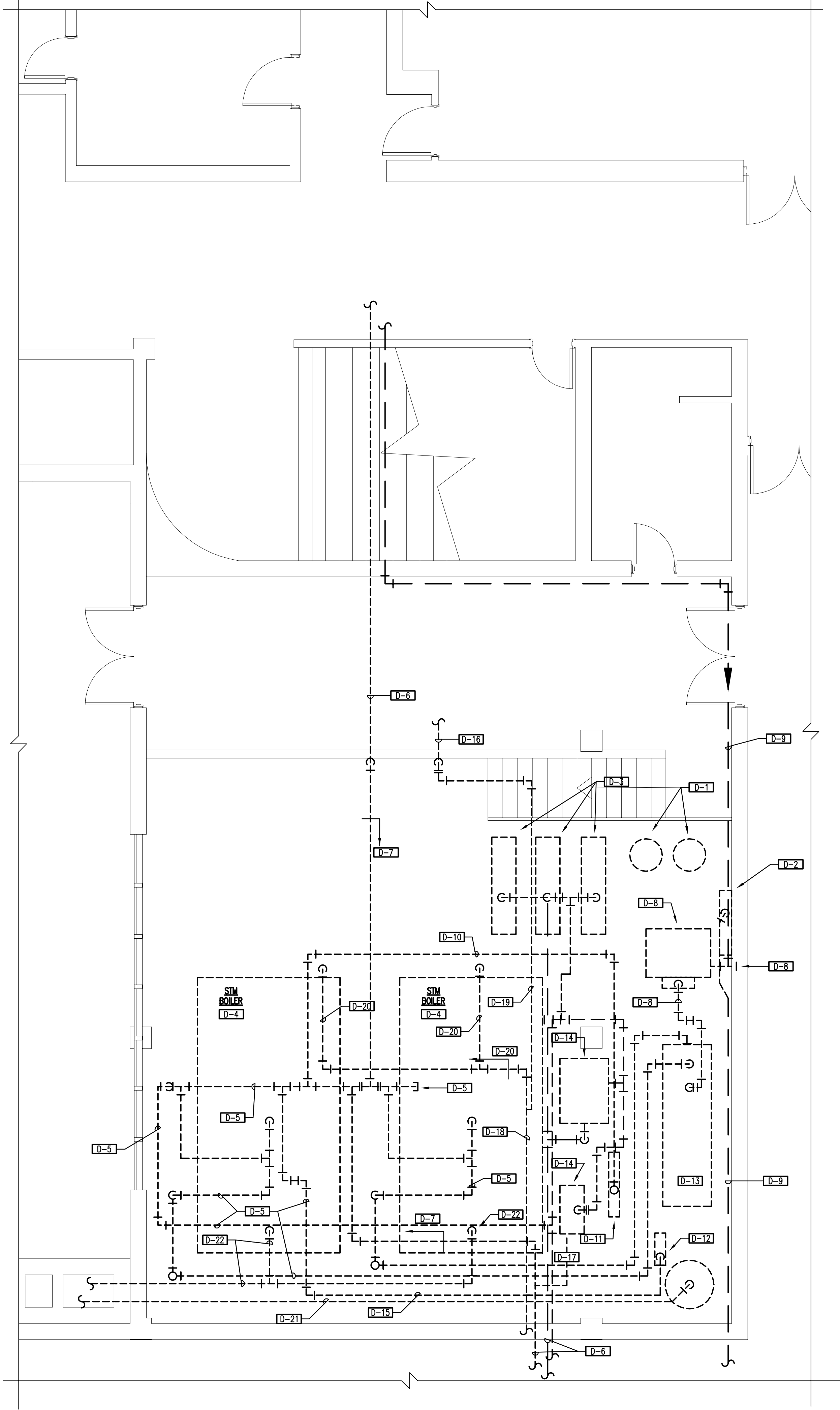
D-21] REMOVE BREECHING/ FLUE (±15"X15") FROM HOT WATER HEATER TO STACK.

D-22] REMOVE BOILER FLUE AND HORIZONTAL BREECHING (±36"X24") IN ITS ENTIRETY TO STACK.

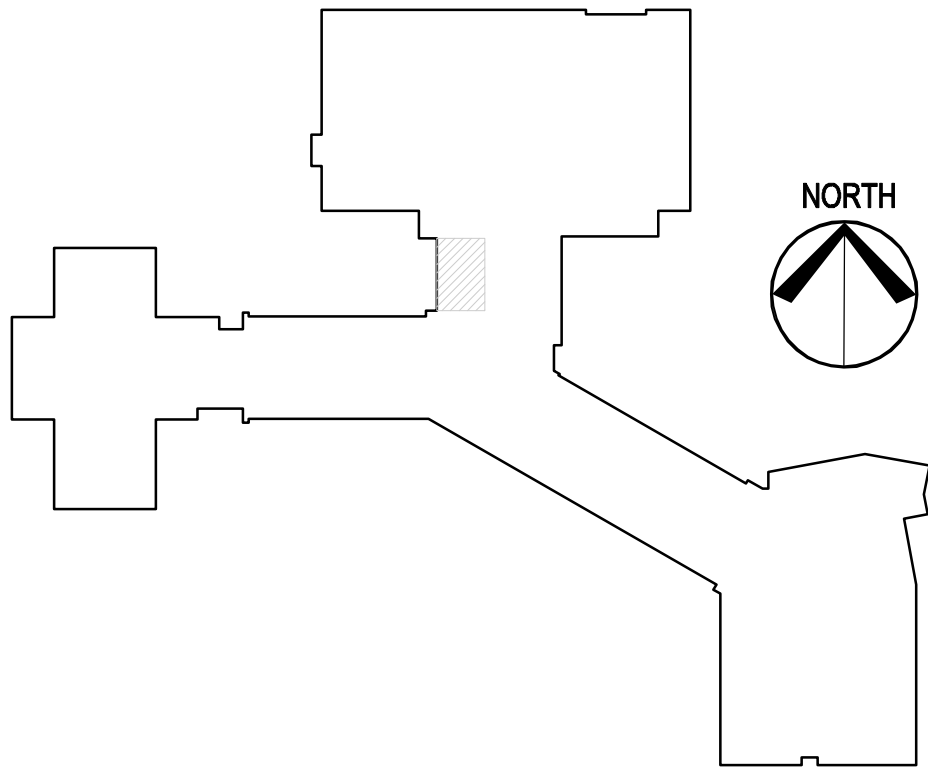
GENERAL NOTES

1. NOT ALL PIPING TO BE REMOVED HAS BEEN SHOWN FOR CLARITY PURPOSES. IT IS THE INTENT THAT ALL PIPING ASSOCIATED WITH THE EXISTING STEAM PLANT BE REMOVED EXCEPT WHERE NOTED TO REMAIN FOR FUTURE CONNECTIONS IN BOILER. REPLACEMENT NEW WORK.

2. CONTRACTOR TO FIELD VERIFY ALL PIPING REQUIRED TO REMAIN AND VERIFY CONNECTIONS NEEDED FOR NEW SYSTEM PRIOR TO DEMOLITION BEGINNING. REQUEST INFORMATION IF IN QUESTION AS THERE WILL BE NO EXTRA COSTS ALLOWED FOR WORK REMOVED THAT MUST BE REPLACED.



1 PARTIAL LOWER LEVEL PLAN - MECHANICAL  
 1/4" = 1' - 0"



BOILER AND ELECTRICAL UPGRADES FOR:  
 KENNEDY MIDDLE SCHOOL  
 ROCKFORD, ILLINOIS

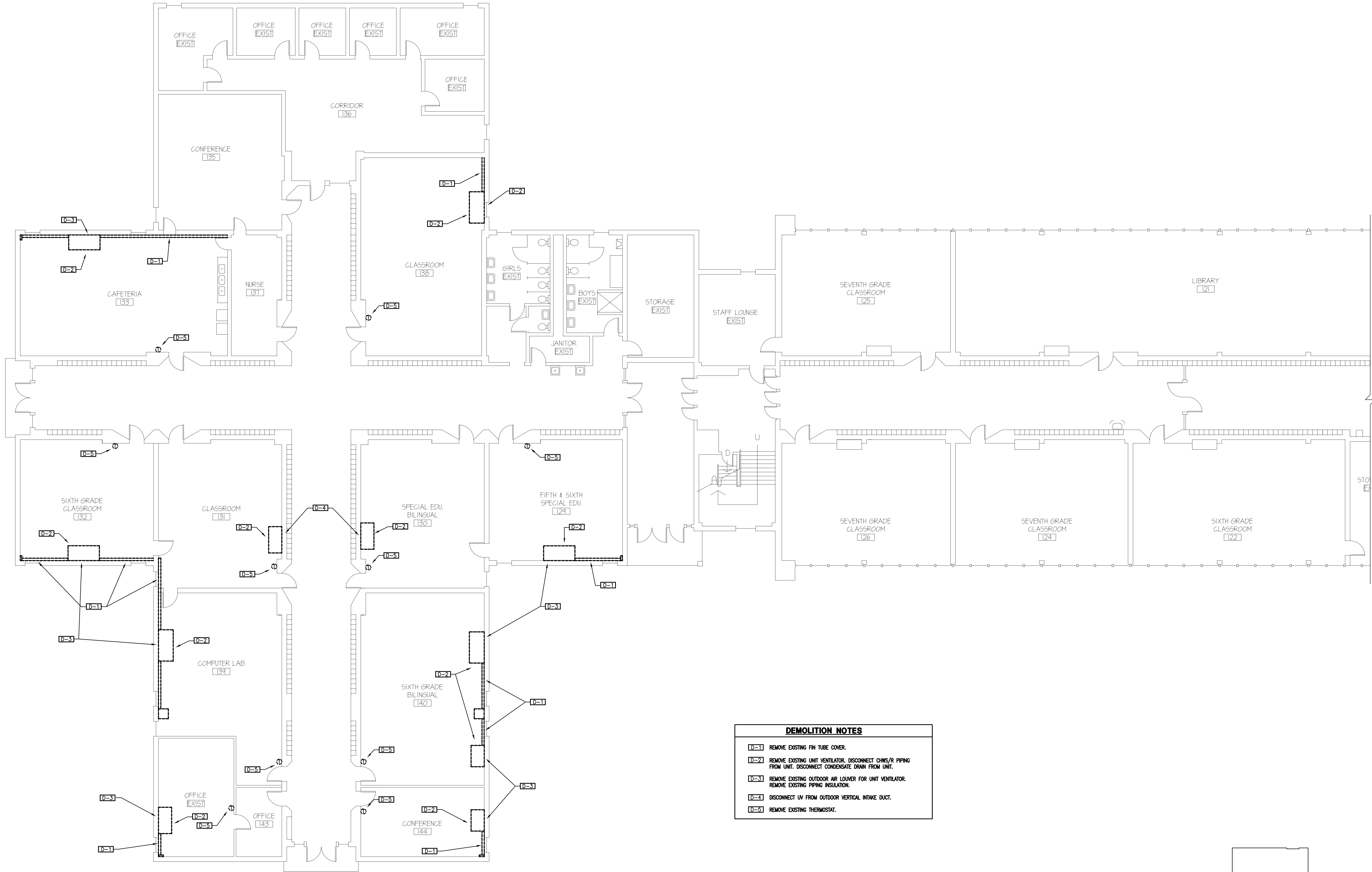
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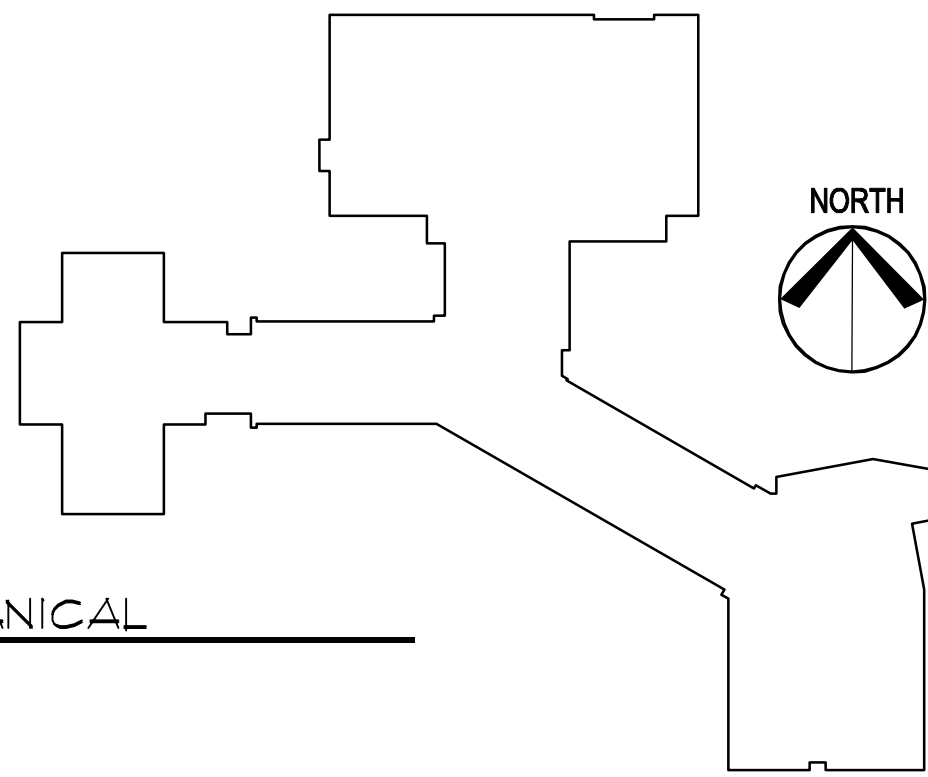
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DEMOLITION NOTES	
D-1	REMOVE EXISTING FIN TUBE COVER.
D-2	REMOVE EXISTING UNIT VENTILATOR. DISCONNECT CHWS/R PIPING FROM UNIT. DISCONNECT CONDENSATE DRAIN FROM UNIT.
D-3	REMOVE EXISTING OUTDOOR AIR LOUVER FOR UNIT VENTILATOR. REMOVE EXISTING PIPING INSULATION.
D-4	DISCONNECT UV FROM OUTDOOR VERTICAL INTAKE DUCT.
D-5	REMOVE EXISTING THERMOSTAT.



1 PARTIAL FIRST FLOOR PLAN - MODULE 1 - MECHANICAL  
 1/8"=1'-0"

BOILER AND ELECTRICAL UPGRADES FOR:  
**KENNEDY MIDDLE SCHOOL**  
 ROCKFORD, ILLINOIS

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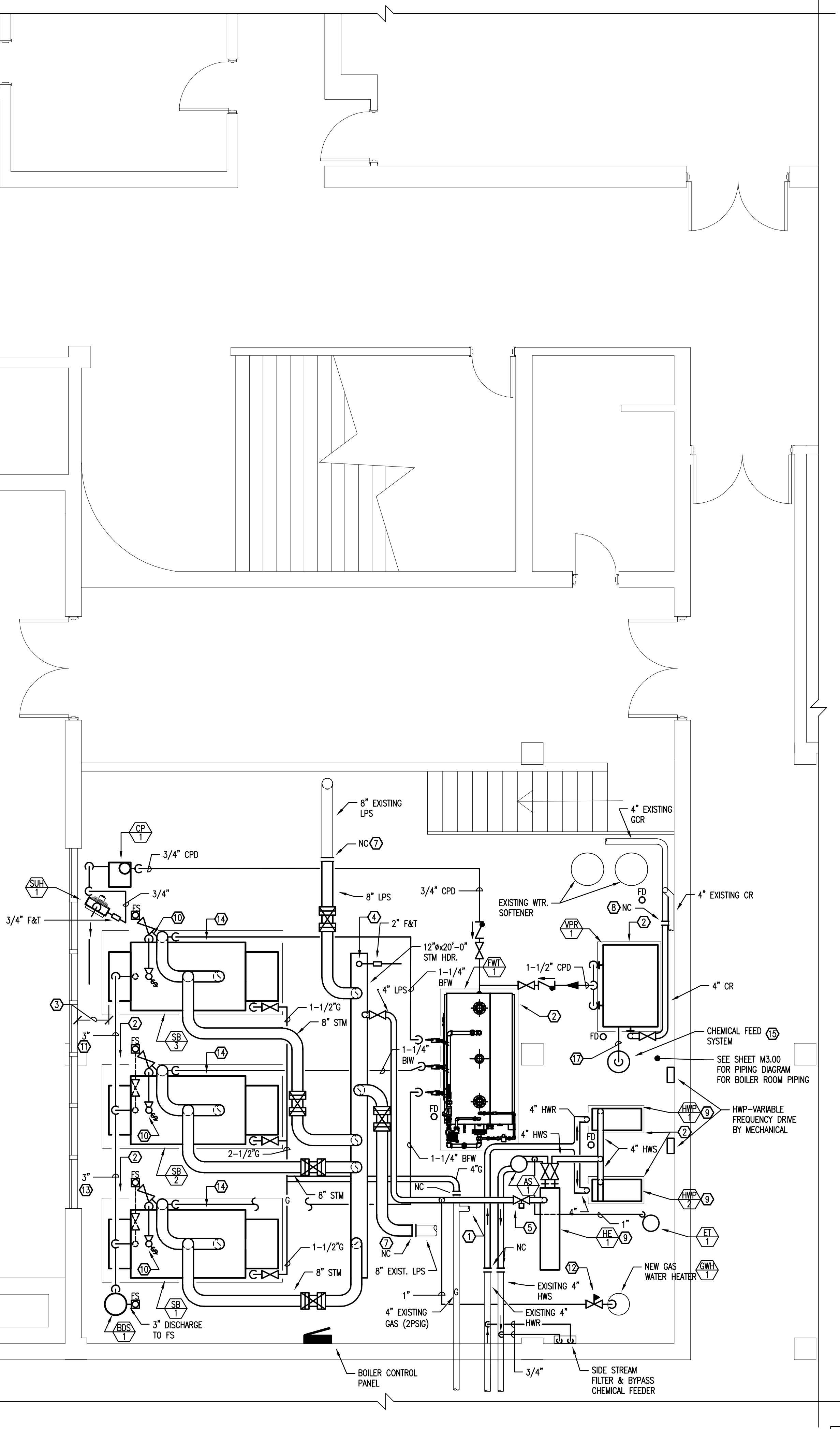
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KENNEDY MIDDLE SCHOOL

C1825

KEYED NOTES

- ① EXISTING 2" G CONNECTION TO POOL.
- ② FURNISH AND INSTALL 4" CONCRETE PAD UNDER EQUIPMENT. PAD TO BE 8" LARGER THAN BASE OF EQUIPMENT IN ALL DIMENSIONS. PROVIDE 45° CHAMFERED CORNER ON TOP EDGE OF PAD.
- ③ PROVIDE 3'-0" CLEARANCE FROM WALL TO BOILER FLUE BOX.
- ④ END OF MAIN DRIP TRAP LEG.
- ⑤ REFER TO HEAT EXCHANGER DETAIL FOR PIPING ARRANGEMENT VALVES AND CONTROL.
- ⑥ HEAT EXCHANGER TO BE HUNG FROM STRUCTURE ±10'-AFF. VERIFY EXACT HEIGHT IN FIELD DURING INSTALLATION.
- ⑦ TIE NEW 8" LPS INTO EXISTING 8" LPS.
- ⑧ TIE NEW 4" CR INTO EXISTING 4" CR. EXTEND TIGHT TO WALL TO VPR INLET.
- ⑨ SEE PUMP DETAIL FOR ALL VALVING REQUIREMENTS.
- ⑩ PIPE FULL SIZE OF SAFETY RELIEF. VALVE PROVIDE WITH BOILER, DOWN TO 12" AFF.
- ⑪ 3" BLOW DOWN LINE TO BLOWDOWN SEPARATOR (BDS). SUPPORT 14" OFF FLOOR.
- ⑫ FURNISH AND INSTALL PRV (PRESSURE REGULATING VALVE) TO FEED NEW OWH-1. 2PSIG DOWN TO 10" W.C. MAKE FINAL VALVED CONNECTION TO OWH-1.
- ⑬ 3" BLOWDOWN LINE COMMON FROM BOILER BLOWDOWN VALVES TO BLOWDOWN SEPARATOR.
- ⑭ PROVIDE 3/4" F&T TRAP AT HIGH WATER LINE TAPPING. PIPE TO SEE PIPING DIAGRAM ON M3.00.
- ⑮ FURNISH AND INSTALL CHEMICAL FEED SYSTEM AS FOLLOWS:
  - a. SYSTEM & PUMP SHALL COMPLY WITH UL STANDARD 778, NEMA 4X, HYDRAULIC INSTITUTE STANDARDS, & NATIONAL ELECTRICAL CODE.
  - b. 50 GALLON POLYETHYLENE STORAGE TANKS WITH RIGID COVER SHALL BE CONSTRUCTED FROM WHITE, UV RESISTANT POLYETHYLENE WITH MOLDED-IN GRADUATIONS IN GALLONS AND LITERS.
  - c. CHEMICAL FEED SYSTEM SHALL BE PROVIDED WITH A STEEL AGITATOR INSIDE TANK.
  - d. METERING PUMP OUTPUT VOLUME SHALL BE ADJUSTABLE WHILE PUMP IS OPERATION AND BE SELECTABLE BETWEEN MANUAL AND EXTERNAL INPUTS.
  - e. IN EXTERNAL MODE, THE PUMP SHALL RESPOND TO A PULSE SIGNAL FROM COLD WATER METER ON FEED WATER TANK SUCH THAT EITHER ONE PULSE PRODUCES N PUMP STROKES, OR N PULSES PRODUCE ONE PUMP STROKE.
  - f. PUMP SHALL BE PROVIDED WITH LOCKABLE KEYPAD TO PREVENT TAMPERING. KEYPAD DISPLAY SHALL SHOW PUMPS OUTPUT IN GALLONS PER HOUR.
  - g. PUMPS SHALL BE CAPABLE OF PUMPING AGAINST 180 PSI AT .66PH AND DISCHARGE FROM PUMP TO CHEMICAL QUILL CONNECTION ON FEEDWATER TANK SHALL BE 3/8" POLYETHYLENE TUBING.
  - h. INSTALL CHEMICAL FEED SYSTEM ON FLAT, LEVEL FOUNDATION DESIGNED TO SUPPORT THE ENTIRE LOAD.
  - i. EQUIPMENT AND MATERIALS SHALL BE INSTALLED IN AN APPROVED MANNER AND IN ACCORDANCE WITH THE CHEMICAL FEED SYSTEM MANUFACTURER'S INSTALLATION REQUIREMENTS.
  - j. INSTALL ANY ELECTRICAL CONTROL ITEMS FURNISHED BY MANUFACTURER PER WIRING DIAGRAM PROVIDED BY MANUFACTURER.
  - k. THE MANUFACTURER SHALL PROVIDE THE SERVICE OF A FIELD REPRESENTATIVE FOR STARTING THE UNIT AND TRAINING THE OPERATOR. ALLOW ONE DAY.
  - l. CHEMICAL FEED SYSTEM SHALL INCLUDE 18 MONTH PARTS AND LABOR WARRANTY FROM DATE OF STARTUP.
- ⑯ MECHANICAL CONTRACTOR FURNISHED TO PLUMBING CONTRACTOR FOR INSTALLATION THE FOLLOWING: PROVIDE A COLD WATER MAKEUP WATER METER WITH PULSE OUTPUT THAT PROVIDES SIGNAL TO CHEMICAL FEED METERING PUMP FOR PROPORTIONAL CHEMICAL FEED. CAST BRONZE METER SHALL INCLUDE A TWO WIRE FEED SWITCH.
- ⑰ PROVIDE 3/8" POLYPROPYLENE PIPING FROM CHEMICAL FEED PUMP TO CHEMICAL FEED QUILL CONNECTION ON FEED WATER TANK.



1 NEW PARTIAL PLAN - BOILER ROOM - MECHANICAL  
 1/4" = 1' - 0"

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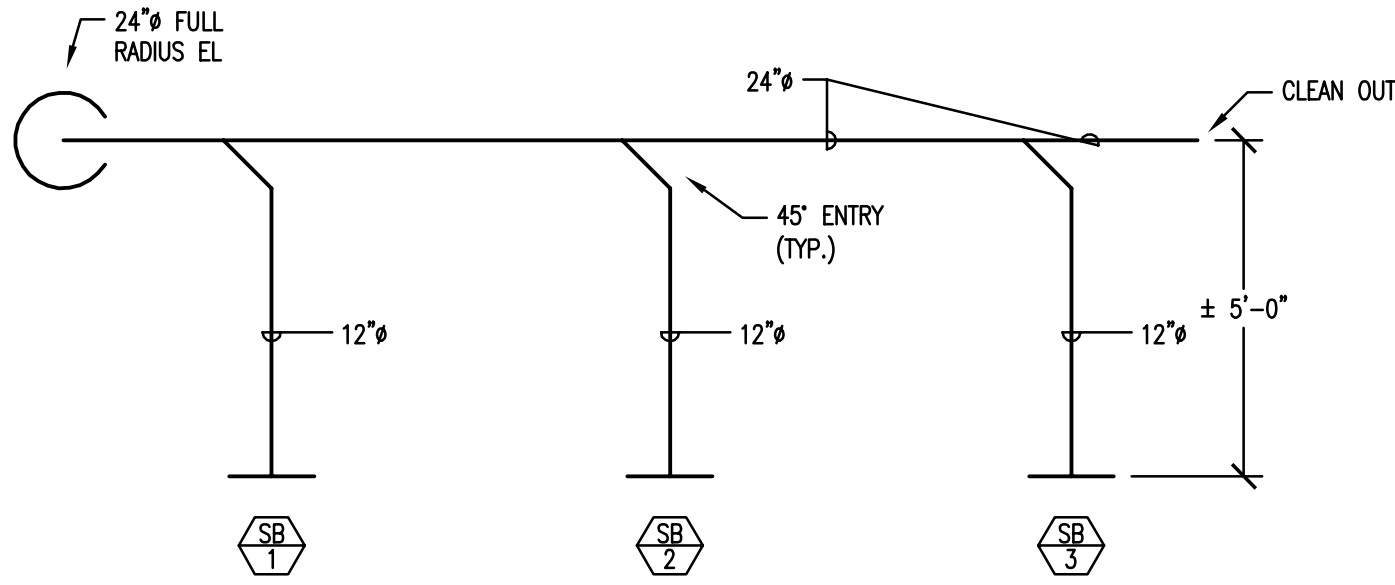
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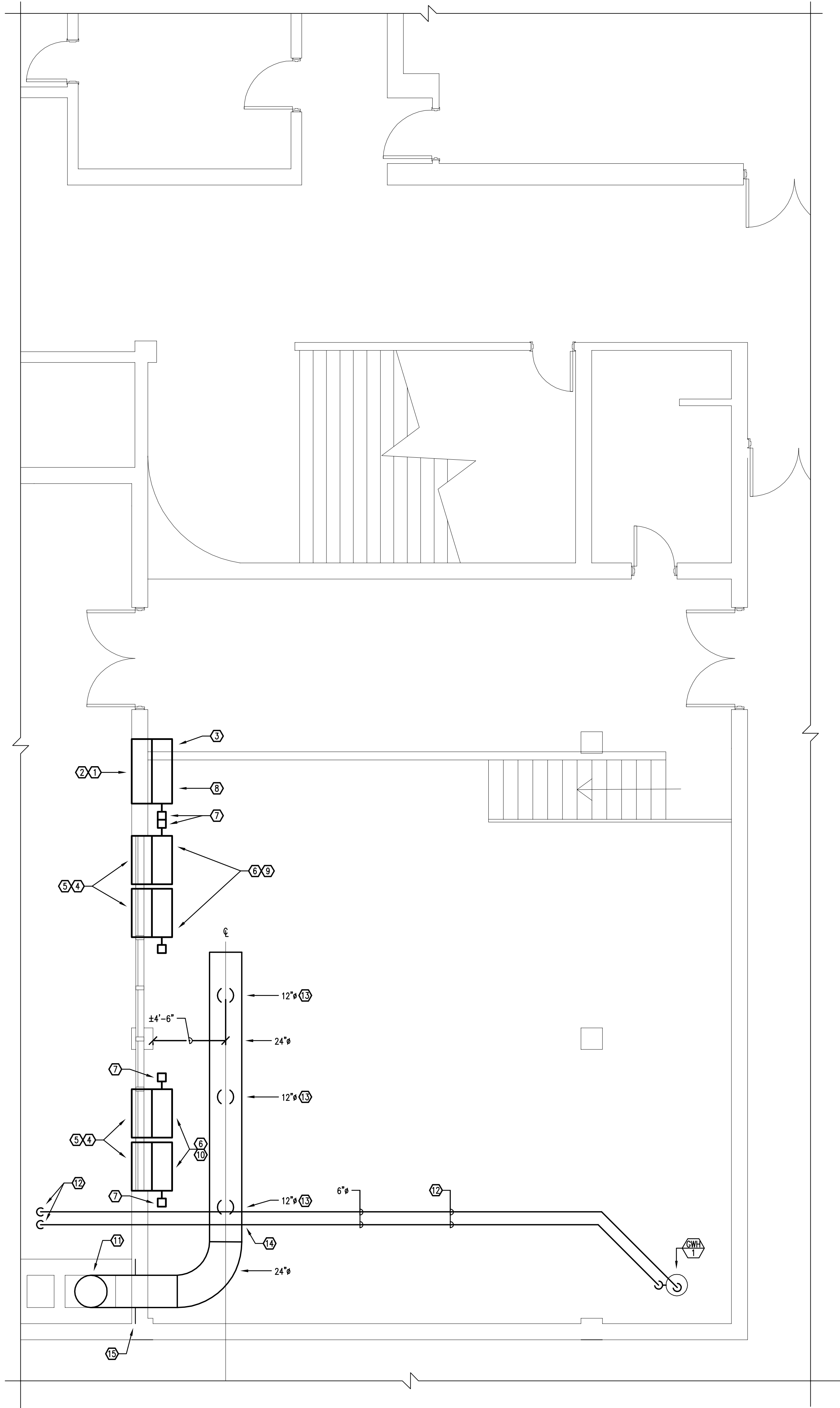
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BOILER AND ELECTRICAL UPGRADES FOR:  
 KENNEDY MIDDLE SCHOOL  
 ROCKFORD, ILLINOIS

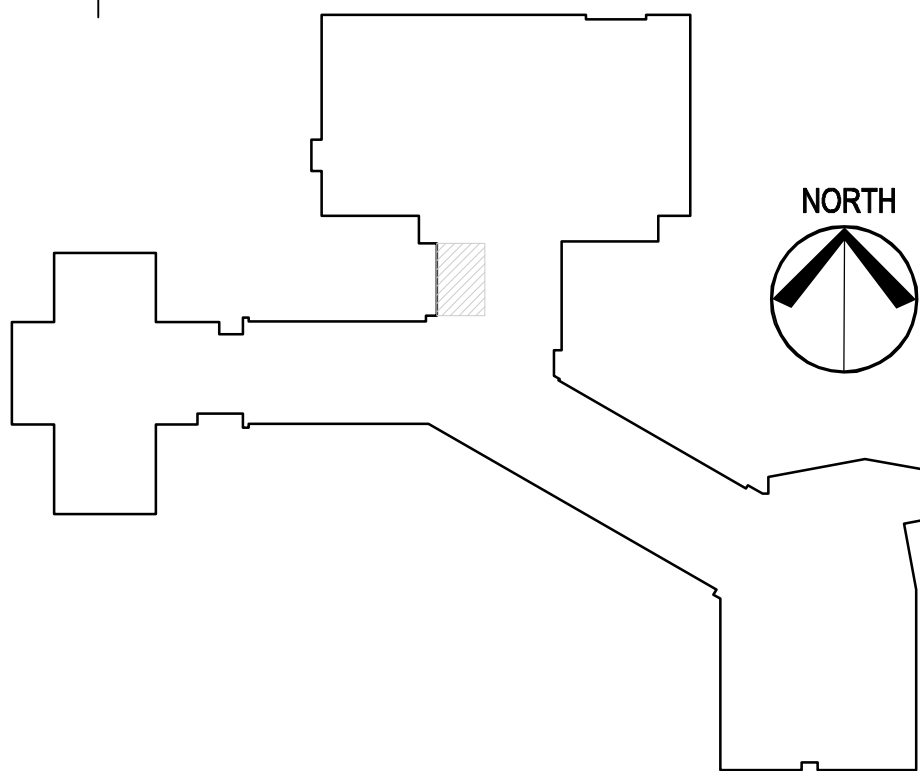
- KEYED NOTES**
- 1 REMOVE EXISTING 48"x30" WALL LOUVER.
  - 2 FURNISH AND INSTALL NEW 48"x30"x6" DEEP, STORM PROOF LOUVER, RUSKIN ELF63500MP, MINIMUM 60% FREE AREA OR EQUAL. CONTRACTOR TO FIELD VERIFY ALL DIMENSIONS PRIOR TO PURCHASING LOUVER.
  - 3 FURNISH AND INSTALL 48"x30" COMBUSTION AIR DAMPER, RUSKIN CD51, LOW LEAK, STANDARD DUTY.
  - 4 REMOVE EXISTING GLASS PANEL, ALUMINUM FRAMING TO REMAIN.
  - 5 FURNISH AND INSTALL NEW 36"x30"x4"DEEP, STORM PROOF LOUVER, RUSKIN ELF3750XH, MINIMUM 54% FREE AREA, OR EQUAL. CONTRACTOR TO FIELD VERIFY ALL DIMENSIONS PRIOR TO PURCHASING LOUVER. FURNISH AND INSTALL ALL NECESSARY ADDITIONAL ALUMINUM FRAMING TO MOUNT NEW LOUVER INTO WINDOW FRAMING.
  - 6 FURNISH AND INSTALL NEW 36"x30" COMBUSTION AIR DAMPER, RUSKIN CD51, LOW LEAK, STANDARD DUTY, OR EQUAL.
  - 7 PROVIDE BELIMO DDC OPERATOR ON COMBUSTION AIR DAMPER. OPERATOR TO BE CONTROLLED BY BOILER CONTROL PANEL.
  - 8 COMBUSTION AIR INTAKE FOR SB-3.
  - 9 COMBUSTION AIR INTAKE FOR SB-2.
  - 10 COMBUSTION AIR INTAKE FOR SB-1.
  - 11 24" DIA SELF SUPPORTING STACK LINER. EXACT HEIGHT OF STACK TO BE DETERMINED AFTER TOP 4'-0" OF EXISTING MASONRY STACK IS REMOVED. ESTIMATED HEIGHT OF STACK LINER IS 38FT FROM STACK BASE.
  - 12 6"x 32H, 40 PWC INTAKE & FLUE FOR CHW-1 THROUGH WALL TIGHT TO OVERHANG ROOF. RUN TO EDGE OF OVER HANG AND TERMINATE AS RECOMMENDED BY MANUFACTURER.
  - 13 45" ENTRY INTO 24" DIA. HORIZONTAL BREECHING.
  - 14 6"x DUCTS OVER TOP OF BREECHING.
  - 15 MODIFY BREECHING ENTRY INTO STACK AS REQUIRED TO SEAL NEW BREECHING.



**BREECHING ELEVATION**  
 NO SCALE



1 NEW PARTIAL PLAN - BOILER ROOM - MECHANICAL  
 1/4" = 1' = 0"



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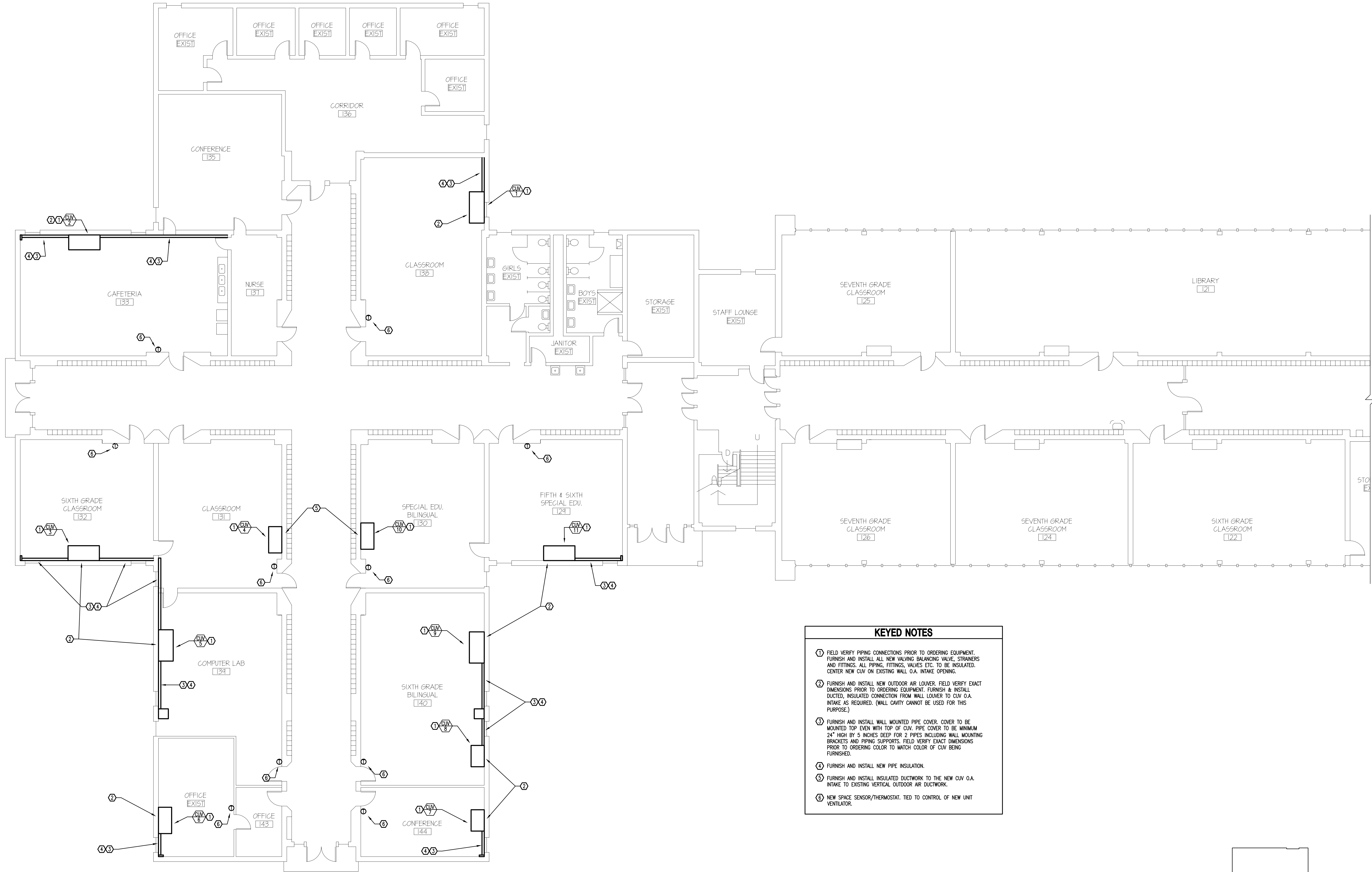
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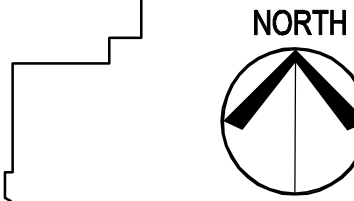
BOILER AND ELECTRICAL UPGRADES FOR:  
**KENNEDY MIDDLE SCHOOL**  
 ROCKFORD, ILLINOIS



KEYED NOTES

- 1 FIELD VERIFY PIPING CONNECTIONS PRIOR TO ORDERING EQUIPMENT. FURNISH AND INSTALL ALL NEW VALVING BALANCING VALVE, STRAINERS AND FITTINGS. ALL PIPING, FITTINGS, VALVES ETC. TO BE INSULATED. CENTER NEW CUV ON EXISTING WALL O.A. INTAKE OPENING.
- 2 FURNISH AND INSTALL NEW OUTDOOR AIR LOUVER. FIELD VERIFY EXACT DIMENSIONS PRIOR TO ORDERING EQUIPMENT. FURNISH & INSTALL DUCTED, INSULATED CONNECTION FROM WALL LOUVER TO CUV O.A. INTAKE AS REQUIRED. (WALL CAVITY CANNOT BE USED FOR THIS PURPOSE.)
- 3 FURNISH AND INSTALL WALL MOUNTED PIPE COVER. COVER TO BE MOUNTED TOP EVEN WITH TOP OF CUV. PIPE COVER TO BE MINIMUM 24" HIGH BY 5 INCHES DEEP FOR 2 PIPES INCLUDING WALL MOUNTING BRACKETS AND PIPING SUPPORTS. FIELD VERIFY EXACT DIMENSIONS PRIOR TO ORDERING COLOR TO MATCH COLOR OF CUV BEING FURNISHED.
- 4 FURNISH AND INSTALL NEW PIPE INSULATION.
- 5 FURNISH AND INSTALL INSULATED DUCTWORK TO THE NEW CUV O.A. INTAKE TO EXISTING VERTICAL OUTDOOR AIR DUCTWORK.
- 6 NEW SPACE SENSOR/THERMOSTAT. TIED TO CONTROL OF NEW UNIT VENTILATOR.

1 PARTIAL FIRST FLOOR PLAN - MODULE 1 - MECHANICAL  
 1/8" = 1' - 0"



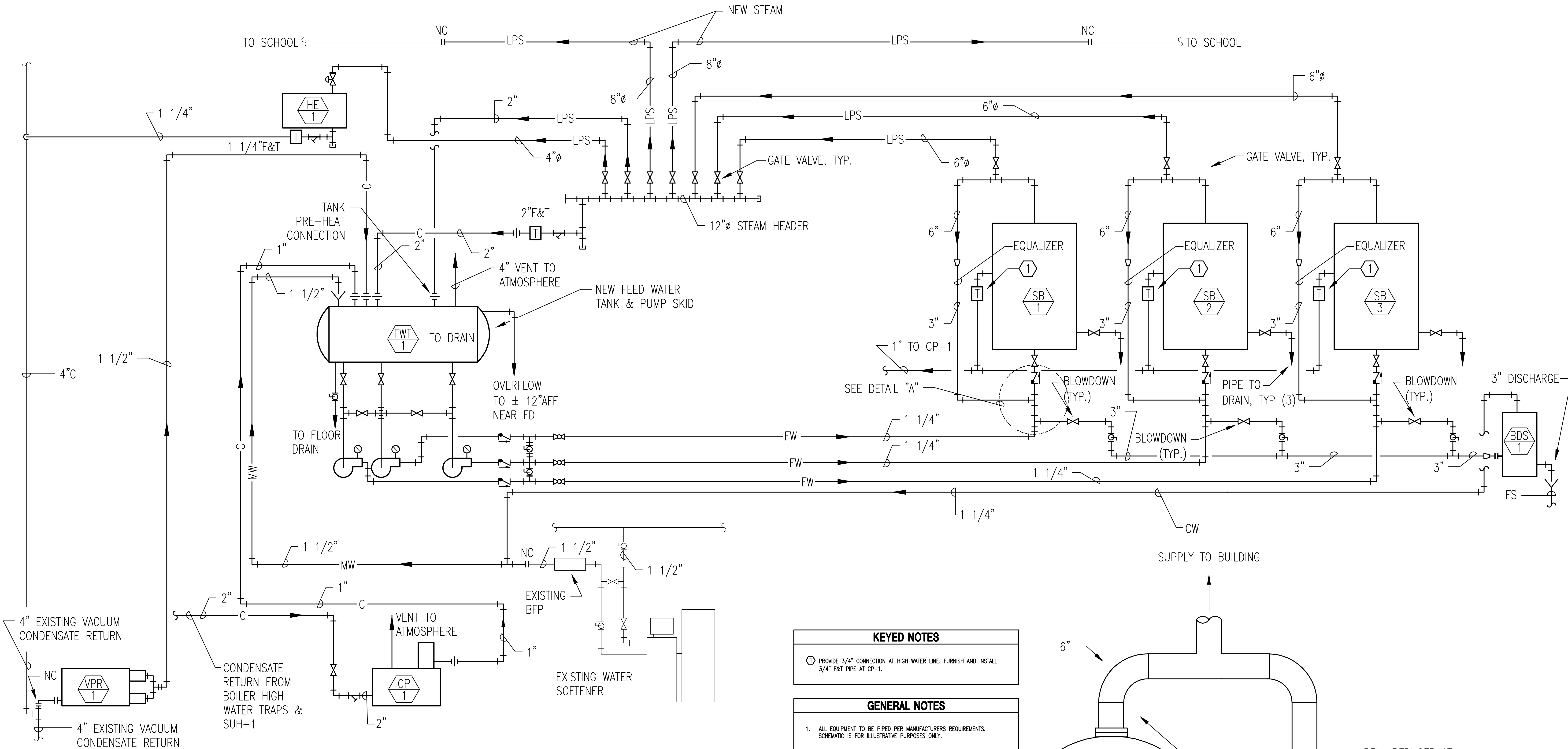
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BOILER AND ELECTRICAL UPGRADES FOR:  
**KENNEDY MIDDLE SCHOOL**  
 ROCKFORD, ILLINOIS



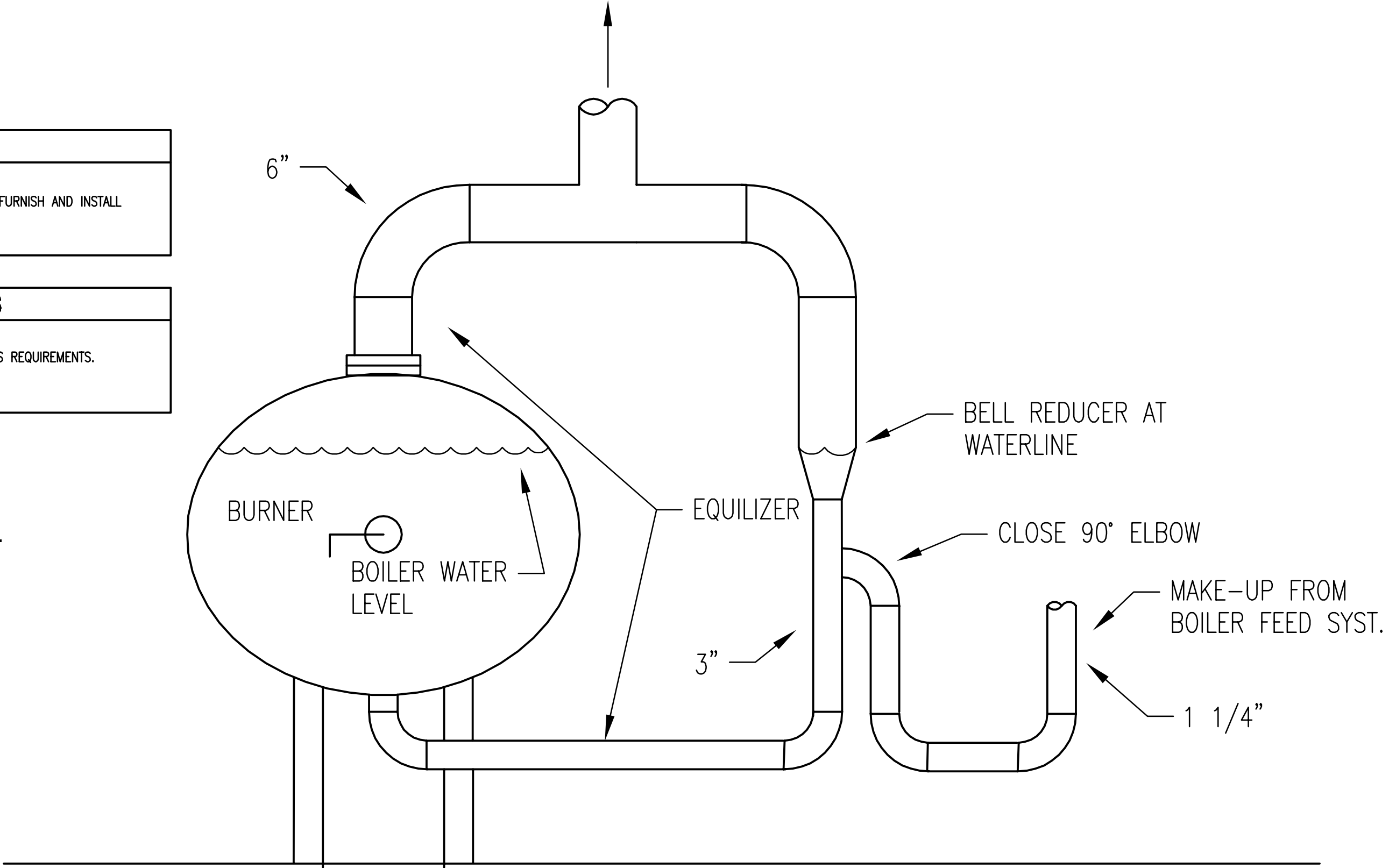


- KEYED NOTES**

① PROVIDE 3/4" CONNECTION AT HIGH WATER LINE. FURNISH AND INSTALL 3/4" F&T PIPE AT CP-1.
- GENERAL NOTES**

1. ALL EQUIPMENT TO BE PIPED PER MANUFACTURERS REQUIREMENTS. SCHEMATIC IS FOR ILLUSTRATIVE PURPOSES ONLY.

1 BOILER ROOM NEW MECHANICAL PIPING DIAGRAM  
NO SCALE



DETAIL 'A'- HARTFORD LOOP  
NO SCALE

BOILER AND ELECTRICAL UPGRADES FOR:  
**KENNEDY MIDDLE SCHOOL**  
ROCKFORD, ILLINOIS

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


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
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
UNIT VENTILATOR SCHEDULE																										
GENERAL DATA					CABINET DATA			AIR DATA		HEATING/COOLING COIL DATA			COOLING COIL DATA			HEATING COIL DATA		WALL LOUVER DATA	CONTROL DATA	FAN MOTOR DATA		FILTER DATA				
TAG	LOCATION/AREA SERVED	MANUFACTURER	MODEL NUMBER	STANDARD AIR DELIVERY (CFM)	TYPE	DIMENSIONS LxHxD (IN.)	O.A. %	AIR INLET TYPE	AIR DISCHARGE TYPE	GPM	PRESS. DROP (FT.)	CONNECTION	EAT (°F)	EWI (°F)	CAPACITY (MBH)	EAT (°F)	EWI (°F)	SIZE	DAMPER	HP	VOLT/PH	TYPE	SIZE	EXTRA SETS	BUILT-IN DISC.	NOTES
1	EXISTING CLASSROOM 138	TRANE	VUVC125	1250	VERTICAL	93 x 30 x 21 1/4	20	BACK OA FRONT RETURN	TOP	4.5	3.0	LEFT	81.9/68.6	45.0	39.9	50	180.0	54" x 10 3/8"	FACE & BYPASS	1/2	120/1	TA	1"	1	YES	1,2,3,4,5,7,8,9,10,11,12,13
2	EXISTING CLASSROOM 133	TRANE	VUVC125	1250	VERTICAL	93 x 30 x 21 1/4	20	BACK OA FRONT RETURN	TOP	4.5	3.0	RIGHT	81.9/68.6	45.0	39.9	50	180.0	54" x 10 3/8"	FACE & BYPASS	1/2	120/1	TA	1"	1	YES	1,2,3,4,5,7,8,9,10,11,12,13
3	EXISTING CLASSROOM 132	TRANE	VUVC100	1000	VERTICAL	81 x 30 x 21 1/4	20	BACK OA FRONT RETURN	TOP	4.0	2.5	LEFT	81.9/68.6	45.0	39.9	50	180.0	54" x 10 3/8"	FACE & BYPASS	1/3	120/1	TA	1"	1	YES	1,2,3,4,5,7,8,9,10,11,12,13
4	EXISTING CLASSROOM 131	TRANE	VUVC100	1000	VERTICAL	81 x 30 x 21 1/4	20	BACK OA FRONT RETURN	TOP	4.0	2.5	RIGHT	81.9/68.6	45.0	39.9	50	180.0	54" x 10 3/8"	FACE & BYPASS	1/2	120/1	TA	1"	1	YES	1,2,3,4,5,7,8,9,10,11,12,13
5	EXISTING CLASSROOM 139	TRANE	VUVC125	1250	VERTICAL	93 x 30 x 21 1/4	20	BACK OA FRONT RETURN	TOP	4.5	3.0	LEFT	81.9/68.6	45.0	39.9	50	180.0	54" x 10 3/8"	FACE & BYPASS	1/3	120/1	TA	1"	1	YES	1,2,3,4,5,7,8,9,10,11,12,13
6	EXISTING CLASSROOM OFFICE	TRANE	VUVC075	750	VERTICAL	69 x 30 x 21 1/4	20	BACK OA FRONT RETURN	TOP	3.0	1.0	RIGHT	81.9/68.6	45.0	39.9	50	180.0	54" x 10 3/8"	FACE & BYPASS	1/3	120/1	TA	1"	1	YES	1,2,3,4,5,7,8,9,10,11,12,13
7	EXISTING CLASSROOM 144	TRANE	VUVC075	750	VERTICAL	69 x 30 x 21 1/4	20	BACK OA FRONT RETURN	TOP	3.0	1.0	LEFT	81.9/68.6	45.0	39.9	50	180.0	54" x 10 3/8"	FACE & BYPASS	1/3	120/1	TA	1"	1	YES	1,2,3,4,5,7,8,9,10,11,12,13
8	EXISTING CLASSROOM 140	TRANE	VUVC075	750	VERTICAL	69 x 30 x 21 1/4	20	BACK OA FRONT RETURN	TOP	3.0	1.0	RIGHT	81.9/68.6	45.0	39.9	50	180.0	54" x 10 3/8"	FACE & BYPASS	1/3	120/1	TA	1"	1	YES	1,2,3,4,5,7,8,9,10,11,12,13
9	EXISTING CLASSROOM 140	TRANE	VUVC100	1000	VERTICAL	81 x 30 x 21 1/4	20	BACK OA FRONT RETURN	TOP	4.0	2.5	LEFT	81.9/68.6	45.0	39.9	50	180.0	54" x 10 3/8"	FACE & BYPASS	1/2	120/1	TA	1"	1	YES	1,2,3,4,5,7,8,9,10,11,12,13
10	EXISTING CLASSROOM 130	TRANE	VUVC100	1000	VERTICAL	81 x 30 x 21 1/4	20	BACK OA FRONT RETURN	TOP	4.0	2.5	RIGHT	81.9/68.6	45.0	39.9	50	180.0	54" x 10 3/8"	FACE & BYPASS	1/2	120/1	TA	1"	3	YES	1,2,3,4,5,7,8,9,10,11,12,13
11	EXISTING CLASSROOM 129	TRANE	VUVC125	1000	VERTICAL	81 x 30 x 21 1/4	20	BACK OA FRONT RETURN	TOP	4.0	2.5	LEFT	81.9/68.6	45.0	47.1	50	180.0	66" x 10 3/8"	FACE & BYPASS	1/2	120/1	TA	1"	3	YES	1,2,3,4,5,7,8,9,10,11,12,13
NOTES:										NOTES:																
1. PROVIDE 12 INCH LOCKABLE PIPING COMPARTMENT ON SIDE OF UNIT VENTILATOR FOR PIPING AND GAS CONTROLLER VERIFY SIDE IN FIELD.										8. PROVIDE PENCIL PROOF DOUBLE DEFLECTION DISCHARGE GRILLE WITH DEBRIS SCREEN.																
2. PROVIDE DOC END DEVICE OPTION (SEE SPECIFICATIONS) WITH TERMINAL BLOCK.										9. OA DAMPER TO BE PROVIDED WITH BELIMO ACTUATOR (2 TO 10 VDC), (3-WIRE TO ALLOW CONTROL AND FEEDBACK).																
3. PROVIDE ECM FAN MOTOR WITH INFINITE SPEED SELECTION.										10. 2-WAY CONTROL VALVE TO BE PROVIDED BY THE MECHANICAL/ GAS CONTRACTOR.																
4. COLOR SHALL BE AS SELECTED BY ARCHITECT (PROVIDE COLOR CHART WITH SUBMITTALS.)										11. PROVIDE FULL ADAPTER BACK WITH OA PLENUM.																
5. PROVIDE INSULATED FRESH AIR FALSE BACK WITH INSULATED PIPE PASSAGE FOR FIELD MOUNTED CROSS OVER PIPING.										12. PROVIDE ANODIZED ALUMINUM SILVER WALL LOUVER WITH LATTICE GUARD.																
6. MIXED AIR TEMPERATURE BASED ON -10°F OUTSIDE AIR AND 70°F RETURN AIR.										13. SEE SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.																
7. PROVIDE ONE(1) CONSTRUCTION AND THREE (3) ADDITIONAL SETS OF THROWAWAY FILTERS PER UNIT ATTIC STOCK.																										



HEAT EXCHANGER SCHEDULE																	
GENERAL DATA												WATER SHELL SIDE DATA				NOTES	
TAG	LOCATION	MANUFACTURER	MODEL NUMBER	TYPE	MBH	PASSES	DIAMETER (IN.)	LENGTH (FT.)	SURFACE AREA (SQ. FT.)	ENTERING PRESS. (PSIG)	FLOW RATE (LBS./HR.)	SIDE FOULING FACTOR	SIDE EWT (°F)	SIDE LWT (°F)	SIDE GPM		SIDE PRESS. DROP (FT.)
HE-1	BOILER ROOM	B&G	SU144-4	SHELL & TUBE	3900	4	14	58	111	5.0	3500	0.002	150	185	225	3.7	
NOTES:																	



STEAM BOILER SCHEDULE													
TAG	LOCATION	MANUFACTURER	MODEL NUMBER	TYPE	OPERATING PRESSURE (PSI)	BURNER TYPE	BURNER HP	BURNER VOLT/PH	AMPS (MCA)	FIRING INPUT (MBH)	OUTPUT (MBH)	BHP	NOTES
 1	BOILER ROOM	BURN HAM	CL-80 C-SERIES	STEAM	5	GAS	1.5	208/3	7.5	3266	2714	81.1	
 2	BOILER ROOM	BURN HAM	CL-80 C-SERIES	STEAM	6	GAS	1.5	208/3	7.5	3267	2715	81.1	
 3	BOILER ROOM	BURN HAM	CL-80 C-SERIES	STEAM	7	GAS	1.5	208/3	7.5	3268	2716	81.1	
NOTES:													



PUMP SCHEDULE												
TAG	LOCATION	SERVICE	MANUFACTURER	MODEL NUMBER	TYPE	GPM	HP	VOLT/PH	HEAD (FT.)	IMP. DIA. (IN.)	RPM	NOTES
 1	BOILER ROOM	HEATING HOT WATER	B&G	e-1510-3AB	END SUCTION	225	7.5	208/3	60	7.75	1800	
 2	BOILER ROOM	HEATING HOT WATER	B&G	e-1510-3AB	END SUCTION	225	7.5	208/3	60	7.75	1800	
PUMP TYPES												
 HOT WATER PUMP												
NOTES:												
1. FURNISH APPROPRIATELY SIZE VARIABLE FREQUENCY DRIVE.												

EXPANSION TANK SCHEDULE							
TAG	LOCATION	MANUFACTURER	MODEL NUMBER	CAPACITY (GAL.)	SYSTEM	H/V	NOTES
 1	BOILER ROOM	B&G	B-LA	132	HOT WATER	V	1, 2, 4
NOTES:							
1. DRAIN VALVE							
2. ATF FITTING							
3. TUBE-GUAGE GLASS							
4. INSULATION							

AIR SEPARATOR SCHEDULE						
TAG	LOCATION	MANUFACTURER	MODEL NUMBER	GPM	FT/H2O	NOTES
 1	BOILER ROOM	B&G	R4	225	5.5	
NOTES:						

CONDENSATE PUMP W/ RECEIVER SCHEDULE 										
TAG	LOCATION	MANUFACTURER	MODEL NUMBER	TYPE	GPM	HP	VOLT/PH	TOTAL AMPS	PUMP QUANTITY	NOTES
	BOILER ROOM	SHIPCO PUMPS	EC-6	FLR. MID. CAST IRON	96GPM @20 PSIG	1/3	120/1	3.1	1	1,2,3
NOTES:										
1. FURNISH WITH HIGH EFFICIENCY MOTORS AND INTEGRAL THERMAL OVERLOADS.										
2. UL LISTED, NEMA 1 CONTROLS										
3. COMPLETE WITH 6 GALLON RECEIVER.										

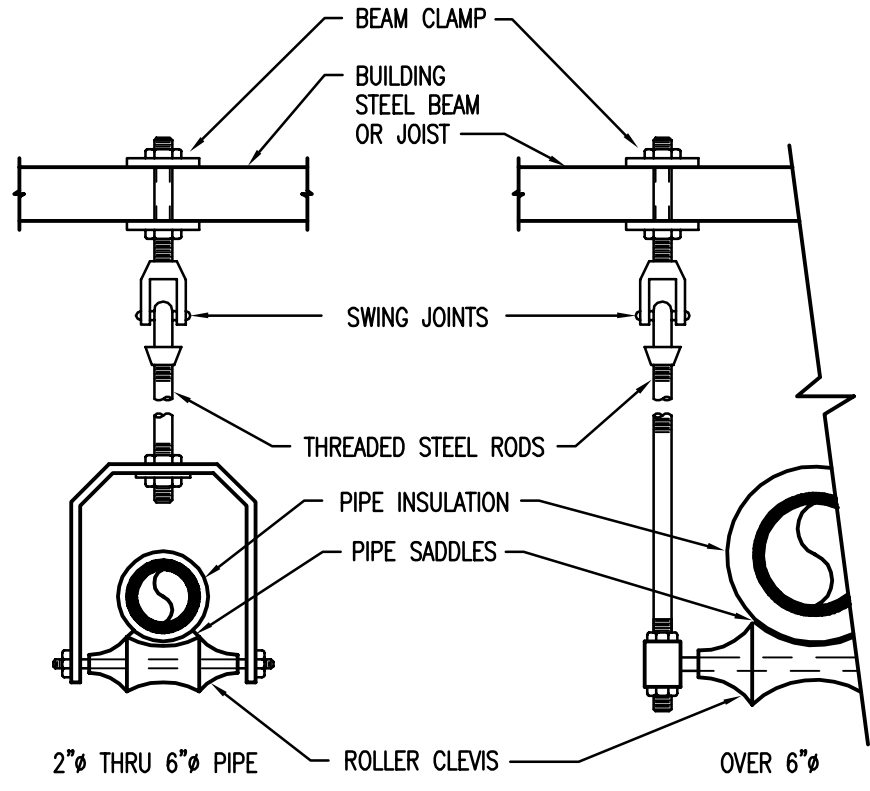
FEED WATER TANK & FEED PUMP(S) 								
TAG	LOCATION	MANUFACTURER	MODEL NUMBER	TYPE	CAPACITY (GAL.)	ELECTRICAL VOLT/PH	ELEC. AMPS MCA	NOTES
 1	BOILER ROOM	FULTON	HT700	HORIZONTAL	750	208/3	15.0	1,2,3
NOTES:								
1. PRE-PACKAGED WITH (4) BURK FEED-WATER PUMPS EACH AT 0.5 HP/120V/1 PH/10 AMPS.								
2. MANUFACTURER TO PROVIDE WITH AUTOMATIC MAKE-UP VALVE AND WYE STRAINER.								
3. SINGLE POINT POWER CONNECTION.								

VACUUM PUMP/ RECEIVER										
TAG	LOCATION	MANUFACTURER	MODEL NUMBER	TYPE	GPM	HP	VOLT/PH	TOTAL AMPS	PUMP QUANTITY	NOTES
	BOILER ROOM	SHIPCO PUMPS	20LRV2-30-353	DUPLEX-MULTI-JET LOW RETURN VACUUM RETURN SYSTEM	28	203	208/3	27.0	2	

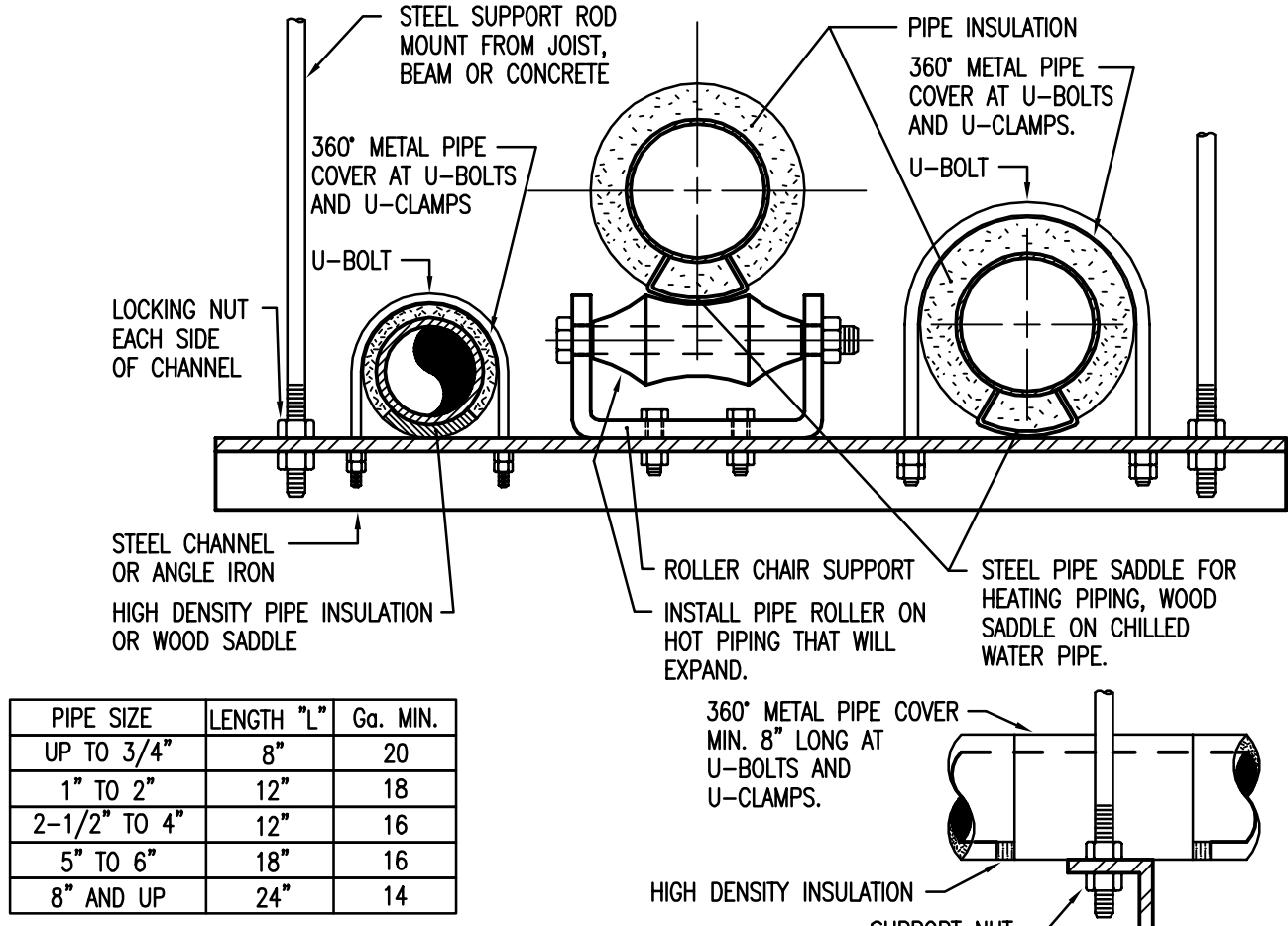
NOTES:

1. FURNISH WITH HIGH EFFICIENCY MOTORS AND INTEGRAL THERMAL OVERLOADS.
2. UL LISTED, NEMA 1 CONTROLS
3. COMPLETE WITH SPLIT 78 GALLON RECEIVER. 39 GAL. TOP CHAMBER/39 GAL. BOTTOM CHAMBER.

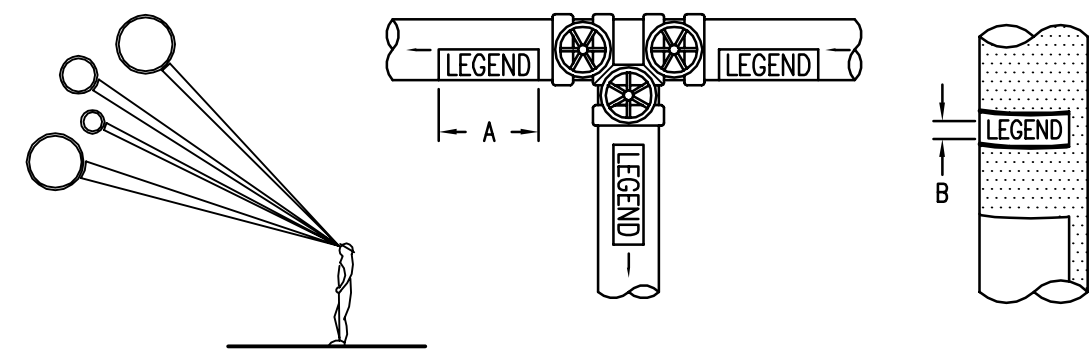




1  
 M5.00  
**HOT WATER PIPING HANGER DETAIL**  
 NO SCALE



2  
 M5.00  
**TRAPEZE PIPE HANGER DETAIL**  
 NO SCALE

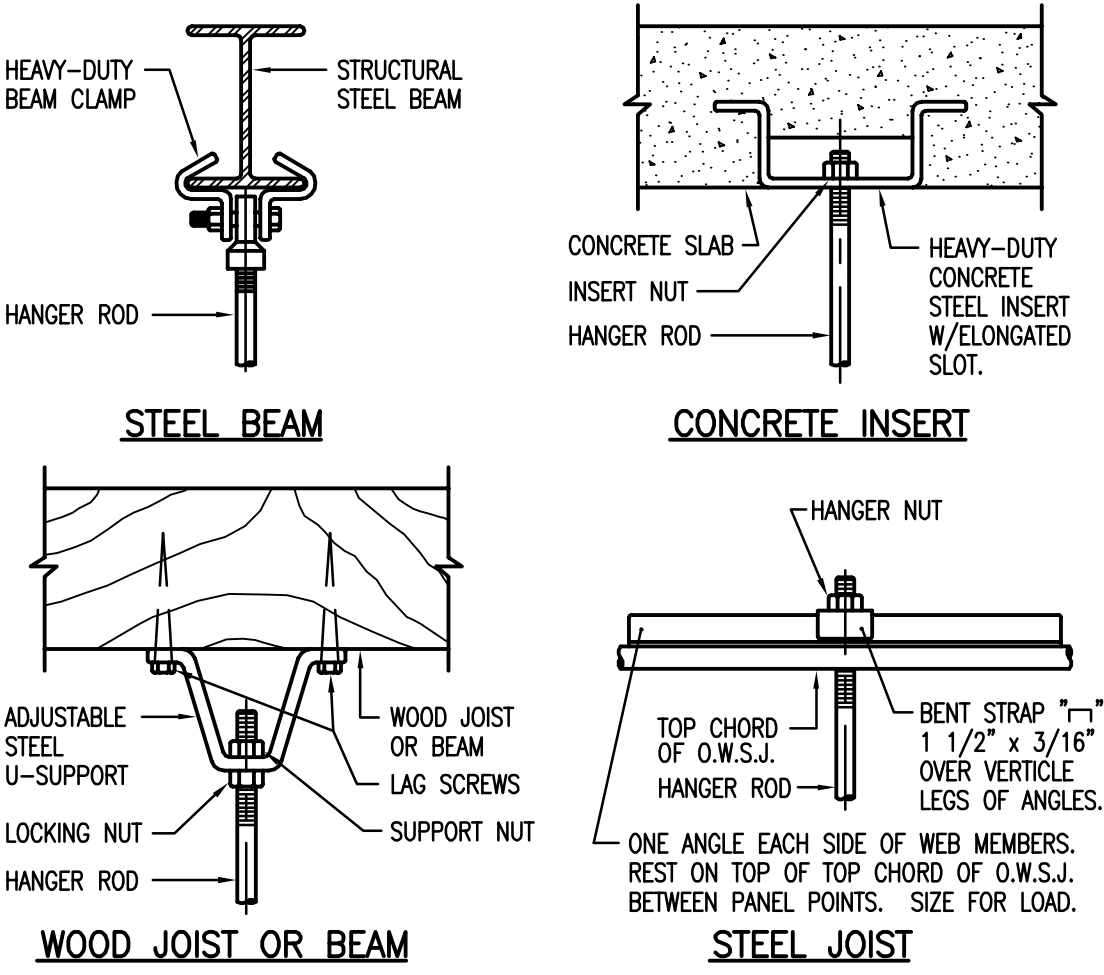


NOTE:  
 IDENTIFICATION MARKERS OR STRIPS TO BE PLACED ON ALL EXPOSED COVERED AND UNCOVERED PIPES AT 50"-0" INTERVALS AND AT ALL VALVES AND BRANCHES AND ON BOTH SIDES OF WALLS WHERE PIPES PASS THROUGH SAME. ARROWS OF SAME COLOR AS IDENTIFICATION MARKERS SHALL ALSO BE PLACED ON PIPES POINTING AWAY FROM MARKER INDICATING DIRECTION OF FLOW.

SIZE OF LEGEND LETTERS		
OUTSIDE DIAMETER OF PIPE OR COVERING	LENGTH OF COLOR FIELD A	SIZE OF LETTERS B
3/4" TO 1-1/4"	8"	1/2"
1-1/2" TO 2"	8"	3/4"
2-1/2" TO 6"	12"	1-1/4"
8" TO 10"	24"	2-1/2"
OVER 10"	32"	3-1/2"

SERVICE	BACKGROUND OR COLOR BAND	IDENTIFICATION MARKER
BOILER FEED	YELLOW	BLACK ON YELLOW
CHILLED WATER SUPPLY	GREEN	WHITE ON GREEN
CHILLED WATER RETURN	GREEN	WHITE ON GREEN
CITY WATER	GREEN	WHITE ON GREEN
CONDENSATE	GREEN	WHITE ON GREEN
DOMESTIC COLD WATER	GREEN	WHITE ON GREEN
DOMESTIC HOT WATER	YELLOW	BLACK ON YELLOW
FIRE PROTECTION (SPRINKLER)	RED	WHITE ON RED
HOT WATER HEATING SUPPLY	YELLOW	BLACK ON YELLOW
HOT WATER HEATING RETURN	YELLOW	BLACK ON YELLOW
NATURAL GAS	YELLOW	BLACK ON YELLOW
SANITARY DRAIN	GREEN	WHITE ON GREEN
STORM WATER	GREEN	WHITE ON GREEN
HIGH PRESSURE STEAM	YELLOW	BLACK ON YELLOW
LOW PRESSURE STEAM	YELLOW	BLACK ON YELLOW

6  
 M5.00  
**PIPE IDENTIFICATION MARKER DETAIL**  
 NO SCALE

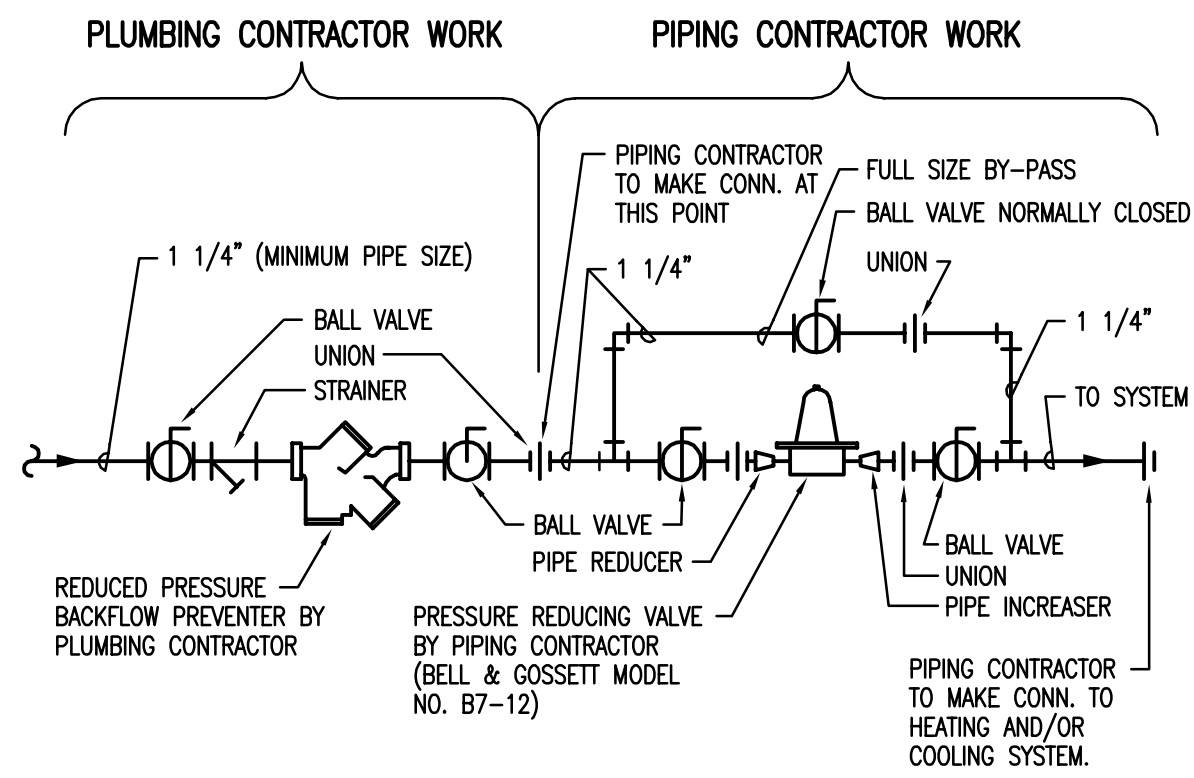


NOMINAL PIPE SIZE	DISTANCE BETWEEN SUPPORTS	HANGER ROD DIMETERS
1/2"	6"	3/8"
3/4" TO 1-1/2"	6"	1/2"
2" TO 2-1/2"	10"	1/2"
3" AND 4"	10"	5/8"
6" TO 12"	14"	7/8"
14" TO 18"	20"	1"

PLACE HANGER WITHIN 1 FOOT OF EACH HORIZ. ELBOW. SUPPORT HORIZ. SOIL WASTE AND STORM PIPE NEAR EACH HUB, WITH 5 FEET MAXIMUM SPACING BETWEEN HANGERS.

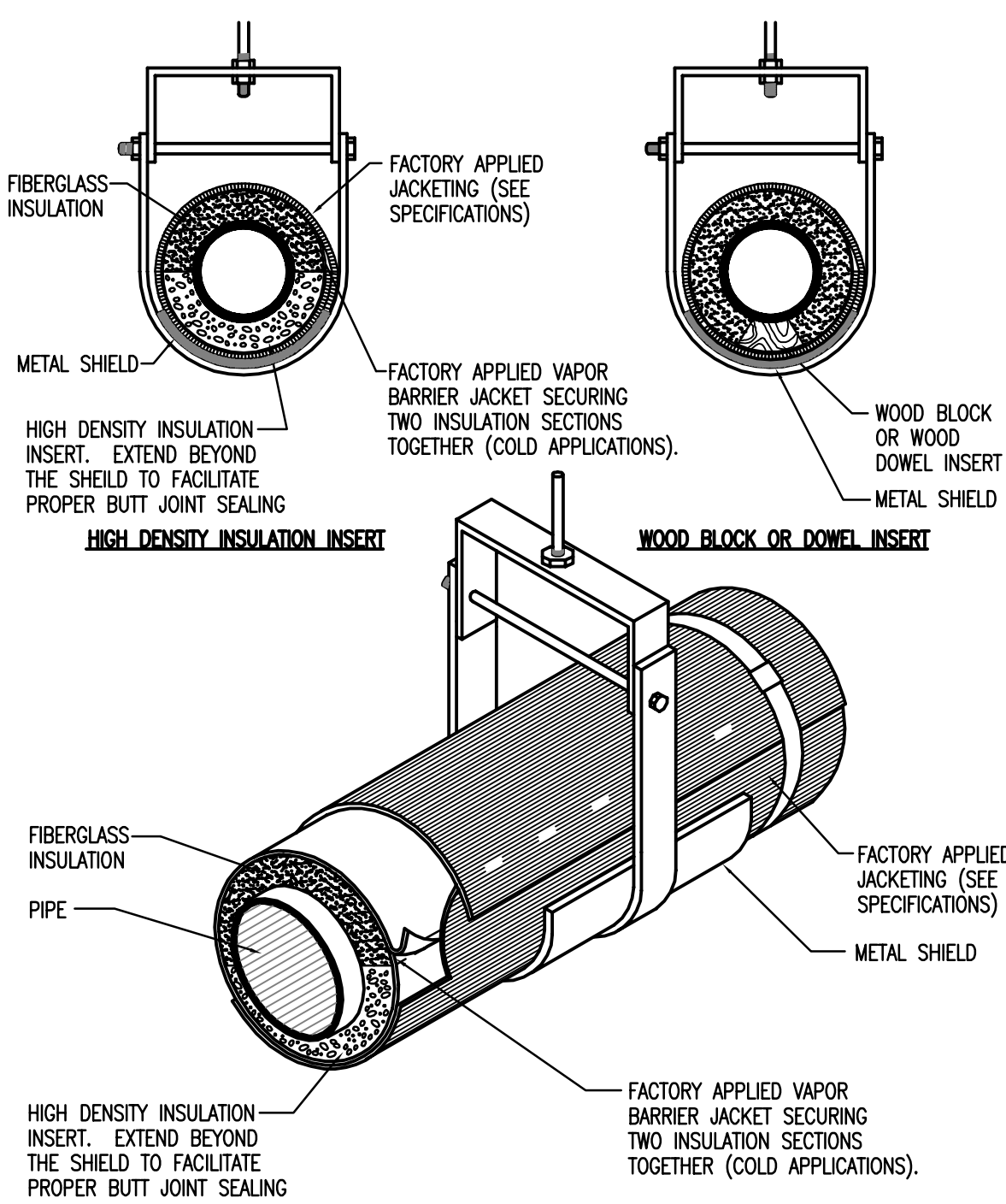
VERTICAL PIPING:  
 1. SUPPORT VERTICAL WATER PIPING AT EVERY FLOOR.  
 2. SUPPORT VERTICAL SOIL PIPE AT EACH FLOOR AT HUB.  
 WHERE SEVERAL PIPES CAN BE INSTALLED IN PARALLEL AND AT SAME ELEVATION PROVIDE MULTIPLE OR TRAPEZE HANGERS.  
 WHERE PRACTICAL, SUPPORT RISER PIPING INDEPENDENTLY OF CONNECTED HORIZ. PIPING.

7  
 M5.00  
**PIPE HANGER DETAILS**  
 NO SCALE

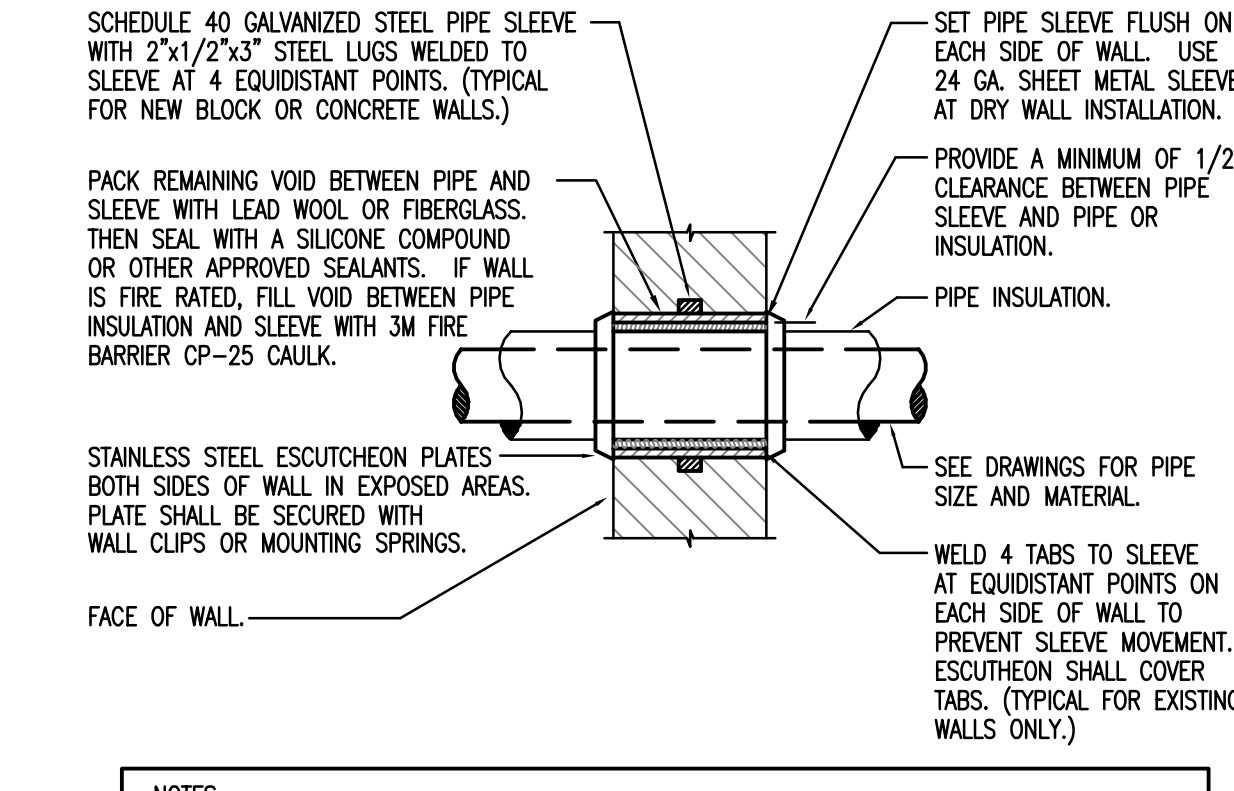


NOTES:  
 1. PLUMBING & PIPING CONTRACTOR SHALL INSULATE ALL PIPES PER SPECIFICATIONS.  
 2. PLUMBING CONTRACTOR TO PROVIDE MAKE-UP WATER LINE, BACK FLOW PREVENTER AND VALVING UP TO FIRST UNION, PIPING CONTRACTOR TO DO ALL WORK FROM UNION TO HEATING AND/OR COOLING SYSTEM.

3  
 M5.00  
**HOT OR CHILLED WATER SYSTEM MAKE-UP WATER DETAIL**  
 NO SCALE

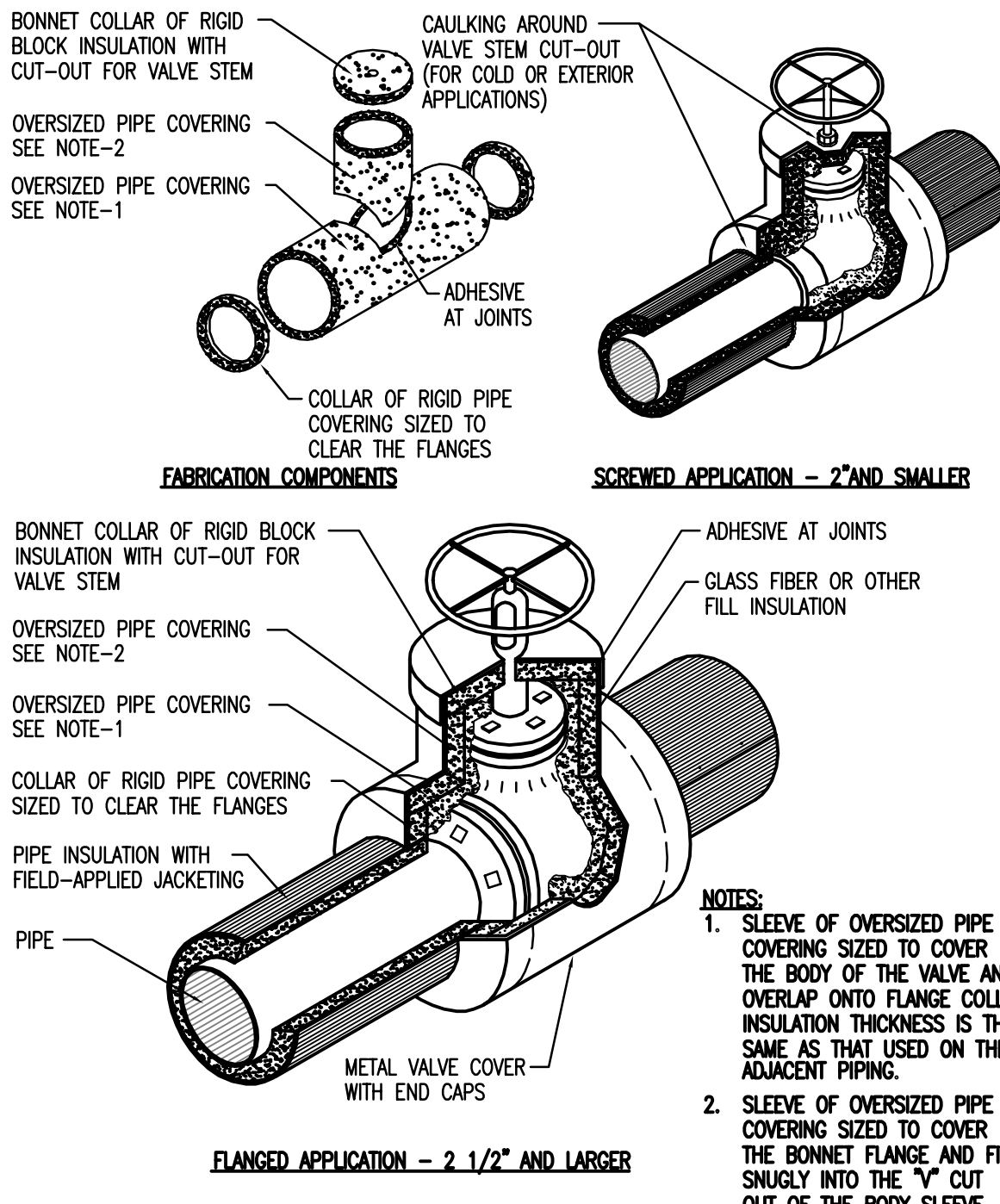


8  
 M5.00  
**INSULATION DETAIL AT CLEVIS HANGER**  
 NO SCALE

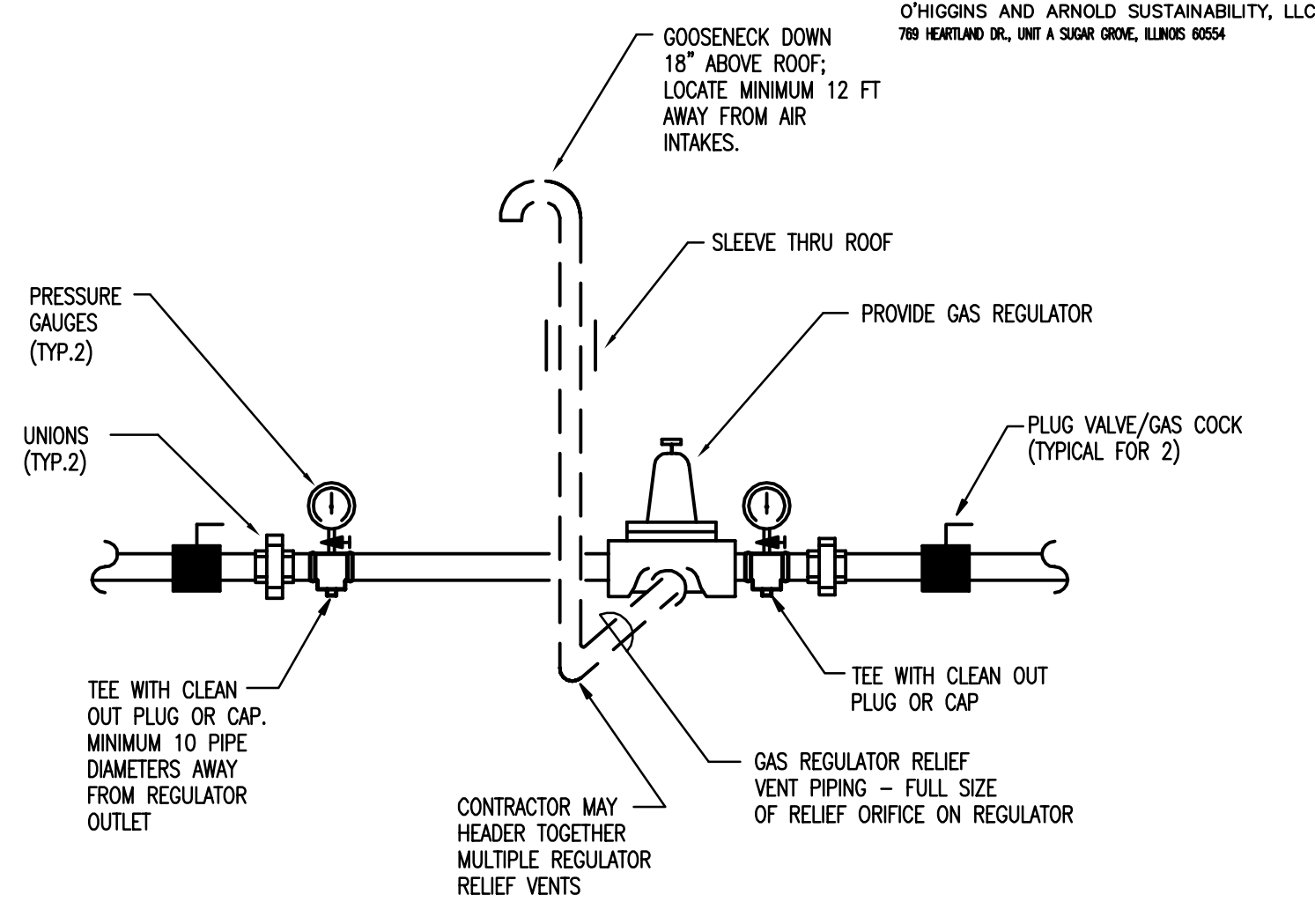


NOTES:  
 1. I.D. OF PIPE SLEEVE TO BE A MIN. OF 1/2" LARGER THAN O.D. OF PIPE OR INSULATION PASSING THROUGH WALL.  
 2. CONTRACTOR SHALL BE RESPONSIBLE FOR THE COORDINATION OF THEIR SLEEVES WITH OTHER TRADES AND/OR CONTRACTORS.  
 3. PIPE SLEEVES THRU SMOKE OR FIRE WALLS SHALL BE IN COMPLIANCE WITH NFPA-90A.

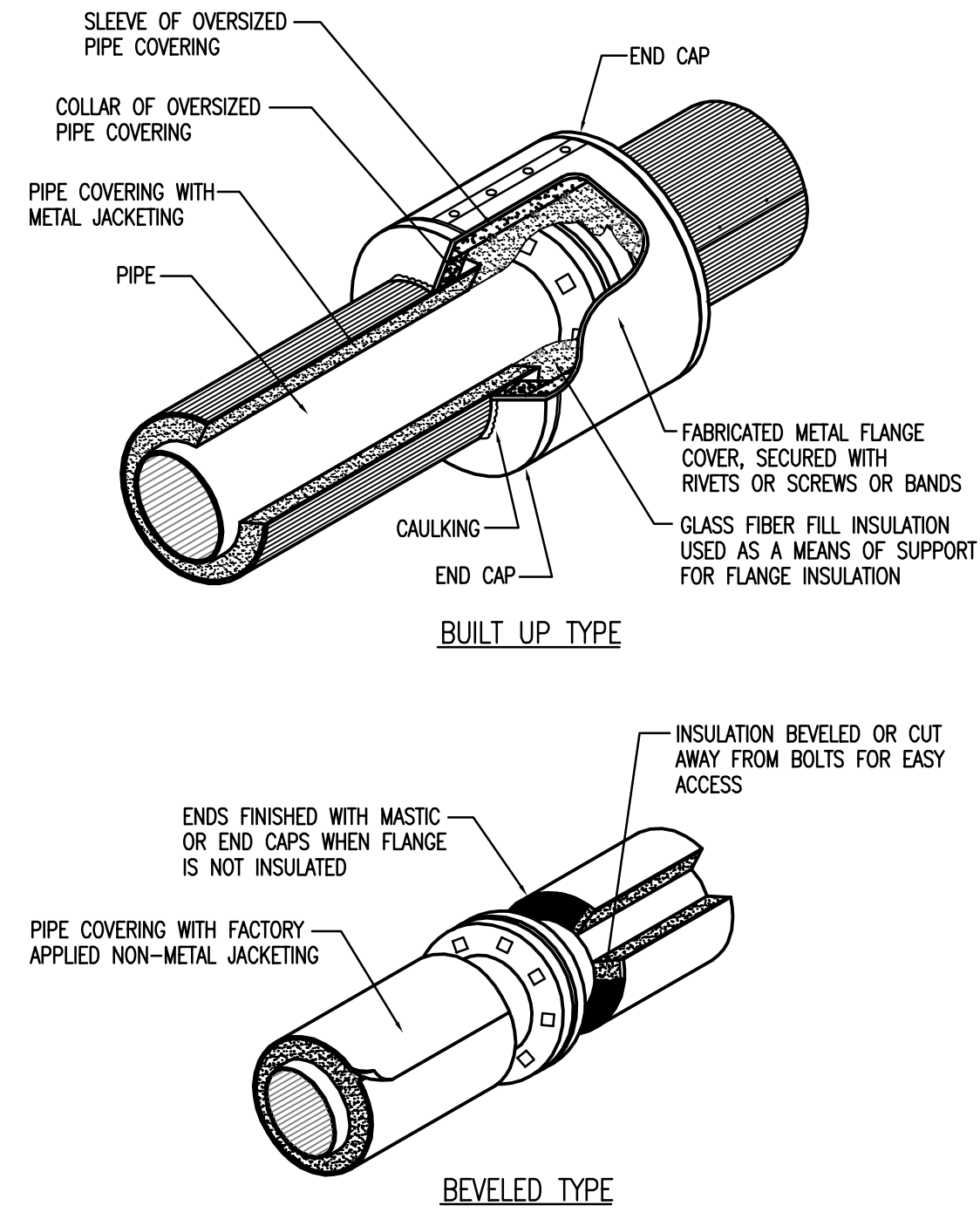
4  
 M5.00  
**PIPE SLEEVE THRU INTERIOR WALL**  
 NO SCALE



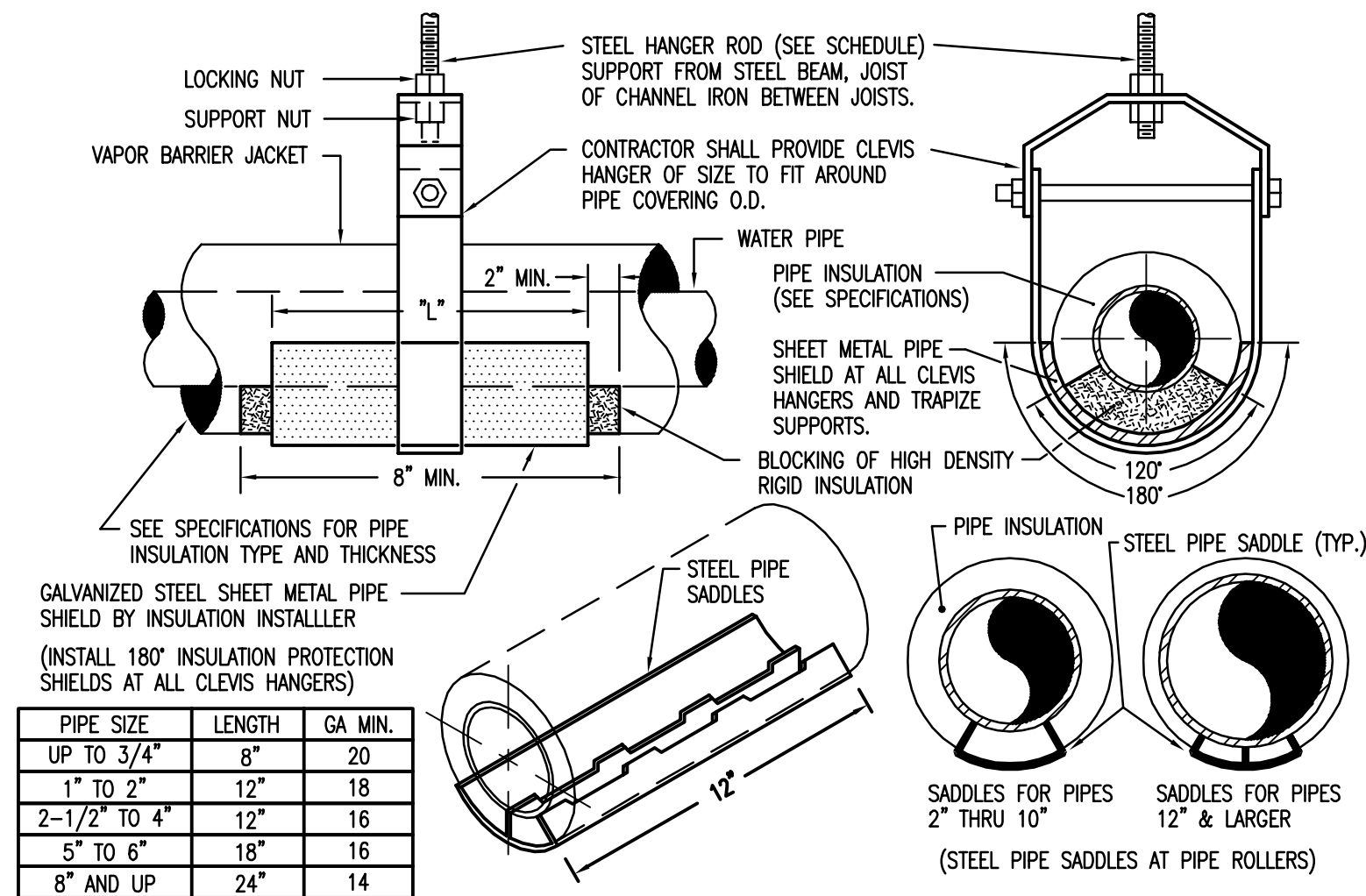
9  
 M5.00  
**FIELD OR FACTORY-FABRICATED VALVE INSULATION**  
 NO SCALE



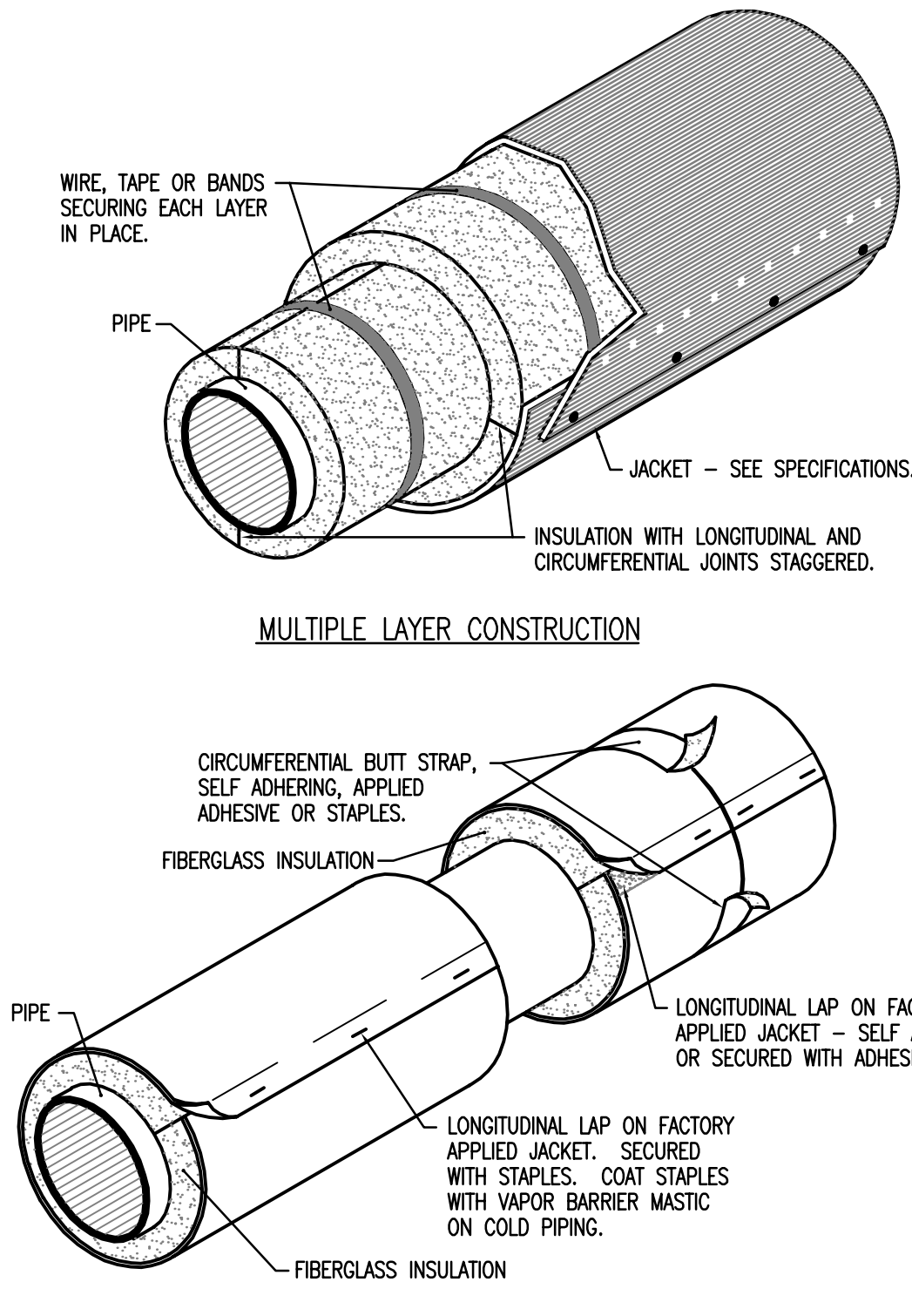
5  
 M5.00  
**NATURAL GAS PRESSURE REDUCING STATION DETAIL**  
 NO SCALE



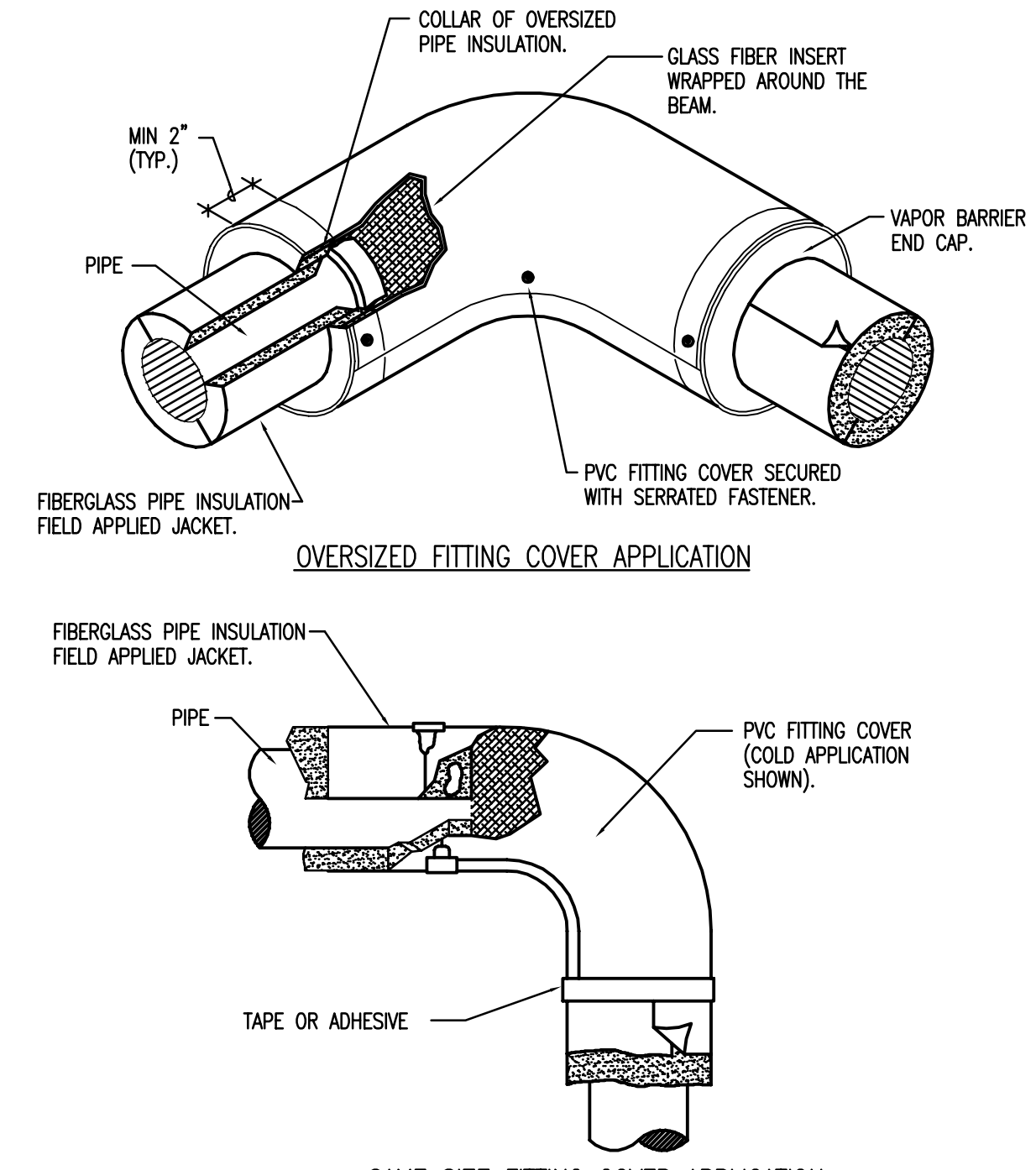
10  
 M5.00  
**IN-LINE FLANGE INSULATION**  
 NO SCALE



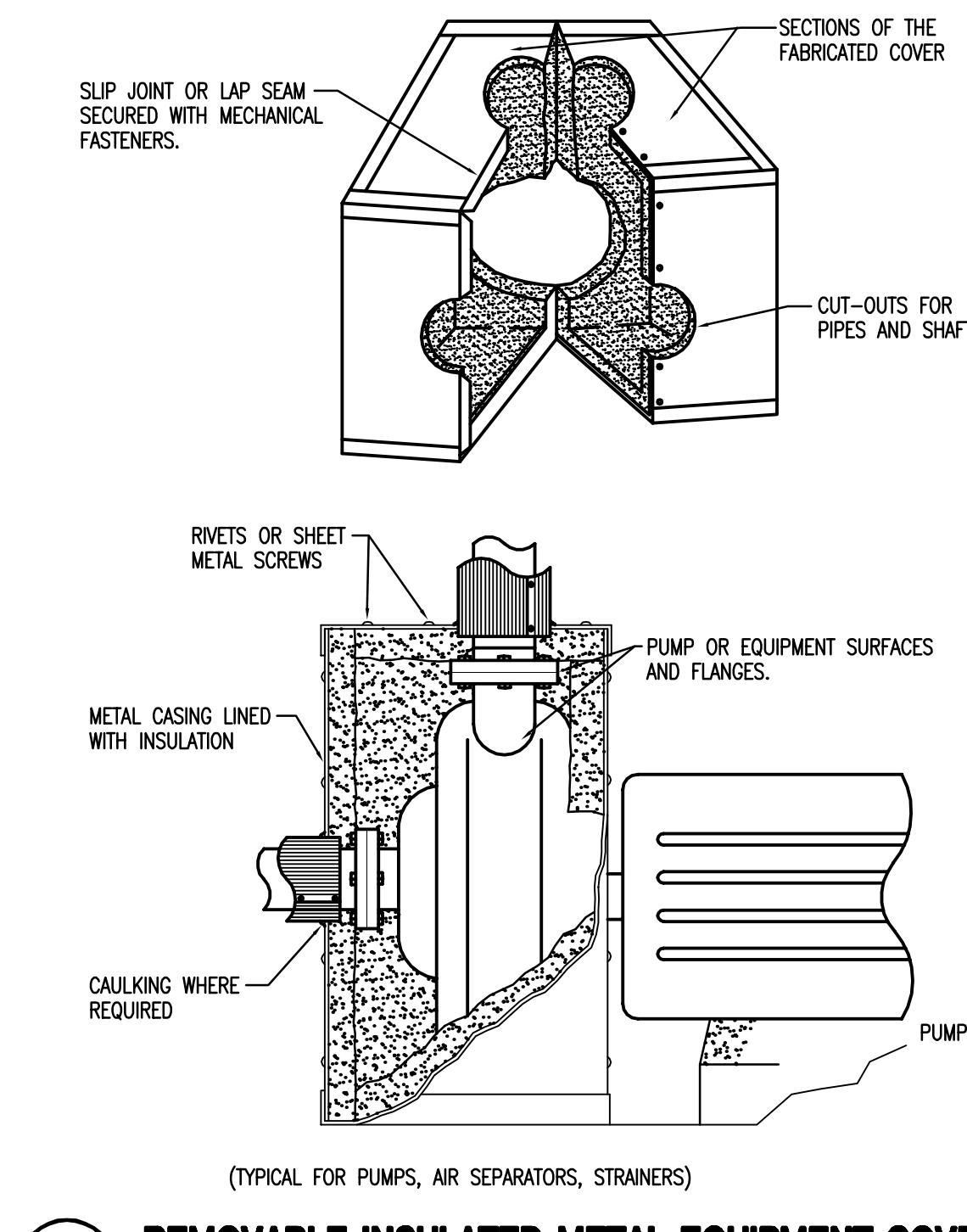
11  
 M5.00  
**PIPE COVERING PROTECTION SHIELDS & PIPE SADDLES**  
 NO SCALE



12  
 M5.00  
**PRE-FORMED PIPE COVERING DETAIL**  
 NO SCALE



13  
 M5.00  
**PVC/GLASS FIBER ELBOW INSULATION SYSTEM DETAIL**  
 NO SCALE



14  
 M5.00  
**REMOVABLE INSULATED METAL EQUIPMENT COVER DETAIL**  
 NO SCALE

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DRAWN BY:	
DATE:	03-11-16
PROJECT NUMBER:	C1825
SHEET NUMBER:	

M5.00

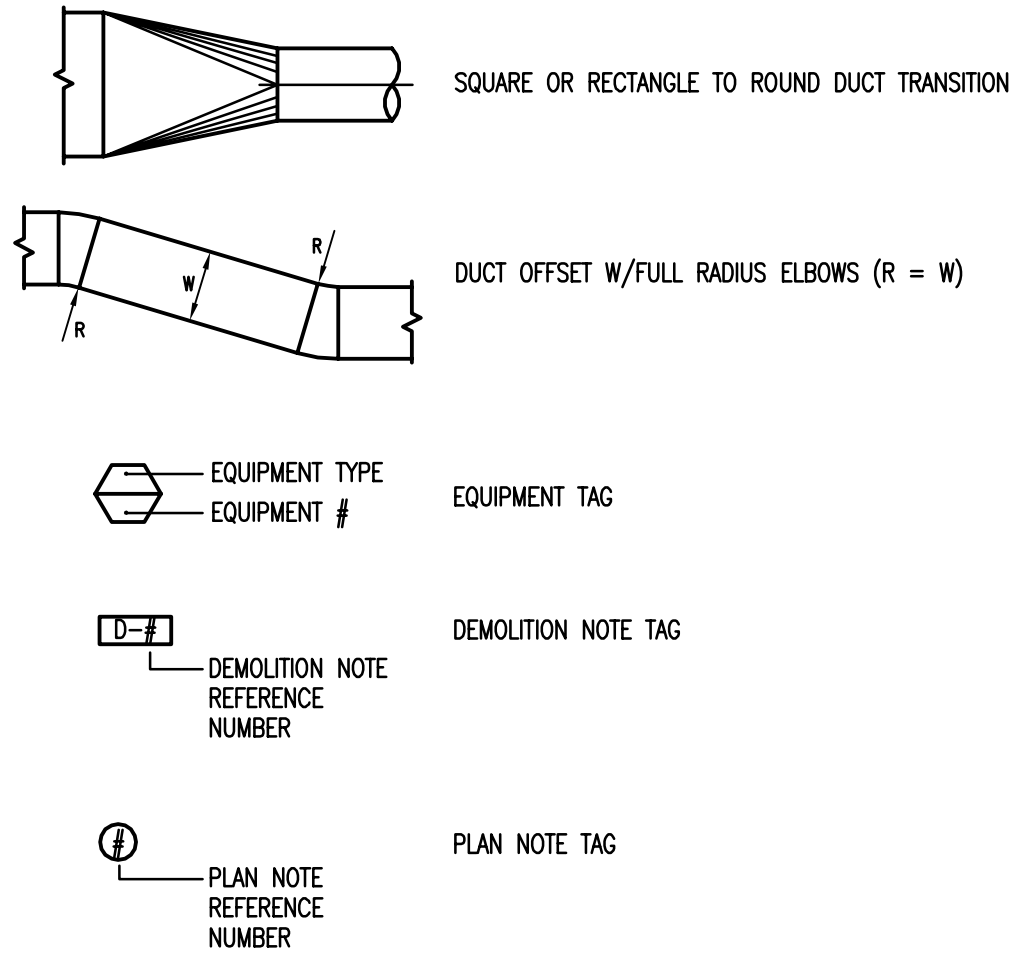
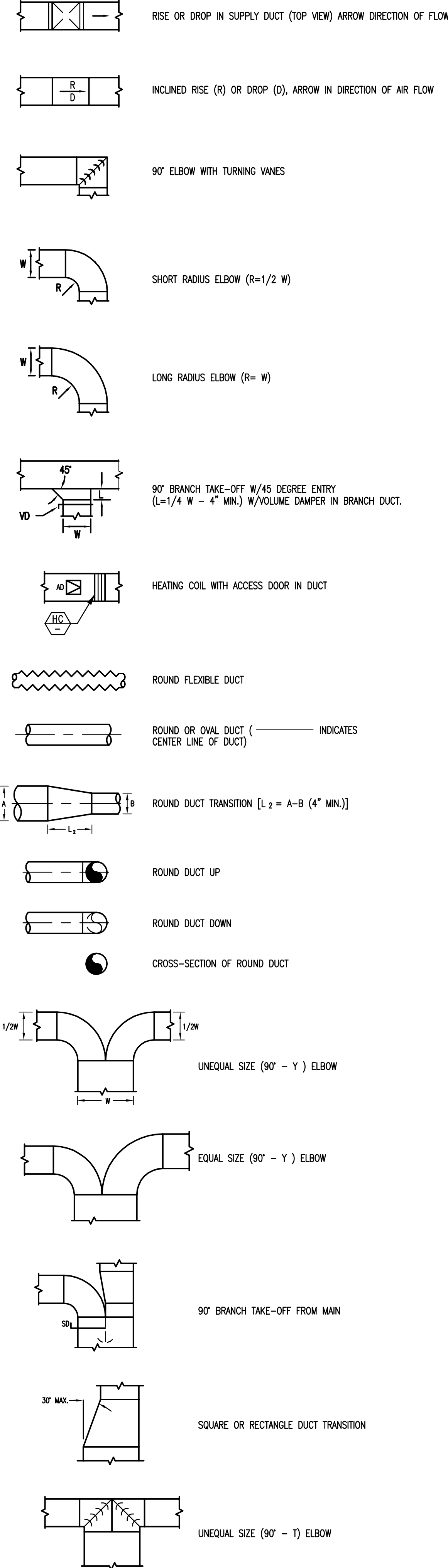
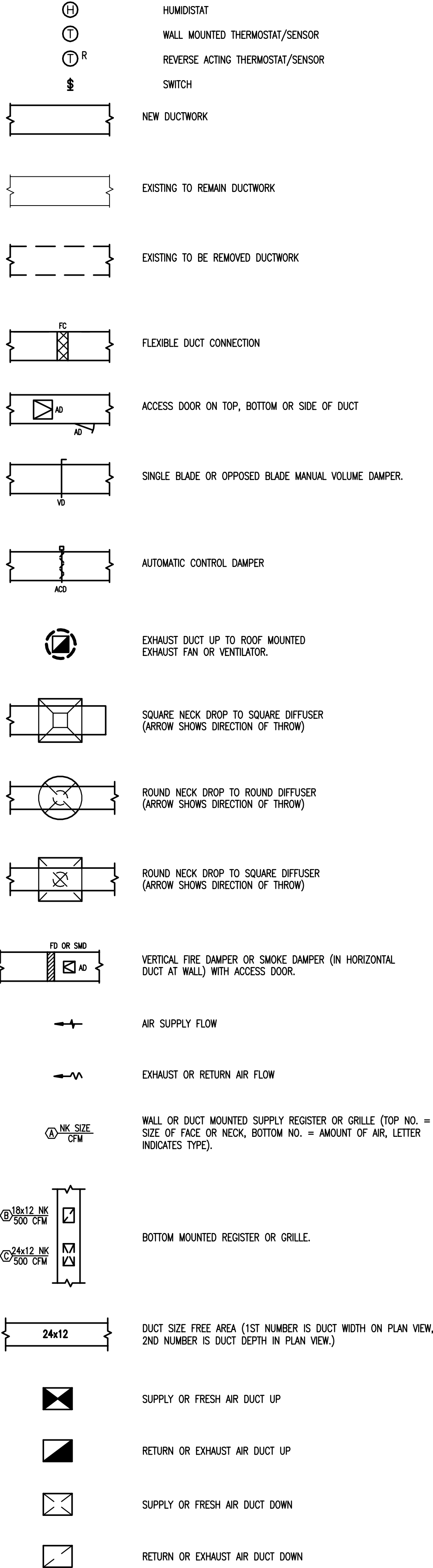
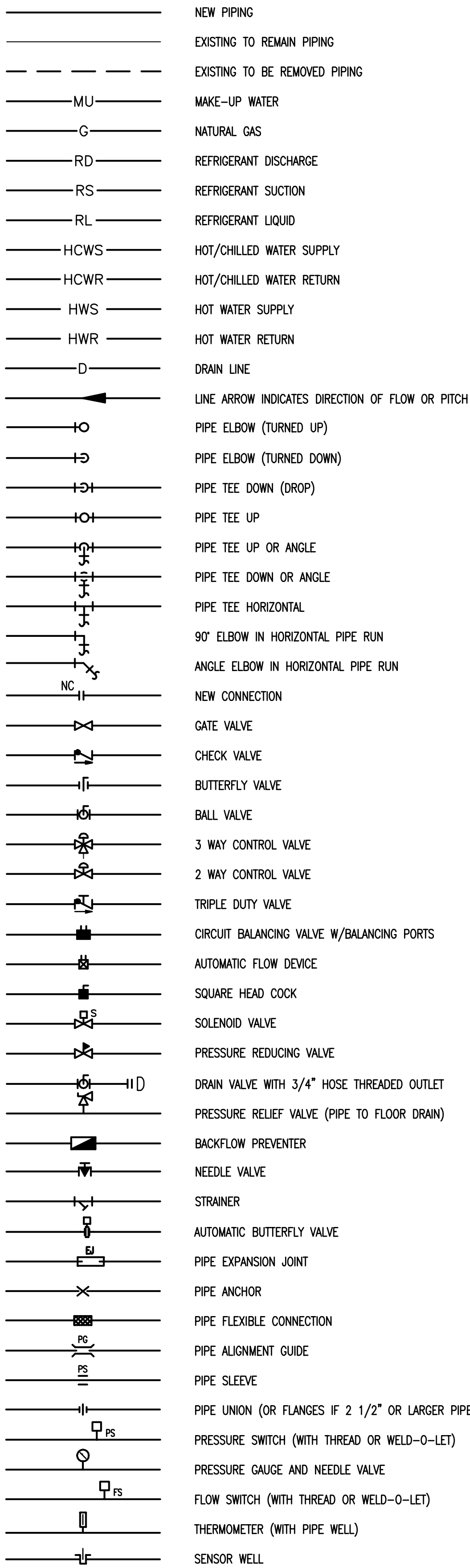
BOILER AND ELECTRICAL UPGRADES FOR:  
**KENNEDY MIDDLE SCHOOL**  
 ROCKFORD, ILLINOIS

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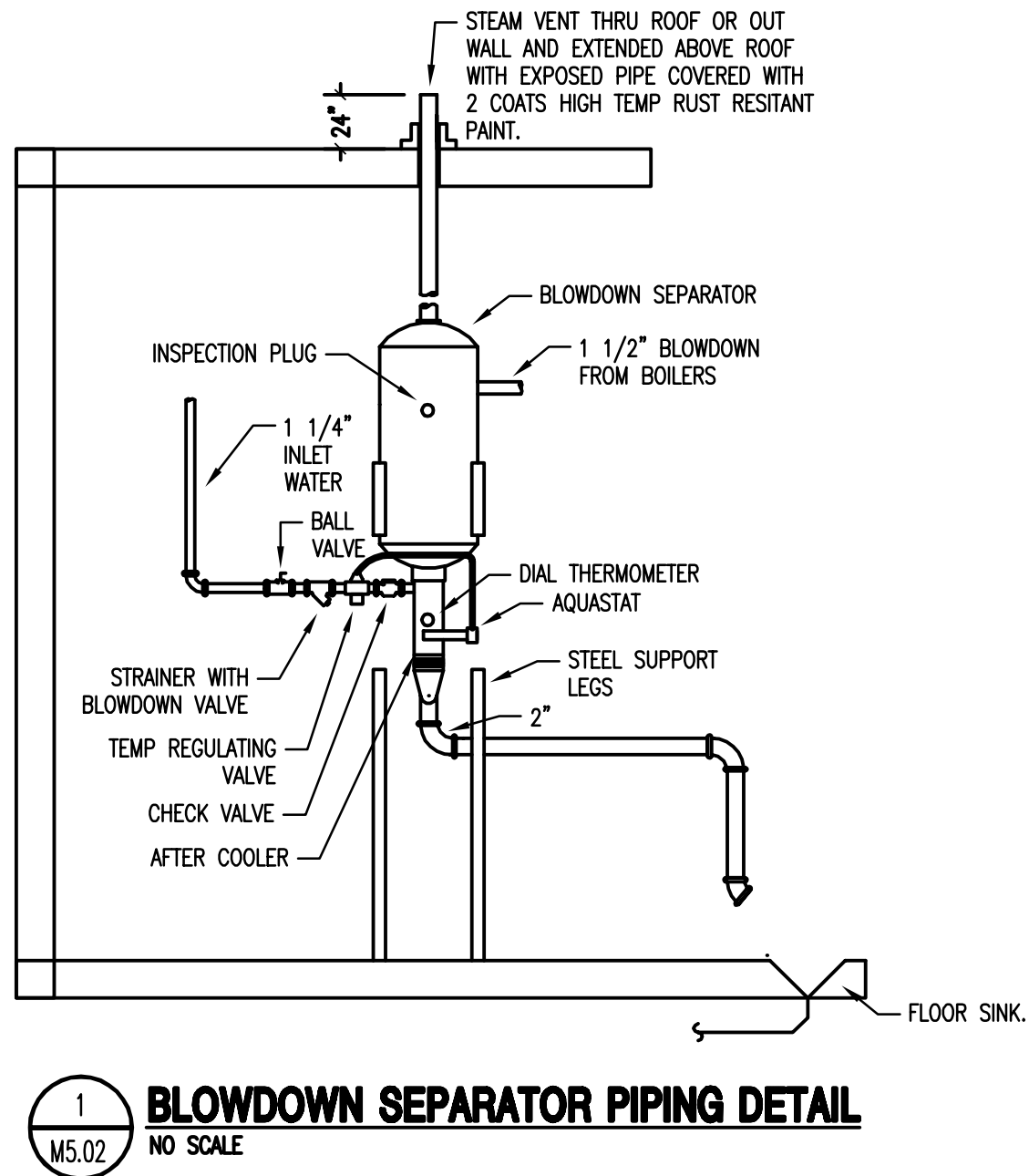




MECHANICAL SYSTEM (HVAC) SYMBOLS



ACV	AUTOMATIC CONTROL VALVE	ELH	ELECTRIC UNIT HEATER	NK	NECK
AFD	AUTOMATIC FLOW DEVICE	EW	ENTERING WATER TEMPERATURE	N.C.	NORMALLY CLOSED
AHU	AIR HANDLING UNIT	EXD	EXHAUST DUCT	N.I.C.	NOT IN CONTRACT
AS	AIR SEPARATOR	F	FAHRENHEIT	N.O.	NORMALLY OPEN
BCP	BOILER CIRCULATING PUMP	FC	FLEXIBLE CONNECTION	OAD	OUTDOOR AIR DAMPER
BWP	BUILDING WATER PUMP	FCU	FAN COIL UNIT	OD	OUTSIDE AIR DUCT
BHP	BRAKE HORSE POWER	FD	FIRE DAMPER	PD	PRESSURE DROP
BTU	BRITISH THERMAL UNIT	FFP	FMS PER FOOT	PG	PIPE GUIDE
BTUH	BRITISH THERMAL UNIT PER HOUR	TFM	FEET PER MINUTE	PH	PHASE
BV	BALL VALVE	FTR	FINNED TUBE RADIATION	PS	PIPE SLEEVE
CBP	COIL BOOSTER PUMP	FV	FACE VELOCITY	PSI	POUNDS PER SQUARE INCH
CC	COOLING COIL	G	GAS PIPING	RAD	RETURN AIR DAMPER
CFM	CUBIC FEET PER MINUTE	GPW	GALLONS PER MINUTE	RED	RETURN AIR DUCT
CH	CHILLER	GV	GATE VALVE	RF	RETURN AIR FAN
CKV	CHECK VALVE	HC	HEATING COIL	RH	RELIEF HOOD
CU	CONDENSING UNIT	HCWP	HOT/CHILLED WATER PUMP	RPM	REVOLUTIONS PER MINUTE
CUH	CABINET UNIT HEATER	HCWR	HOT/CHILLED WATER RETURN	RTU	ROOF TOP UNIT
CUV	CLASSROOM UNIT VENTILATOR	HCWS	HOT/CHILLED WATER SUPPLY	SF	SUPPLY FAN
CWP	CHILLED WATER PUMP	HP	HORSEPOWER	SP	STATIC PRESSURE
CWR	CHILLED WATER RETURN	HWB	HOT WATER BOILER	STR	STRAINER
HCWS	CHILLED WATER SUPPLY	HWP	HOT WATER CIRCULATING PUMP	SUD	SUPPLY DUCT
D	DRAIN LINE	HWR	HOT WATER RETURN	SUH	SUSPENDED UNIT HEATER
DB	DRY BULB	HWS	HOT WATER SUPPLY	TSP	TOTAL STATIC PRESSURE
EAD	EXHAUST AIR DAMPER	IH	INTAKE HOOD	WB	WET BULB
EAT	ENTERING AIR TEMPERATURE	LAT	LEAVING AIR TEMPERATURE	WC	WATER COLUMN
EF	EXHAUST FAN	LWT	LEAVING WATER TEMPERATURE	WG	WATER GAUGE
EH	EXHAUST HOOD	MOD	MOTOR OPERATED DAMPER	WLS	WALL LOUVER AND SCREEN
ET	EXPANSION TANK	NC	NEW CONNECTION		



1  
 M5.02  
 BLOWDOWN SEPARATOR PIPING DETAIL  
 NO SCALE

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BOILER AND ELECTRICAL UPGRADES FOR:  
 KENNEDY MIDDLE SCHOOL  
 ROCKFORD, ILLINOIS



GENERAL NOTES FOR MECHANICAL WORK	
1. DRAWINGS ARE GENERALLY DIAGRAMMATIC. ROUTING OF PIPING AND DUCTWORK AS SHOWN, DOES NOT INTEND TO SHOW EVERY RISE, DROP, OFFSET, FITTING NOR EVERY STRUCTURAL ELEMENT THAT MAY BE ENCOUNTERED DURING THE INSTALLATION OF THIS WORK. EACH CONTRACTOR SHALL MAKE ANY REQUIRED CHANGES FROM THE GENERAL ROUTING SHOWN ON THESE DRAWINGS, SUCH AS OFFSETS, BENDS OR CHANGES IN ELEVATION DUE TO COORDINATION WITH THE WORK OF OTHER TRADES AND BUILDING CONSTRUCTION. ALL CHANGES SHALL BE MADE WITHOUT ADDITIONAL COST TO THE OWNER OR DELAY IN COMPLETION DATE OF THE PROJECT.	24. INSTALL A MINIMUM 12" X 12" ACCESS DOOR (INLET SIDE) AT EACH MOTORIZED DAMPER, FIRE DAMPER, SMOKE DAMPER, INLINE FAN, INTAKE AND EXHAUST PLENUMS AND AN ACCESS DOOR AT AIR SUPPLY UNIT FILTER SECTION.
2. IT IS INTENDED THAT EQUIPMENT SHALL BE LOCATED SYMMETRICALLY WITH THE ARCHITECTURAL ELEMENTS OF THE BUILDING, NOTWITHSTANDING THE FACT THAT LOCATIONS INDICATED BY THESE DRAWINGS MAY BE DISTORTED FOR CLARNESS OF PRESENTATION.	25. THE LOCATIONS SHOWN FOR ALL DIFFUSERS, REGISTERS AND GRILLES, ETC. ARE DIAGRAMMATIC. EXACT LOCATION SHALL BE DETERMINED FROM THE REFLECTED CEILING PLANS AND/OR ON THE JOB SITE BY THE ARCHITECT/ENGINEER REPRESENTATIVES.
3. CONTRACTOR SHALL CHECK DRAWINGS OF OTHER TRADES TO VERIFY THAT SPACES IN WHICH THEIR WORK WILL BE INSTALLED ARE CLEAR OF OBSTRUCTIONS. WORK SHALL BE INSTALLED TO MAINTAIN MAXIMUM HEADROOM AND SPACE CONDITION AT ALL POINTS IN THE BUILDING. WHERE HEADROOM OR SPACE CONDITIONS APPEAR INADEQUATE, CONTRACTOR SHALL NOTIFY ARCHITECT/ENGINEER BEFORE PROCEEDING WITH THE INSTALLATION OF THEIR WORK.	26. INSTALL CODE APPROVED FUSIBLE LINK FIRE DAMPERS IN ALL DUCTS WHICH PASS THROUGH FAN ROOM WALL, BOILER ROOM WALL, MECHANICAL ROOM WALL, AND ALL FLOORS OR AS INDICATED ON DRAWINGS. WHERE FIRE DAMPERS CANNOT BE CHECKED FROM A REGISTER OR GRILLE, INSTALL AN ACCESS DOOR IN THE DUCT NEXT TO THE DAMPER AND ACCESS PANEL IN ALL NEW ACCESSIBLE CEILINGS.
4. CONTRACTOR SHALL FURNISH OTHER TRADES ADVANCE INFORMATION AND/OR SHOP DRAWINGS ON LOCATIONS AND SIZES OF PIPING, DUCTWORK, EQUIPMENT, FRAMES, BOXES, SLEEVES AND OPENINGS, ETC. NEEDED FOR THEIR WORK TO PERMIT OTHER TRADES AFFECTED TO INSTALL THEIR WORK PROPERLY AND WITHOUT DELAY.	27. UNLESS INDICATED OTHERWISE, THE ARCHITECT/ENGINEER MAKES NO REPRESENTATION AS TO WHETHER OR NOT ANY HAZARDOUS OR CONTAMINATED MATERIALS (INCLUDING BUT NOT LIMITED TO ASBESTOS, PCB'S, CONTAMINATED SOILS, ETC.) ARE PRESENT WITHIN THE EXISTING BUILDING OR ON THE SITE. WORK SHOWN ON THE DRAWINGS AND/OR INDICATED IN THE SPECIFICATIONS SHALL NOT BE CONSTRUED TO CALL FOR CONTACT WITH ANY OF THESE MATERIALS. IF THESE MATERIALS ARE ENCOUNTERED OR SUSPECTED, THE CONTRACTOR SHALL NOT DISTURB THEM AND SHALL CONTACT THE ARCHITECT/ENGINEER IMMEDIATELY.
5. WHERE THERE IS EVIDENCE THAT WORK OF ONE TRADE WILL INTERFERE WITH WORK OF OTHER TRADES, ALL TRADES SHALL MEET ON JOB SITE TO WORK OUT SPACE CONDITIONS AND MAKE SATISFACTORY ADJUSTMENTS TO INSTALLATION OF THE NEW WORK. CONTRACTOR SHALL BE RESPONSIBLE, AT THEIR OWN EXPENSE, FOR THE REMOVAL AND REINSTALLATION OF ANY PART OF THEIR WORK IF SAME WAS INSTALLED WITHOUT CONSULTING WITH OTHER TRADES BEFORE INSTALLING THEIR WORK.	28. CONTRACTOR SHALL STORE ALL MATERIALS AND EQUIPMENT SHIPPED TO THE SITE IN A PROTECTED AREA. IF MATERIAL IS STORED OUTSIDE OF THE BUILDING, IT MUST BE STORED OFF THE GROUND A MINIMUM OF SIX INCHES (6") SET ON 6 X 6 PLANKS AND/ OR WOOD PALETS. ALL MATERIAL AND EQUIPMENT MUST BE COMPLETELY COVERED WITH WATERPROOF TAPPS OR VISQUIN. ALL PIPING AND DUCTWORK WILL HAVE THE ENDS CLOSED TO KEEP OUT DIRT AND OTHER DEBRIS. NO EQUIPMENT WILL BE ALLOWED TO BE STORED ON THE SITE UNLESS IT IS SITTING ON WOOD PLANKS AND COMPLETELY PROTECTED WITH WEATHERPROOF COVERS.
6. CONTRACTOR SHALL PROVIDE SLEEVES IN FLOORS AND WALLS AS SHOWN ON THE DRAWINGS, AS REQUIRED BY JOB SITE CONDITIONS, AND/OR AS SPECIFIED, WHEN INSTALLING THEIR WORK.	29. SEE LARGE SCALE DRAWINGS (DETAILS) FOR ALL REQUIRED VALVES, FITTINGS, GAUGES, VENTS, THERMOMETERS WHICH ARE CONNECTED TO FINED TUBE RADIATION (FTR), AIR HANDLING UNITS (AHU), CABINET UNIT HEATERS (CUH), SUSPENDED UNIT HEATERS (SUH), HOT AND CHILLED WATER COILS, EXPANSION TANKS (ET), AIR SEPARATORS (AS), PUMPS, ETC. ALL WORK SHOWN ON DETAILS SHALL BE BY INSTALLING CONTRACTOR UNLESS OTHERWISE NOTED.
7. THE SEQUENCE FOR THE INSTALLATION OF ALL WORK SHALL BE COORDINATED BETWEEN ALL CONTRACTORS ON THE PROJECT AND IN STRICT ACCORDANCE WITH ARCHITECT/ENGINEER AND OWNERS STIPULATION AS CALLED FOR IN THE SPECIFICATION AND/OR AS DIRECTED.	30. ALL AUTOMATIC MOTORIZED DAMPERS SHALL BE FURNISHED BY BAS CONTRACTOR (EXCEPT FOR DAMPERS FURNISHED WITH PACKAGED AIR HANDLING UNITS AND PROVIDED WITH POWER ROOF EXHAUST FANS) AND INSTALLED BY MECHANICAL CONTRACTOR. ALL DAMPER MOTORS FURNISHED AND INSTALLED BY BAS CONTRACTOR.
8. CONTRACTOR SHALL REFER TO THE ARCHITECTURAL AND STRUCTURAL CONTRACT DRAWINGS (BEFORE SUBMITTING THEIR BIDS) TO FAMILIARIZE THEMSELVES WITH THE EXTENT OF THE OTHER TRADES CONTRACTORS WORK, CEILING HEIGHTS AND CLEARANCE FOR INSTALLING THEIR WORK.	31. MECHANICAL CONTRACTOR SHALL PROVIDE ON SITE SCHOOLING OF OWNERS OPERATING PERSONNEL FOR ALL SYSTEMS AND EQUIPMENT INSTALLED UNDER HIS CONTRACT.
9. CONTRACTOR SHALL BE RESPONSIBLE AND PAY FOR ALL CORING, CUTTING, PATCHING, REPAIRING AND REFINISHING OF BUILDING CONSTRUCTION REQUIRED TO ACCOMMODATE THE INSTALLATION OF THEIR WORK. ALL PATCHING, REPAIRING AND REFINISHING WORK SHALL BE PERFORMED BY THOSE REGULARLY INVOLVED IN THAT TRADE AND SHALL MATCH THE NEW CONSTRUCTION AS CLOSELY AS POSSIBLE. CARE SHALL BE TAKEN SO AS NOT TO DAMAGE ANY EXISTING BUILDING CONSTRUCTION OR ITEMS THAT ARE TO REMAIN. ANY EXISTING FINISHES THAT ARE DAMAGED DURING THE INSTALLATION OF NEW WORK SHALL BE REPAIRED, REPLACED AND PAID FOR BY THE INSTALLING CONTRACTOR, TO THE SATISFACTION OF THE ARCHITECT AND OWNER. REFER TO ARCHITECTURAL DRAWINGS FOR EXISTING BUILDING CONSTRUCTION THAT IS TO REMAIN AND, THEREFORE, SUBJECT TO PATCHING, REPAIRING, AND REFINISHING.	32. BEFORE STARTING ANY SYSTEM INSTALLING CONTRACTOR SHALL CONTACT EQUIPMENT MANUFACTURER TO VERIFY THAT EACH SYSTEM EQUIPMENT OR SYSTEM HAS BEEN CHECKED FOR PROPER LUBRICATION, DRIVE ROTATION, BELT TENSION, CONTROL SEQUENCE OR OTHER CONDITIONS WHICH MAY CAUSE DAMAGE TO THE EQUIPMENT OR SYSTEM.
10. CONTRACTOR SHALL BE RESPONSIBLE FOR THEIR OWN CLEAN-UP DURING CONSTRUCTION. IF CONTRACTOR FAILS TO PROVIDE SUCH CLEAN-UP, THE ARCHITECT/ENGINEER WILL DIRECT ANOTHER CONTRACTOR TO PERFORM THE CLEAN-UP AND THE NEGLIGENT CONTRACTOR SHALL PAY THE ASSOCIATED BACK-CHARGES AS DEEMED APPROPRIATE BY THE ARCHITECT/ENGINEER.	33. MECHANICAL CONTRACTOR TO FURNISH AND INSTALL ALL GAS REGULATORS ON THE LEAVING SIDE OF THE GAS METER. EACH GAS REGULATORS WILL HAVE A VENT PIPE WHICH TERMINATES 18" ABOVE THE ROOF WITH A GOOSENECK.
11. CONTRACTOR SHALL INSTALL ALL AUXILIARY SUPPORTING STEEL AS REQUIRED FOR THE SUPPORTING OF THEIR PIPING, DUCTWORK, CONDUIT, TANKS, EQUIPMENT, ETC. ALL SUPPORTING STEEL FOR ITEMS ABOVE A SUSPENDED CEILING SHALL BE FROM BUILDING STRUCTURAL MEMBERS ONLY.	34. MECHANICAL CONTRACTOR SHALL INSTALL ALL WELLS IN PIPING FOR MOUNTING OF BUILDING AUTOMATION SYSTEM CONTROLS AND MECHANICAL CONTRACTOR'S THERMOMETERS AND GAUGES. MECHANICAL CONTRACTOR WILL COORDINATE THE EXACT LOCATION OF BUILDING AUTOMATION SYSTEM CONTRACTOR'S CONTROLS WITH HIM PRIOR TO INSTALLING WELLS.
12. ALL PIPING SHALL BE SUSPENDED WITH CLEVIS AND/OR TRAPEZE PIPE HANGERS. INSULATED PIPING SHALL REST ON STEEL OR WOOD (CHILLED WATER PIPING) PIPE COVERING PROTECTION SADDLES OR SHEET METAL INSULATION SHIELDS AS CALLED FOR IN THE SPECIFICATIONS AND/OR DETAILED ON THE DRAWINGS.	35. MECHANICAL CONTRACTOR SHALL RUN INSULATED DRAIN PIPES FROM ALL HEATING/COOLING FAN COIL UNITS AND UNIT VENTILATORS. SEE DRAWINGS AND DETAILS FOR LOCATION OF TERMINATION OF DRAIN PIPING. ALL CONDENSATE DRAIN PIPES MUST BE PITCHED AWAY FROM THE DRAIN PAN. ALL CONDENSATE DRAIN PIPES WILL BE INSULATED FROM UNIT TO TERMINATION POINT.
13. ALL WATER SUPPLY AND RETURN PIPING SHALL BE INSULATED, INCLUDING ALL PIPING ABOVE CEILINGS, INSIDE EQUIPMENT, CABINETS, PIPE CHASES AND IN WALLS. SEE SPECIFICATIONS FOR TYPE AND THICKNESS OF INSULATION.	36. MECHANICAL CONTRACTOR SHALL INSTALL DRAIN PIPING FROM ALL BUILT-UP AIR HANDLING UNITS. DRAIN PIPE WILL BE RUN FROM UNIT DRAIN PAN TO NEAREST FLOOR DRAIN.
14. ALL HOT WATER SUPPLY/RETURNS PIPING SHALL BE INSTALLED TO COMPENSATE FOR EXPANSION OF THE PIPE BY INSTALLING PIPE ANCHORS, GUIDES, EXPANSION JOINTS OR LOOPS AND PIPE OFFSETS AS REQUIRED BY FIELD CONDITIONS OR AS SHOWN ON THE DRAWINGS.	37. THE MECHANICAL CONTRACTOR TO PROVIDE 1/4 INCH SCALE PIPING AND DUCTWORK DRAWINGS FOR COORDINATION WITH OTHER TRADES. DRAWINGS TO INDICATE DIMENSIONS AND ELEVATIONS OF ALL PIPING AND DUCTWORK. DRAWINGS TO ALSO INCLUDE ALL WALL/FLOOR/ROOF OPENINGS.
15. PITCH ALL SUPPLY AND RETURN WATER LINES TO DRAIN COMPLETELY THROUGH LOWER EQUIPMENT, UNIONS, OR DRAIN VALVES. INSTALL A 1/2" DRAIN VALVE WITH 3/4" HOSE THREAD OUTLET IN ALL MAIN PIPING RUNS WHICH WOULD NOT BE ABLE TO DRAIN THRU A LOWER PIECE OF EQUIPMENT. ALL DRAIN VALVES TO BE BALL VALVES.	38. MECHANICAL CONTRACTOR TO PROVIDE SCHEDULE OF CURB INSTALLATION/REMOVAL ON EXISTING ROOF AREAS TO CONTRACTOR FIVE (5) WORKING DAYS IN ADVANCE. ANY REVISIONS TO THIS SCHEDULE RESULTING IN UN-PATCHED ROOF TIE-INS AND DAMAGE TO EXISTING CONDITIONS SHALL BE REPAIRED BY MECHANICAL CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER.
16. INSTALL A MANUAL SHUT OFF COCK AND DIRT LEG ON EACH BRANCH GAS LINE CONNECTED TO GAS FIRED EQUIPMENT. ALL VENT LINES FROM EACH GAS REGULATOR SHALL BE GROUPED INTO A COMMON HEADER AND RUN UP THRU ROOF TO A TURNED DOWN ELBOW WITH GALVANIZED INSECT SCREEN OVER OPENING.	39. ALL PIPE PASSING THRU WALLS SHALL HAVE A GALVANIZED SHEET METAL OR SCHEDULE 40 STEEL PIPE SLEEVE INSTALLED AROUND THE PIPE AND PIPE INSULATION. SEE SLEEVE DETAILS THESE DRAWINGS.
17. RECESSED AND/OR SEMI-RECESSED CABINET UNIT HEATERS (CUH) SHALL BE MOUNTED A MINIMUM OF 8" ABOVE THE FLOOR AND HAVE A FOUR (4) SIDE FLANGED OVERLAP WALL GUARD FRAME.	40. INSTALL A SHEET METAL SLEEVE AROUND ANY DUCTWORK WHICH GOES THROUGH WALL CONSTRUCTION, PACK FIBERGLAS INSULATION AROUND SLEEVE AND DUCT AND CAULK WITH FIRE SEAL CAULKING.
18. ALL ROOF MOUNTED EXHAUST FANS SHALL HAVE A BUILT IN DISCONNECT SWITCH, ALUMINUM BIRD SCREEN, MOTORIZED DAMPER OR MANUAL BACKDRAFT DAMPER (REFER TO SCHEDULE) AND SHALL BE MOUNTED ON AN ALUMINUM PREFABRICATED CURB WITH SOUND INSULATION ON THE INSIDE OF THE CURB. CURB HEIGHT SHALL BE A MINIMUM OF 18 INCHES ABOVE ROOF DECK.	41. WHEN INSTALLING EXPANSION JOINTS, CONTRACTOR SHALL INSTALL A PIPE ANCHOR AT EACH END OF RUN AND PIPE GUIDES A MINIMUM OF EVERY TWENTY-FIVE (25) FEET OR AS CALLED FOR ON THE DRAWINGS. MOUNT THE FIRST PIPE GUIDE LOCATED ON EACH SIDE OF THE EXPANSION JOINT A MINIMUM OF FOUR (4) PIPE DIAMETERS FROM THE EXPANSION JOINT.
19. ALL DUCTWORK SIZES SHOWN ON THE DRAWINGS ARE INSIDE DIMENSIONS. WHERE DUCT LINING IS CALLED FOR CONTRACTOR SHALL INCREASE THE SIZE OF THE DUCT TO MAINTAIN THE MINIMUM INSIDE DIMENSIONS CALLED FOR ON THE DRAWINGS.	42. THE DRAWINGS, SCHEDULES AND SPECIFICATIONS HAVE BEEN PREPARED USING ONE MANUFACTURER FOR EACH PIECE OF EQUIPMENT AS THE BASIS FOR DIMENSIONAL DESIGN. IF THE CONTRACTOR PURCHASES EQUIPMENT LISTED AS A SPECIFIED ACCEPTABLE MANUFACTURER BUT IS NOT THE SCHEDULED MANUFACTURER USED FOR THE BASE DESIGN, THE CONTRACTOR SHALL BE RESPONSIBLE FOR CHECKING ALL THE DIMENSIONS OF THE EQUIPMENT TO VERIFY THAT IT WILL FIT IN THE SPACE SHOWN ON THE DRAWINGS. MINOR DEVIATIONS IN DIMENSIONS WILL BE PERMITTED, PROVIDED THE RATINGS MEET THOSE SHOWN ON THE DRAWINGS AND EQUIPMENT WILL PHYSICALLY FIT INTO THE SPACE ALLOCATED WITH SUITABLE ACCESS AROUND EQUIPMENT FOR OPERATION AND MAINTENANCE ON THE EQUIPMENT.
20. MECHANICAL CONTRACTOR SHALL COORDINATE ALL SERVICE POINTS ON VAN BOXES WITH THE INSTALLATION OF NEW WORK IN THIS PROJECT AND NEW BUILDING CHARACTERISTICS TO MAKE SURE ACCESSIBILITY IS MAINTAINED.	43. CONTRACTOR AND/OR MANUFACTURER SHALL VERIFY THAT THE CHARACTERISTICS OF THE EQUIPMENT HE SUBMITS FOR REVIEW MEETS THE CAPACITY AND DUTY SPECIFIED.
21. ALL DUCTWORK CONNECTIONS TO AIR MOVING EQUIPMENT SHALL BE MADE WITH FLEXIBLE DUCT CONNECTIONS ON THE INLET AND DISCHARGE OF ALL SUPPLY, RETURN AND EXHAUST FANS (EXCEPT ROOF MOUNTED EXHAUST FANS).	44. WHEN EQUIPMENT IS SUBMITTED FOR REVIEW AND DOES NOT MEET THE PHYSICAL SIZE OR ARRANGEMENT OF THAT SCHEDULED AND SPECIFIED, CONTRACTOR SHALL PAY FOR ALL ALTERATIONS REQUIRED TO ACCOMMODATE SUCH EQUIPMENT AT NO ADDITIONAL COST TO OWNER. CONTRACTOR WILL ALSO PAY ALL COSTS FOR ADDITIONAL WORK REQUIRED BY OTHER CONTRACTORS, OWNER, ARCHITECT OR ENGINEER TO MAKE CHANGES WHICH WOULD ALLOW THE EQUIPMENT TO FIT IN THE SPACE AND FUNCTION AS INTENDED.
22. ALL BUILT UP UNITS SHALL HAVE INTERNAL SPRING VIBRATION ISOLATORS. ALL SUSPENDED EXHAUST AND EXHAUST/RETURN FANS SHALL BE HUNG WITH OR SET ON SPRING VIBRATION ISOLATORS.	
23. INSTALL TURNING VANES IN ALL SQUARE DUCT ELBOWS. INSTALL MANUAL VOLUME DAMPERS IN EACH BRANCH DUCT AT CONNECTION TO MAIN DUCT AND IN EACH DUCT AFTER A BRANCH DUCT SPLIT.	

GENERAL NOTES - BAS.	
I. GENERAL	ELASTOMER BLADE EDGE SEALS AND STAINLESS STEEL OR ELASTOMER BLADE END SEALS.
THE CONTROLS CONTRACTOR SHALL BE THE CONTROLS ENGINEER FOR THIS PROJECT; RESPONSIBLE FOR DESIGN AND ENGINEERING OF ALL CONTROL SYSTEMS TO OPERATE AS DESCRIBED IN THE SEQUENCE OF OPERATION, TO CONFORM WITH THE GOVERNING BUILDING CODES AND OPERATE IN A MANNER CONSISTENT WITH KNOWN GOOD CONTROLS ENGINEERING PRACTICE.	ALL CONTROL DAMPERS SHALL SPRING RETURN TO A FAIL SAFE POSITION FOR FREEZE PREVENTION BY SPRING RETURN. FACE AND BYPASS DAMPER SHALL FAIL OPEN, OUTDOOR AIR DAMPERS SHALL FAIL CLOSED, EXHAUST AIR DAMPERS SHALL FAIL CLOSED, AND RETURN AIR DAMPER SHALL FAIL OPEN.
THE CONTROLS CONTRACTOR/ENGINEER SHALL IDENTIFY ANY POTENTIAL CONDITIONS THAT COULD BE CONTRISTED TO DEVATE FROM GOOD CONTROLS ENGINEERING PRACTICE PRIOR TO BIDDING AND INCLUDE ALL ENGINEERING AND INSTALLATION WORK REQUIRED TO MAKE ALL HVAC SYSTEMS COMPLETE AND OPERATIONAL, IN CONFORMANCE WITH GOOD CONTROLS ENGINEERING PRACTICE, PRIOR TO SUBMITTING HIS BID.	V. THERMOSTAT
THE BAS CONTRACTOR SHALL PROVIDE ALL CONTROL COMPONENTS, WIRING, INTERLOCKS, ELECTRICAL POWER AND ALL OTHER DEVICES REQUIRED TO MAKE ALL HVAC EQUIPMENT INSTALLED UNDER THIS PROJECT COMPLETE AND FULLY OPERATIONAL PER THE SEQUENCE OF OPERATION AND AS REQUIRED FOR SAFE AND ACCURATE CONTROL.	THE BAS CONTRACTOR SHALL PROVIDE THERMOSTATS FOR ALL CONTROLLED EQUIPMENT TO OPERATE AS DESCRIBED IN THE SEQUENCE OF OPERATION AND/OR PER MANUFACTURER'S REQUIREMENTS AND KNOWN STANDARDS OF GOOD CONTROL PRACTICE. INCLUDE ALL THERMOSTATS AS REQUIRED FOR EQUIPMENT TO BE COMPLETE AND FULLY OPERATIONAL WHETHER SHOWN SPECIFICALLY ON THE PLANS OR NOT.
THE BAS CONTRACTOR SHALL PROVIDE ALL CONTROL VALVES AND ACTUATORS TO THE MECHANICAL CONTRACTOR FOR INSTALLATION. THE BAS CONTRACTOR SHALL DIRECT THE MECHANICAL CONTRACTOR AS TO THE PROPER LOCATION AND ORIENTATION OF ALL DEVICES TO ACHIEVE A PROPER AND CORRECT CONTROL SEQUENCE.	ALL TEMPERATURE SENSORS IN DUCTWORK, AIR HANDLING UNITS AND PLENUMS SHALL BE OF AVERAGING TYPE. PROPERLY SUPPORT AVERAGING ELEMENT (MINIMUM TWENTY FEET LENGTH) ACROSS A REPRESENTATIVE AREA TO ACHIEVE A TRUE AVERAGE READING. SUPPORT USING HEAVY CABLE AND/OR HALF INCH CONDUIT WITH NYLON WIRE TIES.
THE BAS CONTRACTOR SHALL INCLUDE ADEQUATE TIME IN HIS BID FOR COMPLETE COMMISSIONING OF THE MECHANICAL SYSTEMS, ON SITE IN COORDINATION WITH THE MECHANICAL CONTRACTOR AND OTHER TRADES AS REQUIRED TO MAKE ALL EQUIPMENT COMPLETE AND FULLY OPERATIONAL.	BUILDING/SPACE STATIC PRESSURE SENSORS SHALL BE INSTALLED IN THE CEILING IN A MAIN BUILDING CORRIDOR OPEN TO THE MAIN ENTRANCE OF THE BUILDING. STATIC PRESSURE SENSING TIP SHALL HAVE COVER PLATE TO MATCH CEILING AND AN EMBOSSED LABEL STATING "PRESSURE CONTROL SENSOR -- DO NOT PAINT".
IN THE EVENT THAT ANY PART OF THE MECHANICAL DRAWINGS, SPECIFICATIONS OR NOTES CONFLICT WITH ANY OTHER, THE MOST STRINGENT REQUIREMENT SHALL APPLY, PROVIDING THE GREATEST SAFETY AND/OR AT THE HIGHEST COST OF THE CONFLICTING OPTIONS.	THE CONTROLS CONTRACTOR/ENGINEER SHALL SELECT ALL PRESSURE AND TEMPERATURE SENSORS WITH AN APPROPRIATE SPAN AND RANGE FOR THE APPLICATION.
II. ELECTRICAL	ALL OUTDOOR AIR SENSORS SHALL BE INSTALLED WITH SUN SHIELD AND IN A LOCATION WHERE THEY CANNOT BE WASHED BY EXHAUST AIR OR OTHER SOURCES OF FALSE READINGS.
THE BAS CONTRACTOR SHALL PROVIDE ALL ELECTRICAL POWER AND CONTROL WIRING, CONDUIT, JUNCTION BOXES, RACEWAY, TRANSFORMERS, RELAYS AND ALL OTHER ELECTRICAL APPURTENANCES REQUIRED FOR A COMPLETE AND FULLY OPERATIONAL CONTROL SYSTEM. THIS INCLUDES ALL POWER WIRING FROM SPARE CIRCUIT BREAKERS PROVIDED IN BUILDING EMERGENCY AND NORMAL POWER PANELS FOR POWERING OF CONTROLS AND CONTROL PANELS AND ALL OTHER CONTROL SYSTEM COMPONENTS. ALL HVAC EQUIPMENT BEING POWERED FROM THE EMERGENCY GENERATOR, IE AIR HANDLING UNITS, EXHAUST FANS, PUMPS, BOILERS, ETC. (EVERY EQUIPMENT WITH ELECTRICAL DRAWINGS) ARE TO HAVE THEIR CONTROLS POWERED FROM EMERGENCY POWER PANELS. ALL VAN BOX CONTROLLERS ARE TO BE POWERED FROM EMERGENCY POWER PANELS. THE UNIT VENTILATOR CONTROLLERS FOR CLASSROOM 107, CLASSROOM 120, CLASSROOM 125, CLASSROOM 220 AND OFFICE 211D ARE TO ALSO HAVE EMERGENCY POWER TO THEIR CONTROLLERS TO ALLOW THE OWNER TO MONITOR THESE SPACES DURING POWER OUTAGES.	MAKE FALSE READINGS. BAS CONTRACTOR/ENGINEER SHALL REVIEW THE PLANS AND IDENTIFY ANY SUCH POTENTIAL CAUSES FOR FALSE READINGS AND NOTIFY THE ENGINEER IN WRITING THAT THESE SHOULD BE RELOCATED PRIOR TO ROUGH IN AND CONTROLS INSTALLATION. THE BAS CONTROLS CONTRACTOR SHALL RELOCATE ANY SENSORS INSTALLED IN IMPROPER LOCATIONS AND GIVING FALSE READINGS AT HIS OWN EXPENSE. CONDITIONS TO BE AWARE OF SHALL INCLUDE BUT ARE NOT LIMITED TO LOCATIONS OF THERMOSTATS BEHIND DOORS, OUTDOOR AIR SENSORS NEAR EXHAUST OPENINGS, STATIC PRESSURE SENSORS IN TURBULENT LOCATIONS, THERMOSTATS INSTALLED ADJACENT TO HEAT SOURCES SUCH AS COFFEE POTS, COMPUTERS, VENDING MACHINES AND OTHER APPLIANCES, ETC.
ALL ELECTRICAL WORK SHALL BE IN CONFORMANCE WITH THE CURRENT NATIONAL ELECTRICAL CODE AND APPLICABLE STATE AND LOCAL AMENDMENTS.	VI. SAFETY DEVICES
THE BAS CONTRACTOR SHALL PROVIDE AND INSTALL ALL HARDWIRED INTERLOCKS BETWEEN STARTERS AS REQUIRED TO ACHIEVE THE SEQUENCE OF OPERATION AND PROPER SYSTEM CONTROLS. PROVIDE RELAYS AS REQUIRED FOR AUTOMATIC START/STOP OF ALL SINGLE PHASE EXHAUST FANS AND INTERLOCK OF AUTOMATIC DAMPERS.	THE BAS CONTRACTOR/ENGINEER SHALL FURNISH AND INSTALL MANUAL RESET SAFETY DEVICES FOR ANY AND ALL CONDITIONS THAT COULD DAMAGE THE EQUIPMENT AND/OR REPRESENT A THREAT TO HUMAN SAFETY. ALL WATER COILS SHALL BE PROTECTED BY AN AVERAGING ELEMENT FREEZE-STAT WITH A NON-ADJUSTABLE 40°F SET POINT, MANUAL RESET, AND HARDWIRED INTERLOCK TO SHUT DOWN THE ASSOCIATED FAN ANY TIME THE TEMPERATURE ACROSS ANY 12" LENGTH OF THE AVERAGING ELEMENT FALLS BELOW 40°F. FREEZE STATS SHALL BE INSTALLED DOWNSTREAM OF ALL WATER COILS.
III. CONTROL VALVES	BOILERS SHALL BE INTERLOCKED TO ONLY FIRE AFTER PROOF OF WATER FLOW AND THAT THE COMBUSTION AIR DAMPER IS FULL OPEN.
ALL CONTROL VALVES SHALL SPRING RETURN TO A FAIL SAFE POSITION. ALL HEATING CONTROL VALVES SHALL FAIL OPEN BY SPRING RETURN TO HEATING AND ALL COOLING CONTROL VALVES SHALL FAIL CLOSED BY SPRING RETURN.	WATER CHILLERS SHALL BE INTERLOCKED SUCH THAT THEY CAN NOT START UNTIL FLOW IS PROVED THROUGH CHILLED WATER BUNDLERS.
ALL CONTROL VALVES USED FOR POSITIVE SHUT-OFF ISOLATION, SUCH AS HOT/CHILLED WATER ISOLATION OR CHANGEOVER IN A TWO-PIPE SYSTEM, SHALL BE QUARTER TURN TYPE BUTTERFLY OR BALL VALVES RATED FOR 300 PSI, BUBBLE TIGHT SHUT-OFF SERVICE.	INSTALL A FLOAT SWITCH IN THE EVAPORATOR DRAIN PAN OF ALL AIR HANDLING EQUIPMENT INSTALLED ABOVE CEILINGS IN OCCUPIED SPACES TO SHUT DOWN THE ASSOCIATED SYSTEM.
THE CONTROLS CONTRACTOR/ENGINEER SHALL SIZE ALL MODULATING TEMPERATURE CONTROL VALVES WITH A CV AND PRESSURE DROP SUCH THAT THERE IS LINEAR CONTROL OF WATER FLOW THROUGHOUT THE ENTIRE STROKE OF THE VALVE. COORDINATE WITH THE MECHANICAL CONTRACTOR TO PROVIDE REDUCERS AS REQUIRED FOR MODULATING VALVES THAT ARE NOT LINE SIZE.	THE BAS CONTRACTOR SHALL WIRE ALL SUPPLY FANS OVER 2000 CFM TO THE LOCAL DUCT SMOKE DETECTOR TO SHUT DOWN THE SUPPLY FAN ON SMOKE ALARM.
IV. AUTOMATIC CONTROL DAMPERS	VII. PUMP CONTROL
ALL CONTROL DAMPERS SHALL BE EXTRUDED ALUMINUM, LOW LEAKAGE AIR FOIL BLADE TYPE WITH	THE BAS CONTRACTOR SHALL WIRE HOT WATER COIL CIRCULATING PUMPS TO START AND RUN CONTINUOUSLY ANY TIME THE OUTDOOR AIR TEMPERATURE IS BELOW 40°F. (D4.)

THE ARCHITECT WILL NOT HAVE CONTROL, OVER, CHARGE OF, OR RESPONSIBILITY FOR THE CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES OR PROCEDURES, OR FOR THE SAFETY PRECAUTIONS AND PROGRAMS IN CONNECTION WITH THE WORK, SINCE THESE ARE SOLELY THE CONTRACTOR'S RIGHTS AND RESPONSIBILITIES.

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KENNEDY MIDDLE SCHOOL

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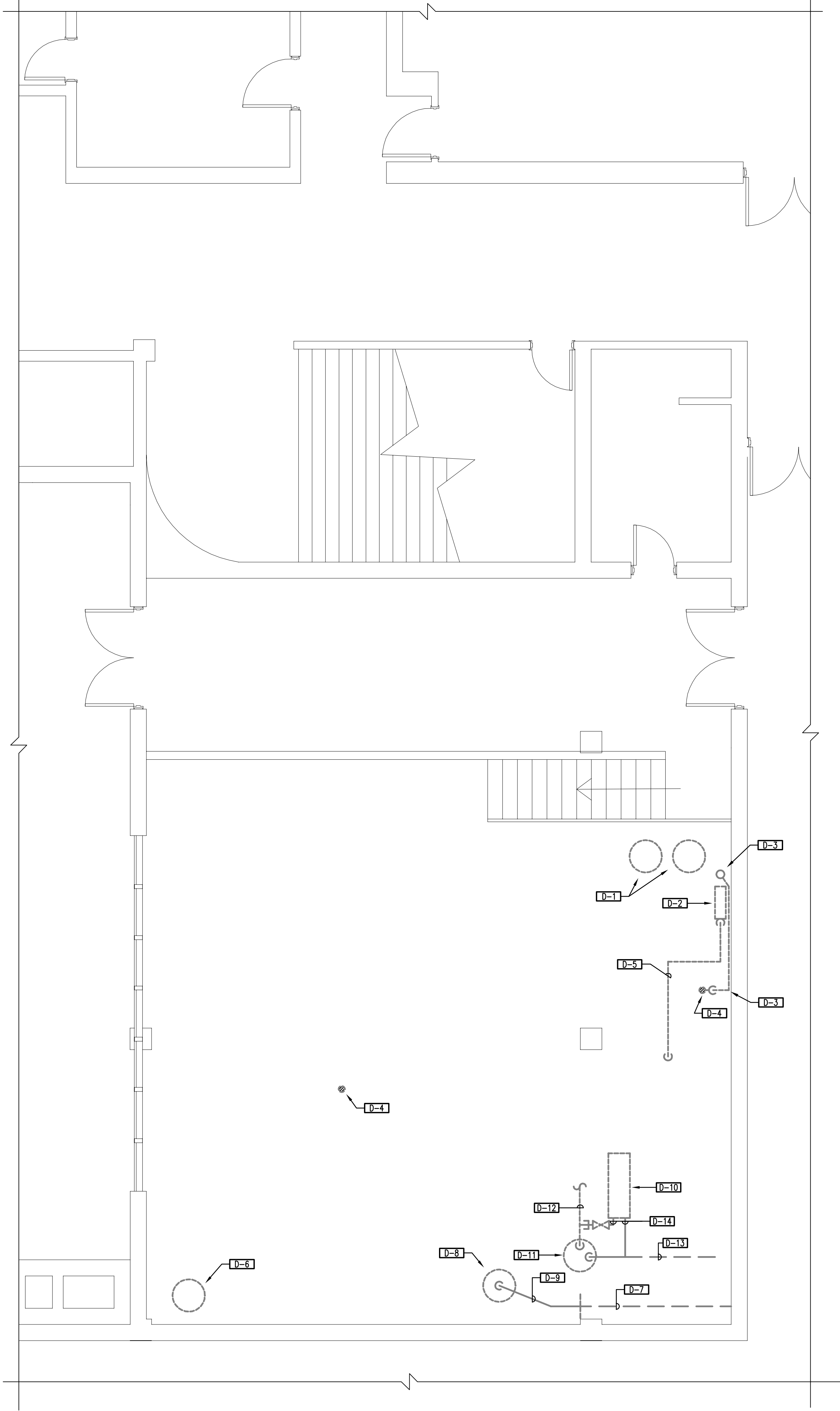
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BOILER AND ELECTRICAL UPGRADES FOR:

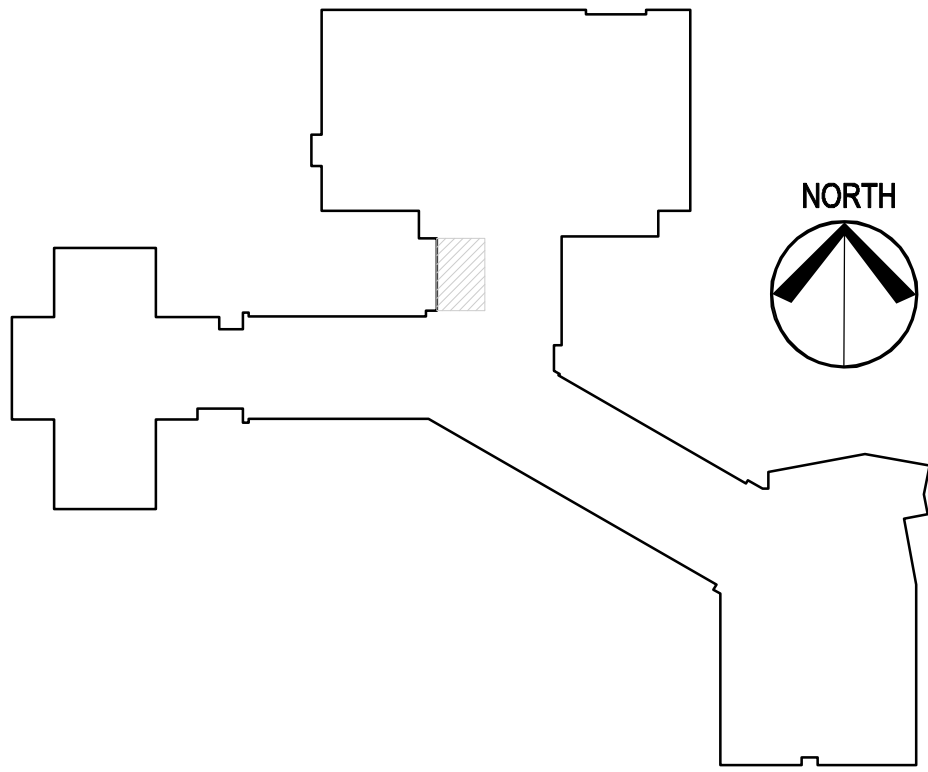
KENNEDY MIDDLE SCHOOL

ROCKFORD, ILLINOIS

DEMOLITION KEYED NOTES	
D-1	EXISTING WATER SOFTENER TO REMAIN AND ALL WATER PIPING.
D-2	EXISTING BACK FLOW PREVENTER (BFP) TO REMAIN.
D-3	REMOVE PVC WASTE TO FLOOR DRAIN.
D-4	REMOVE FTO COVER AND FILL WITH CONCRETE FLUSH WITH FLOOR. PIPING UNDER FLOOR TO BE ABANDONED.
D-5	REMOVE 1 1/2" CW PIPING, VALVES, SUPPORTS FROM OUTLET OF BFP TO INLET OF BOILER FEED WATER TANK.
D-6	REMOVE COVER OF BASIN, BLOCK UNDER GROUND OPENINGS, FILL WITH SAND AND GRAVEL AND POUR 8" CONCRETE TOP FLUSH WITH FLOOR. PROVIDE 6X6 MESH TOP & BOTTOM AND DOWEL AT FOUR QUADRANTS INTO EXISTING FLOOR.
D-7	EXISTING 8" SANITARY LINE TO REMAIN.
D-8	REMOVE EXISTING SANITARY EJECTOR COVER, BASIN AND PUMP. CUT FLOOR BACK FOR INSTALLATION OF NEW SANITARY EJECTOR BASIN AND PUMP.
D-9	REMOVE PUMPED DISCHARGE PIPING AND CONNECTION TO SANITARY MAIN. CAP MAIN.
D-10	REMOVE EXISTING DOMESTIC STEAM TO HOT WATER HEAT EXCHANGER.
D-11	REMOVE DOMESTIC HOT WATER BURKAY HEATER, VALVING AND VENT. CONTRACTOR TO TURN OVER BURKAY HEATER TO OWNER IN GOOD CONDITION.
D-12	EXISTING 2" CW FEED TO REMAIN FOR NEW INSTALLATION CONNECTION.
D-13	EXISTING 2" HW FEED TO REMAIN FOR NEW INSTALLATION CONNECTION.
D-14	REMOVE CW/HW PIPING TO AND FROM HEAT EXCHANGER AND BURKAY HEATER.



1 PARTIAL LOWER LEVEL PLAN - PLUMBING  
 1/4" = 1'-0"



THE ARCHITECT WILL NOT HAVE CONTROL, OVER, CHARGE OF, OR RESPONSIBILITY FOR, THE CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES OR PROCEDURES, OR FOR THE SAFETY PRECAUTIONS AND PROGRAMS IN CONNECTION WITH THE WORK SINCE THESE ARE SOLELY THE CONTRACTOR'S RIGHTS AND RESPONSIBILITIES.

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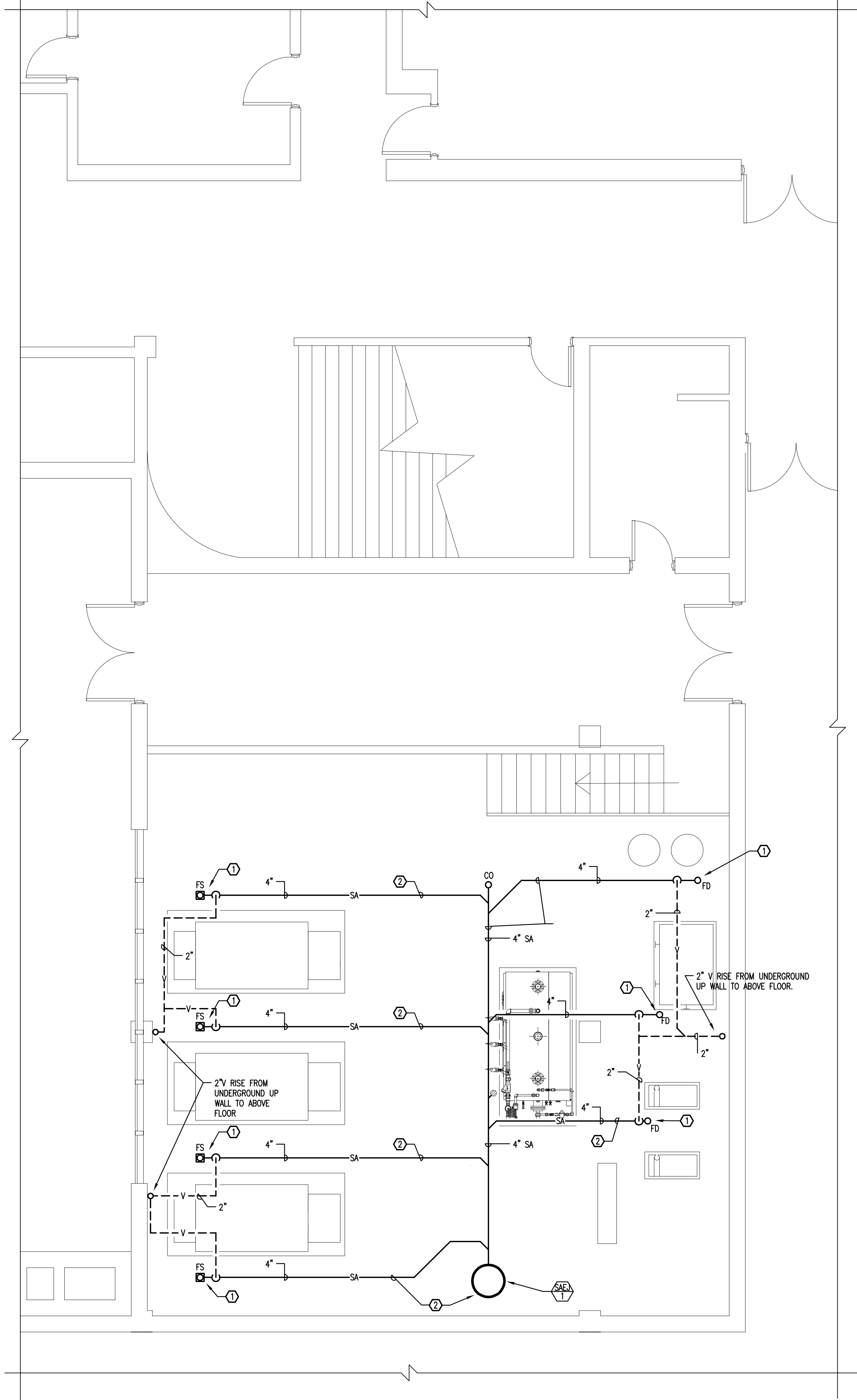
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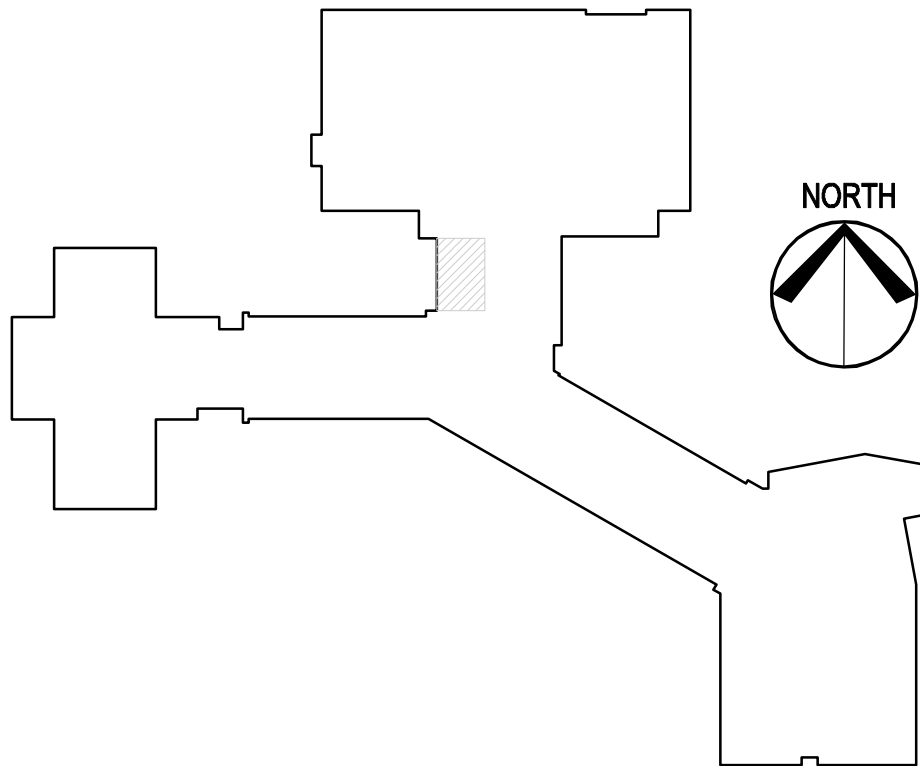
BOILER AND ELECTRICAL UPGRADES FOR:  
**KENNEDY MIDDLE SCHOOL**  
 ROCKFORD, ILLINOIS

BOILER AND ELECTRICAL UPGRADES FOR:  
**KENNEDY MIDDLE SCHOOL**  
 ROCKFORD, ILLINOIS

- GENERAL NOTES**
  - CONTRACTOR TO SAWCUT ALL FLOORS FOR INSTALLATION OF NEW FS, FD AND UNDER FLOOR SANITARY PIPING. REPLACE FLOORING TO MATCH FLUSH WITH EXISTING FLOOR.
- KEYED NOTES**
  - COORDINATE EXACT LOCATION OF FD'S AND FS'S WITH MECHANICAL EQUIPMENT LAYOUT AND MECHANICAL CONTRACTOR.
  - SAW CUT BOILER ROOM FLOOR TO INSTALL NEW UNDERFLOOR PIPING. SEE FLOOR PATCHING DETAIL.



1 NEW PARTIAL LOWER LEVEL PLAN - PLUMBING SANITARY  
 1/4"=1'-0"




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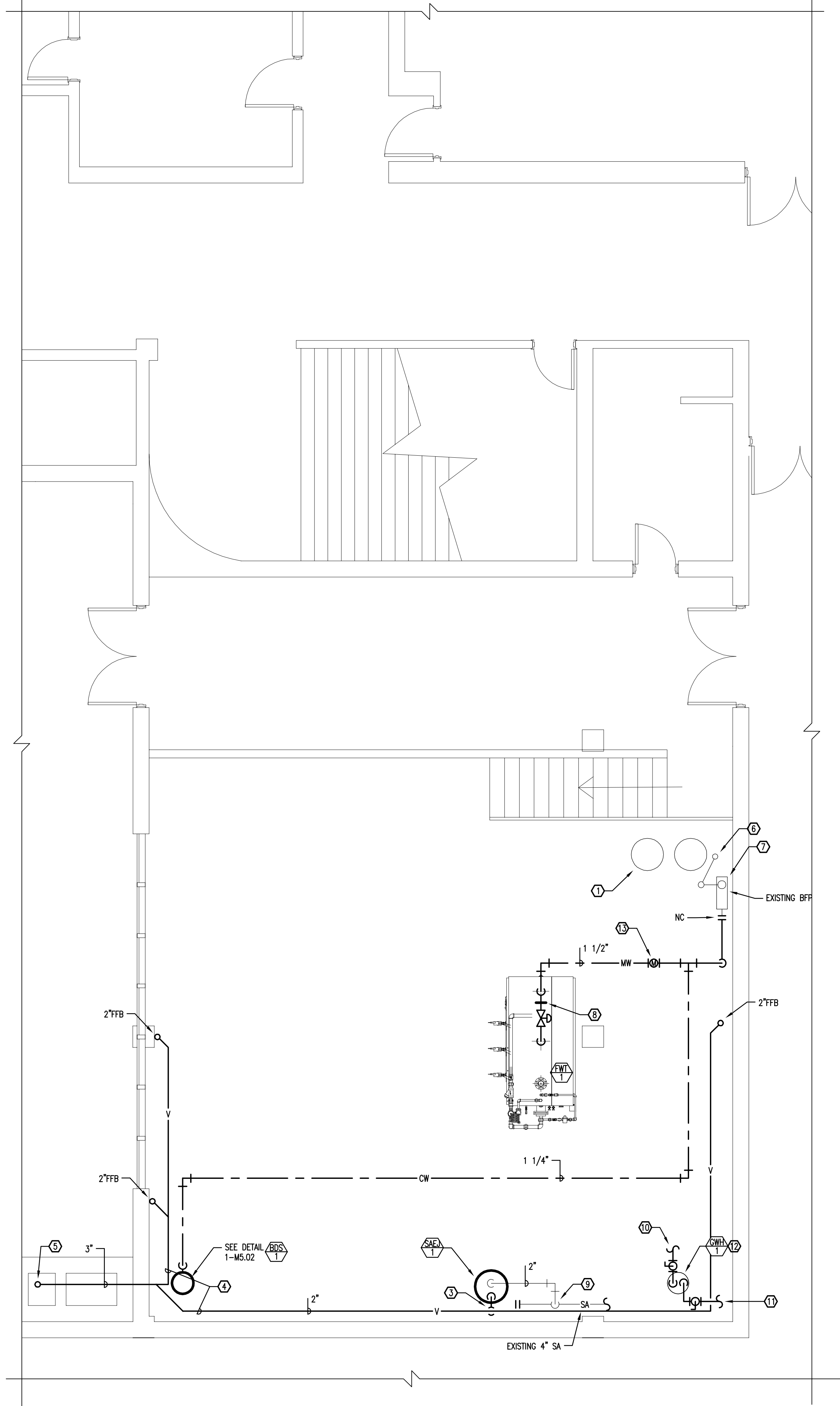
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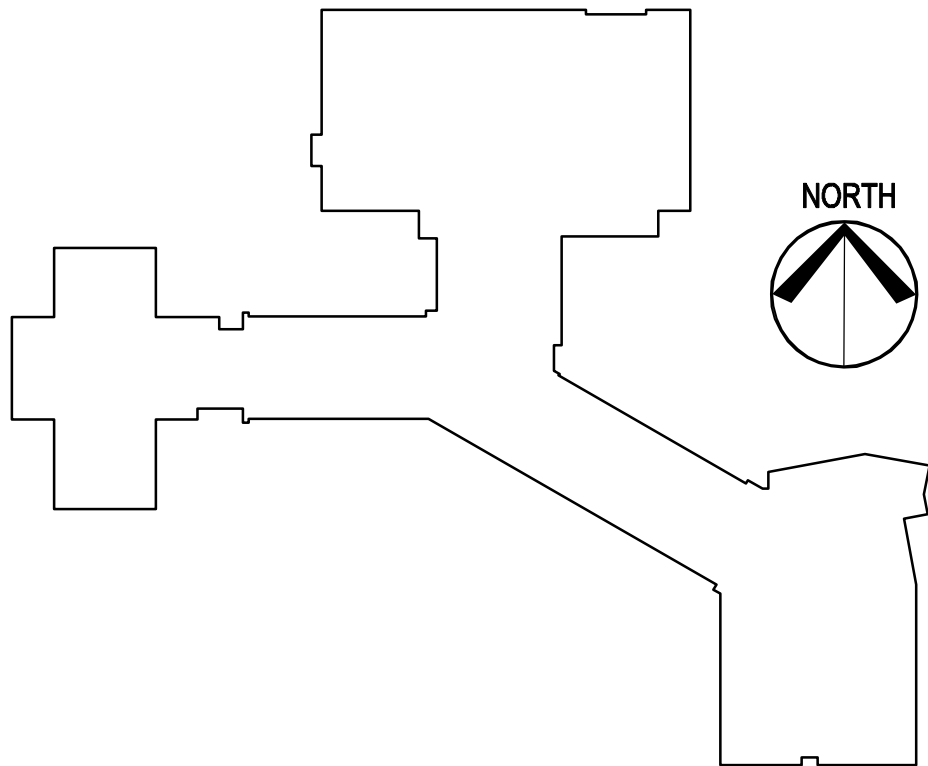
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SHEET NUMBER	

P1.00

KEYED NOTES	
1	EXISTING WATER SOFTENER.
2	VENT LINE TIGHT TO STRUCTURE.
3	2" VENT OFF SEAJ-1 TO STRUCTURE.
4	HEIGHT OF VENT TO BE DETERMINED BY BOTTOM OF BOILER BREECHING ENTERING STACK.
5	VENT TO RUN UNDER BREECHING AND PAST STACK LINER INTO 2ND STACK CAVITY AND RISE UP THRU STACK CAP, 3"V, 4"VTR.
6	FURNISH AND INSTALL NEW 2" DRAIN WITH 3" OPENSITE FOR SOFTENER BACK WASH PIPE, PIPE TO NEW FLOOR DRAIN.
7	FURNISH AND INSTALL NEW 2" DRAIN WITH 3" OPEN SITE FOR BFP, PIPE TO NEW FLOOR DRAIN.
8	TIE 1 1/2" MAKE UP WATER LINE INTO FEED WATER MAKE UP CONNECTION.
9	TIE PUMPED DISCHARGE PIPE FROM  INTO EXISTING 4" SANITARY LINE.
10	TIE NEW 1 1/2" CW INTO EXISTING CW THAT FEED OLD WATER HEATER.
11	TIE NEW 1 1/2" HW INTO EXISTING HW LEAVING BOILER ROOM TO STORAGE TANK.
12	COORDINATE EXACT LOCATION OF GWH WITH MECHANICAL EQUIPMENT.
13	INSTALL PULSE TYPE WATER METER FURNISHED BY MECHANICAL CONTRACTOR.



1 NEW PARTIAL PLAN - BOILER ROOM - PLUMBING  
 1/4"=1'-0"



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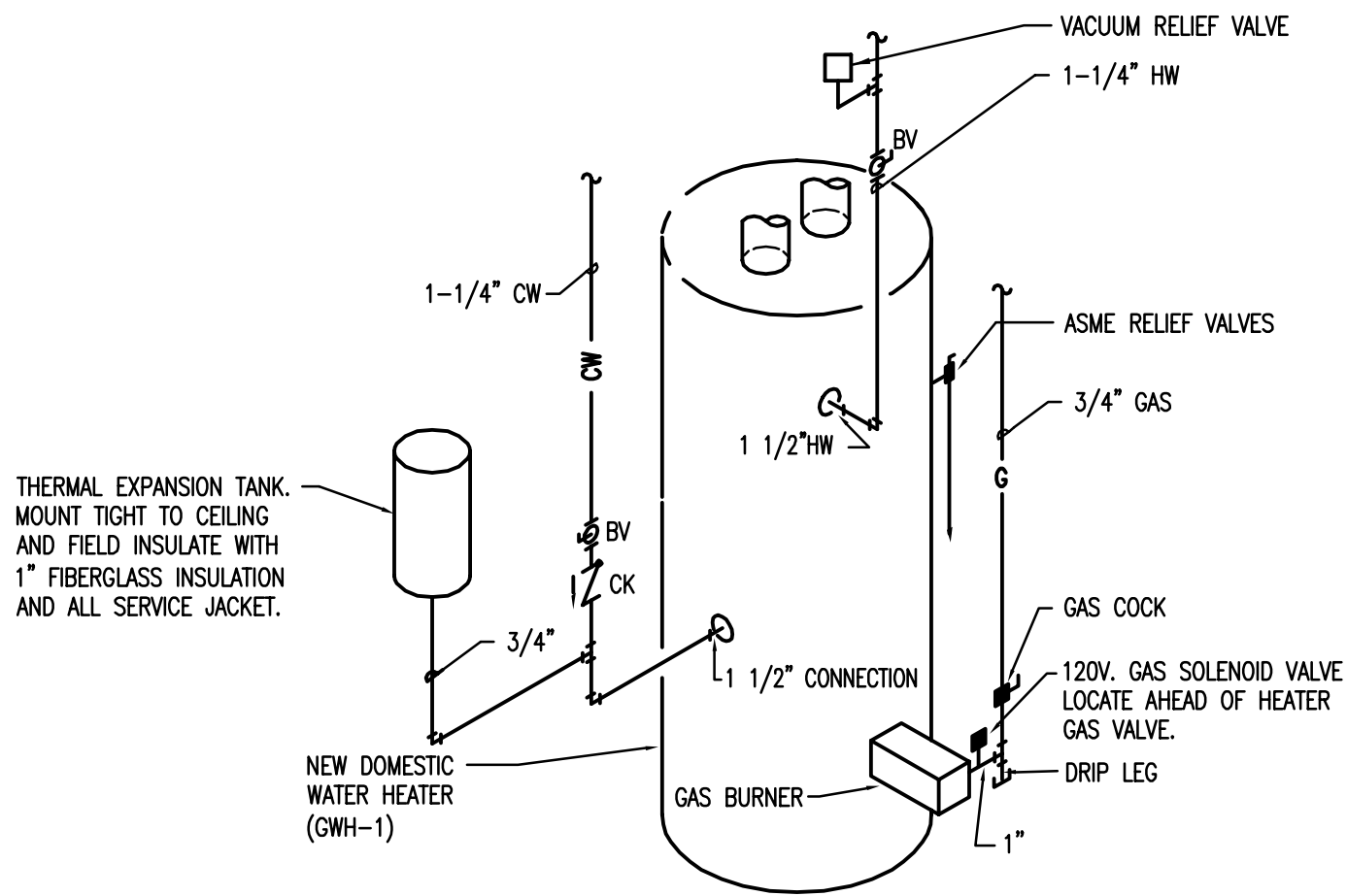
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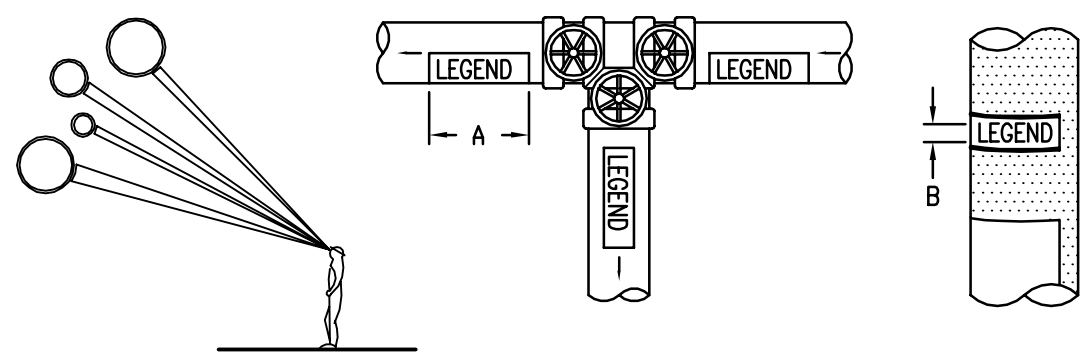
P2.01

BOILER AND ELECTRICAL UPGRADES FOR:  
 KENNEDY MIDDLE SCHOOL  
 ROCKFORD, ILLINOIS





1  
P4.00  
NO SCALE  
DOMESTIC HOT WATER HEATER PIPING DIAGRAM

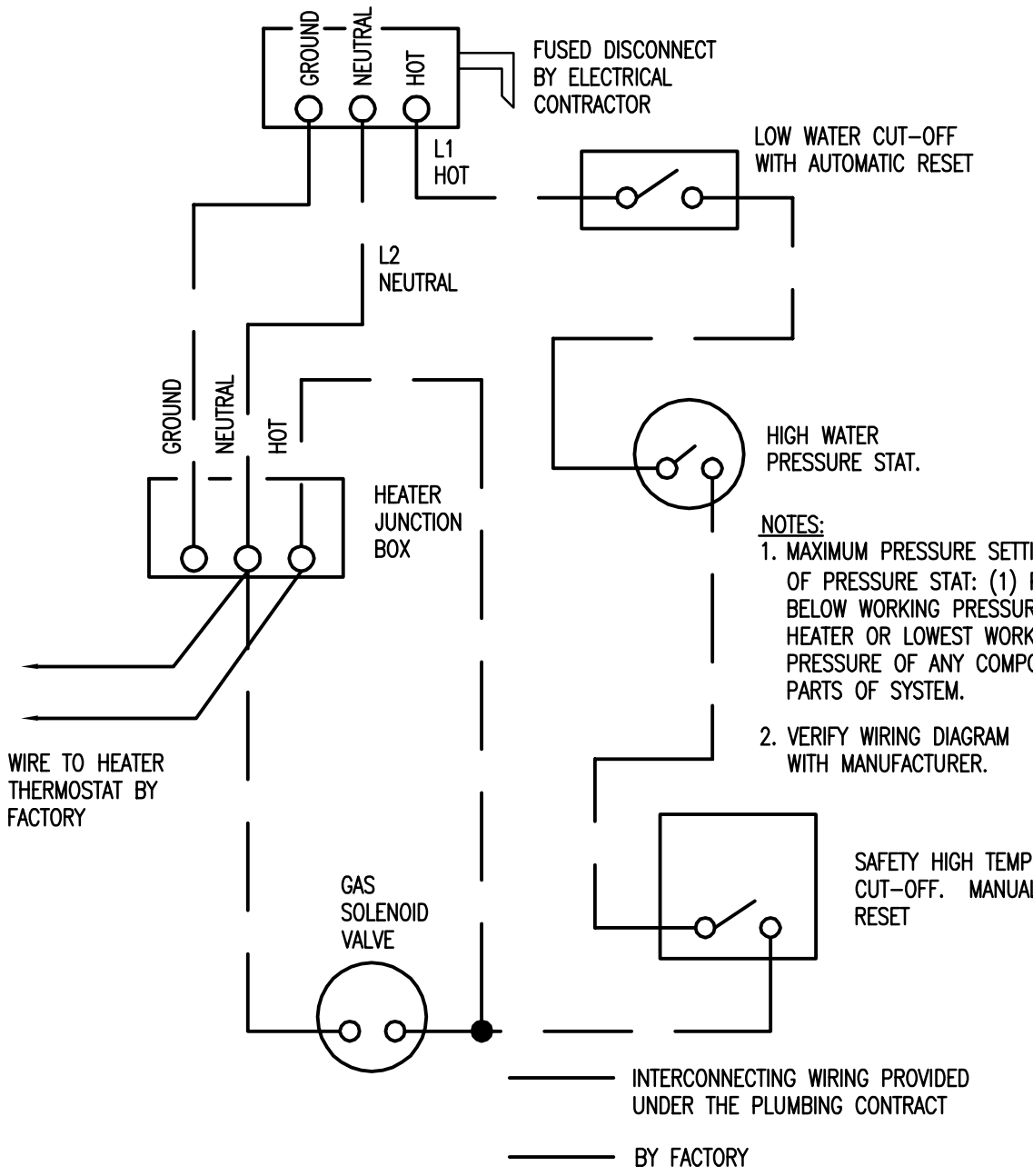


NOTE: IDENTIFICATION MARKERS OR STRIPS TO BE PLACED ON ALL EXPOSED COVERED AND UNCOVERED PIPES AT 50'-0" INTERVALS AND AT ALL VALVES AND BRANCHES AND ON BOTH SIDES OF WALLS WHERE PIPES PASS THROUGH SAME. ARROWS OF SAME COLOR AS IDENTIFICATION MARKERS SHALL ALSO BE PLACED ON PIPES POINTING AWAY FROM MARKER INDICATING DIRECTION OF FLOW.

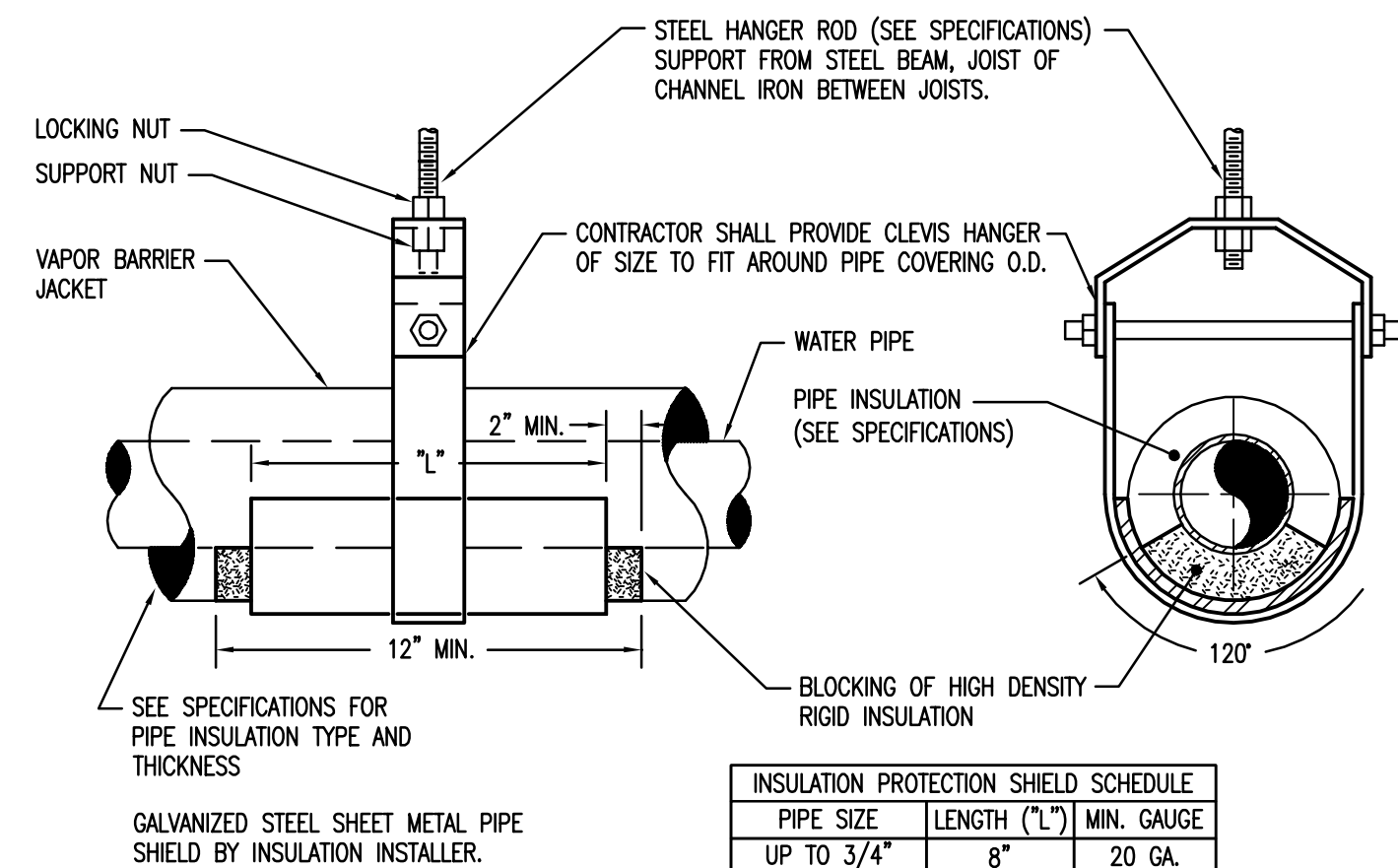
SIZE OF LEGEND LETTERS		
OUTSIDE DIAMETER OF PIPE OR COVERING	LENGTH OF COLOR FIELD A	SIZE OF LETTERS B
3/4" TO 1-1/4"	8"	1/2"
1-1/2" TO 2"	8"	3/4"
2-1/2" TO 6"	12"	1-1/4"
6" TO 10"	24"	2-1/2"
OVER 10"	32"	3-1/2"

SERVICE	BACKGROUND OR COLOR BAND	IDENTIFICATION MARKER
CITY WATER	GREEN	WHITE ON GREEN
DOMESTIC COLD WATER	GREEN	WHITE ON GREEN
DOMESTIC HOT WATER	YELLOW	BLACK ON YELLOW
FIRE PROTECTION (SPRINKLER)	RED	WHITE ON RED
NATURAL GAS	YELLOW	BLACK ON YELLOW
SANITARY DRAIN	GREEN	WHITE ON GREEN
STORM WATER	GREEN	WHITE ON GREEN

2  
P4.00  
NO SCALE  
TYPICAL PIPE IDENTIFICATION MARKERS

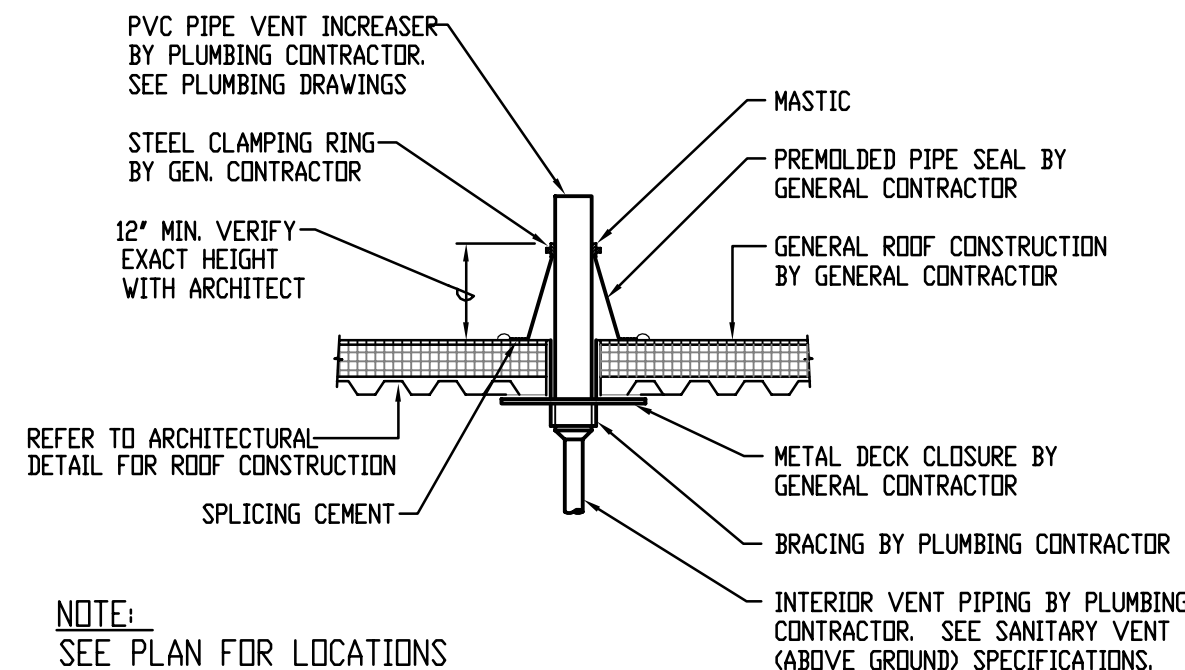


3  
P4.00  
NO SCALE  
ILLINOIS SCHOOL CODE WIRING FOR GAS FIRED TANK TYPE WATER HEATERS



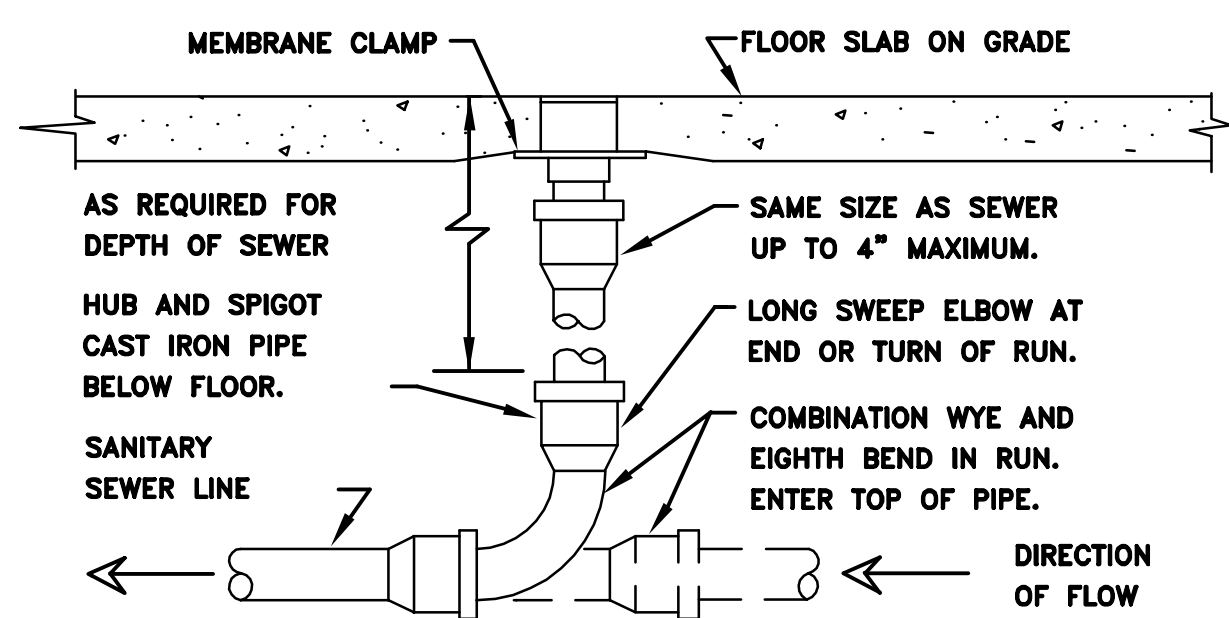
PIPE SIZE	LENGTH (L) MIN. GAUGE	INSULATION PROTECTION SCHEDULE
UP TO 3/4"	8"	20 GA.
1" TO 2"	12"	18 GA.
2-1/2" TO 4"	12"	16 GA.
5" TO 6"	18"	16 GA.
8" AND UP	24"	14 GA.

4  
P4.00  
NO SCALE  
PIPE COVERING PROTECTION SHIELDS AND CLEVIS HANGER DETAIL

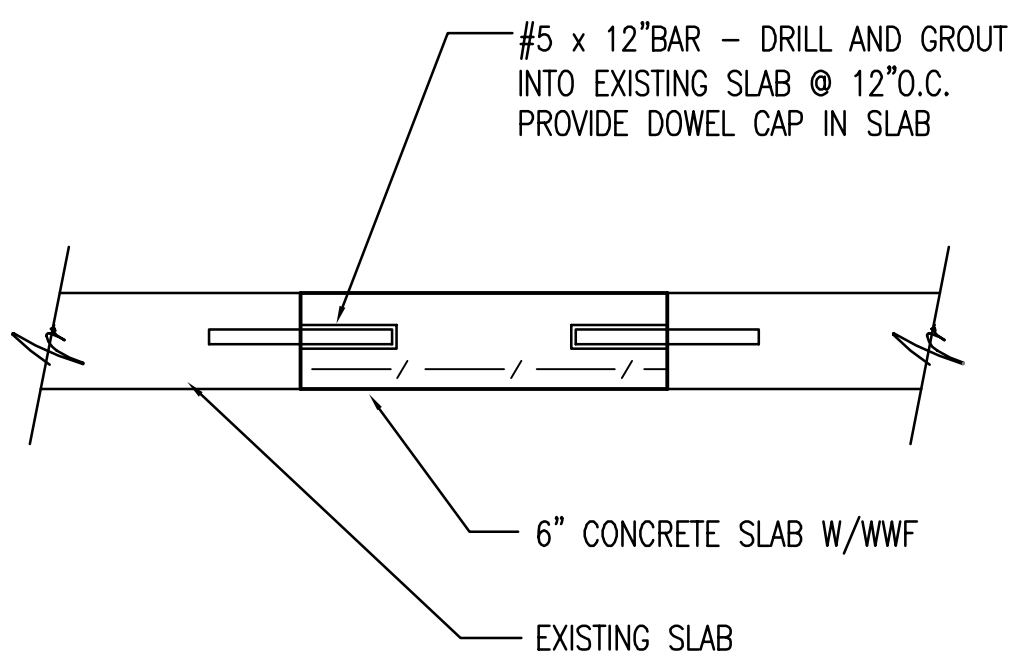


NOTE: SEE PLAN FOR LOCATIONS REFER TO ARCHITECTURAL DRAWINGS FOR ROOFING INFORMATION.

5  
P4.00  
NO SCALE  
PLUMBING VENT THROUGH ROOF (VTR) DETAIL



6  
P4.00  
NO SCALE  
FLOOR CLEAN OUT DETAIL



7  
P4.00  
NO SCALE  
SLAB PATCHING DETAIL

### GAS WATER HEATER (GWH) SCHEDULE

EQUIP. TAG	MANUFACTURER	MODEL	BTU INPUT	RECOVERY CAPACITY	TANK CAPACITY GAL.	THERMAL EFFICIENCY	VENT	ELECTRICAL REQUIREMENTS	NOTES
1	A.O. SMITH	BTH-400M	399,000	675 GPH @ 70F ΔT	119	98%	4" IN-OUT	15AMP (MAX.) 120V, 60 HZ, 1 PHASE	1,2,3,4,5, 6,7,8,10

- NOTES:
- ALL CAPACITIES LISTED ARE MINIMUM REQUIREMENTS.
  - CONTRACTOR TO SUBMIT MODIFIED PIPING DIAGRAMS IN THE EVENT THAT ONE OF THE OTHER MANUFACTURERS LISTED IN THE SPECIFICATIONS ARE UTILIZED IN LIEU OF MANUFACTURER LISTED ABOVE.
  - CONTRACTOR TO PROVIDE INTERCONNECTING WIRING FOR HEATERS AS SHOWN ON WIRING DIAGRAMS, IN ACCORDANCE WITH DIVISION-16 SPECIFICATIONS.
  - CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING AND COMPENSATING OTHER TRADES FOR INCREASED ELECTRICAL REQUIREMENTS WHICH MAY OCCUR FROM UTILIZING OTHER ACCEPTABLE EQUIPMENT.
  - ALL UNITS SHALL BE MANUFACTURED FOR A MINIMUM 150 PSIG WORKING PRESSURE.
  - PIPE T & P DOWN TO FLOOR.
  - CONCENTRIC VENT KIT.
  - NO SUBSTITUTIONS.
  - CONDENSATE NEUTRALIZATION KIT
  - STATE, RHEEM, BRADFORD WHITE OR OWNER APPROVED. OTHER MANUFACTURERS.

### EJECTOR PUMP SCHEDULE

EQUIPMENT TAG	LOCATION	GPM @ FT. HD	MINIMUM SOLIDS SIZE	PUMP DISCHARGE	BASIN SIZE	MOTOR CHARACTERISTICS	AMPS (FLA)	MANUFACTURER AND MODEL NUMBER	NOTES
1	BOILER ROOM	52 @ 10	5/8"	1 1/2" SIMPEX	30"DIA x 36" DEEP (TYPE B)	1/2 H.P., 1750 RPM, 120 V, 1 PHASE, CONTROLS TYPE-B	9.5	METROPOLITAN IND. MODEL OSP-50	①③④⑥⑦

- EJECTOR PUMPS SCHEDULE NOTES:**
- FLOAT OPERATING LEVELS ARE MEASURED FROM BASIN RIM TO ACTUATING LEVEL. VERIFY LEVEL ELEVATIONS AND INLET ELEVATIONS WITH FIELD CONDITIONS PRIOR TO ORDERING BASINS.
  - PROVIDE WITH EXTRA CONTACTS FOR REMOTE ANNUNCIATION OF HIGH WATER ALARM.
  - PROVIDE TYPE-B PERFORATED STEEL COVER WITH PUMP DISCHARGE FLANGE.
  - PROVIDE COVER CUP FLANGE ON BASIN FOR FLUSH WITH FLOOR MOUNTING OF COVER. PROVIDE CONCRETE ANCHOR FLANGE 5" BELOW COVER FLANGE.
  - PROVIDE TYPE-A SOLID STEEL COVER WITH INSPECTION OPENINGS, FLANGED CONNECTIONS AND PUMP ACCESS COVER PLATES. (REFER TO VALVE BOX AND BASIN SPECIFICATIONS)
  - PROVIDE CONCRETE ANCHOR FLANGES 5" BELOW COVER FLANGE AND AT BOTTOM.
  - PROVIDE LINE SIZED BALL/GATE AND CHECK VALVES ON DISCHARGE AND CONNECT TO PUMP DISCHARGE.
  - PROVIDE WITH FIBERGLASS SETTLING BASIN OF SAME SIZE.
  - PROVIDE MODIFIED CONTROL PANEL THAT INCORPORATES DUAL VARIABLE FREQUENCY DRIVE SYSTEM AND SUBMERSIBLE LEVEL TRANSMITTER WITH BACKUP FLOAT SWITCHES.
- EJECTOR PUMPS CONTROL SCHEDULE NOTES:**
- TYPE-A: DUPLEX CONTROL PANEL AS SPECIFIED IN SECTION 15450 FOR SUBMERSIBLE PUMPS. (SEE NOTE 2 ABOVE)
- TYPE-B: MERCURY FLOAT SWITCH (SIMPLEX CONTROL) WITH PIGGYBACK MOLDED/GROUNDED PLUG AND REQUIRED LENGTH OF ASSOCIATED CORD.