PROJECT MANUAL

Rebid For
Gymnasium Boiler Replacement

for

Buhl Jt. School District #412

April 2025

Architects:

HSA ARCHITECTS
270 N. 27th St., Suite 200
Boise, ID 83702

Owner:

Buhl Jt. School District #412
920 Main Street
Buhl, ID 83316

HSA #: 24.118

PROJECT MANUAL

Gymnasium Boiler Replacement

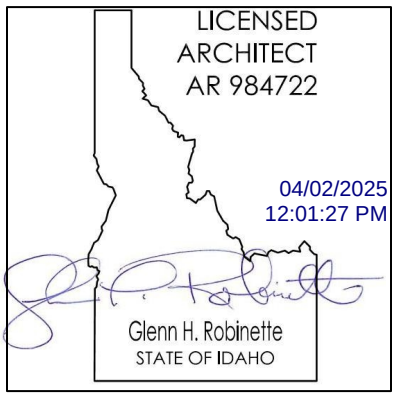
for

Buhl Jt. School District #412

DATE: April 2025

Architect
Hutchison- Smith Architects
270 N. 27th Street, Suite 200
Boise, Idaho 83702
Glenn Robinette

Mechanical Engineer
Nielson Engineering, Inc.
156 N 12th Ave.
Pocatello, Idaho 83201
Gordon Nielson



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Advertisement for Bids
REBID Gymnasium Boiler Replacement
Buhl School District

Buhl Joint School District #412 hereby announces that sealed bids will be received at the office of the Buhl School District, 920 Main Street, Buhl, ID 83316 for **REBID Gymnasium Boiler Replacement.** Proposals will be received until **Tuesday, April 22, 2025; 3:00 p.m.** local prevailing time.

Contractors wishing to submit bids must hold a current Public Works Contractors License, commensurate with the size of contract and must submit a bid bond in the amount of 5% of the total bid amount, including any add alternates with the bid. The successful bidder will be required to furnish the additional necessary bond(s) for the faithful performance of the contract and supply the necessary insurance documents as prescribed in the contract documents. All properly submitted proposals will be received and opened and publicly read at the above hour and date.

Licensed contractors may obtain Drawings and Project Manual from the following:

HSA Architects
270 N. 27th St., Ste. 200
Boise, ID 83702
(208) 338-1212
https://www.hsaarchitects.com/projects-currently-bidding/

AGC
1649 W. Shoreline Dr., Ste 100
Boise, ID 83702
(208) 344-2531
www.nwagcplanroom.com

A pre-bid conference will be held at the project site on **Tuesday, April 15, 2025 at 10:00 a.m.** Attendance is recommended.

Bids received after the bid opening time will not be considered and no bidder may withdraw his bid after the bid opening time or before the award of contract unless said award is delayed for a period exceeding sixty (60) days.

The Board of Trustees of Joint School District No.412 reserves the right to disregard all non-conforming, non-responsive or conditional bids, to waive any minor irregularities, to reject all bids, or to accept the bid or bids it deems best.

Buhl Jt. School District No.412
Advertise 2 x Saturday (4/5 & 4/21/2025)

INSTRUCTIONS TO BIDDERS

AIA Document A701, Instruction to Bidders, is hereby included by reference and shall be a part of the Contract Documents. Copies of AIA Document A701 are available for review at the offices of the Architect. Copies of the document may be purchased from the American Institute of Architects, or its local distributor.

SUPPLEMENTARY INSTRUCTIONS TO BIDDERS

The following supplements modify, change, delete from or add to the Instructions to Bidders, AIA Document A701 - 1997. Where any Article of the Instructions to Bidders is modified or any Paragraph, Subparagraph or Clause thereof is modified or deleted by the Supplementary Instructions to Bidders, the unaltered provisions of that Article, Paragraph, Subparagraph or Clause shall remain in effect.

ARTICLE 2 BIDDERS REPRESENTATIONS

2.1.2 Delete the period and add a comma and add the following;

and with a full understanding of the schedule, phasing, existing site constraints, material availability, or any other construction-related issues that may affect the project.

ARTICLE 3 BIDDING DOCUMENTS

3.1.3 Add after….in any other manner, including the telephone or e-mail.

3.2.3 Add after….in any other manner, including the telephone or e-mail.

ARTICLE 4 BIDDING PROCEDURES

Add to or supplement Article 4, the following:

4.1.1 A photocopy of the form bound in the Project Manual or a modified form included in an addendum is acceptable.

4.1.7 A corporate seal is not required if not required by the state of incorporation.

Delete the last sentence.

4.2.1.1 To be considered, proposals must be accompanied by an acceptable security, in an amount not less than five (5) percent of the total amount of the bid including add alternates. The security may be in the form of a bond, or a certified or cashier's check.

4.2.1.2 A successful bidder who fails to sign the contract for the work or furnish the required bonds within 10 days following the receipt of notice of intent to award a contract, shall forfeit the security. The owner may then award the contract to the next lowest bidder.

4.2.3.1 The specified time for retainage of the bid security is 60 days after the opening of bids, so long as the bidder has not been notified of the acceptance of the bid.

4.3.1.1 The mailing envelope containing the bid shall be addressed as follows:

Gymnasium Boiler Replacement
Buhl Jt. School District #412
920 Main Street
Buhl, ID 83316

Bidders are required to use Sealed Bid Label included in the Specification. Cut off and apply to front of Bid envelope.

ARTICLE 5 CONSIDERATION OF BIDS

5.4 PUBLIC WORKS CONTRACTORS LICENSE

This Public Works project is not financed in whole or in part by Federal Aid Funds. Bid Proposals will be accepted from those contractors only (prime contractors, subcontractors, and/or specialty contractors) who, prior to the bid opening, hold current licenses as public works contractors in the State of Idaho.

5.5 IDAHO DOMICILED CONTRACTORS

BIDDER DOMICILED OUTSIDE OF IDAHO - Any contract for purchase of any materials, supplies, services or equipment, the bidder domiciled outside the boundaries of Idaho shall be required, in order to be successful, to submit a bid the same percent less than the lowest bid submitted by the responsible bidder domiciled in Idaho as would be required for such an Idaho domiciled bidder to succeed over the bidder domiciled outside Idaho on a like contract being let in his domiciliary state.

ARTICLE 6 POST BID INFORMATION

Delete paragraph 6.2

ARTICLE 7 PERFORMANCE BOND AND PAYMENT BOND

Modify and add to Article 7, the following:

In paragraph 7.2.1, in the first sentence, delete the word “three” and insert “five” days following the word “date”, delete the rest of the paragraph and insert the following: “the contractor receives a faxed copy of the contract and the Notice of Acceptance.”

7.2.2.1 Performance bond and labor and material payment bond are required for this project; each in an amount of not less than 100% of the contract amount, and by a surety company authorized to do business in Idaho.

END OF SUPPLEMENTARY INSTRUCTIONS TO BIDDERS

BID PROPOSAL

TO: Buhl School District Office
920 Main Street
Buhl, ID 83316

Persons:

The Bidder, in compliance with your invitation for bids for **REBID Gymnasium Boiler Replacement** of the Buhl School District , having examined the plans and specifications with related documents and the site of the proposed work, and being familiar with all the conditions surrounding the construction of the proposed project including the availability of materials and labor, hereby proposes to furnish all labor, materials and supplies, and to provide the service and insurance in accordance with the Contract Documents, within the time set forth therein, and the prices stated below. These prices are to cover all expenses incurred in performing the work required under the Contract Documents, of which this proposal is part, including the Building Permit fee. Plan Review fee is paid for by the Owner.

Bidder hereby agrees to commence work under this contract upon receipt of Notice to Proceed and to substantially complete the work by **9/1/2025.** Bidder further agrees to pay as liquidated damages, the sum of $350.00 for each consecutive calendar day thereafter as hereinafter provided in Paragraph 9.11.1 of the Supplementary Conditions.

Bidder acknowledges receipt of the Addendum No(s)._____.

BASE BID: Bidder agrees to perform all of this work as described in the specifications and shown on the plans for the sum of:

_____ Dollars ($ _____)

(*Amount shall be shown in both words and figures. In case of discrepancy, the amount shown in words will govern.*)

Alternate No. 1: Aldrich Horizontal Firetube Boiler
Add or deduct to the sum of _____ Dollars ($ _____)

Bidder understands that the Owner reserves the right to reject any or all Bids and to waive any informalities in the bidding. The Bidder agrees that this Bid shall be good and may not be withdrawn for a period of 30 calendar days after the scheduled closing time for receiving bids.

Upon receipt of written notice of the acceptance of this Bid, Bidder will execute the formal contract attached within ten (10) days and deliver a Surety Bond or Bonds as required by Article 7 of the Instructions to Bidders, including paragraph 7.1.1 and 7.2.1 of the Supplementary Instructions to Bidders.

The bid security attached in the amount of 5% of the bid amount is to become the property of the Owner in the event the contract and bond are not executed within the time above set forth, as liquidated damages for the delay and additional expense to the Owner caused thereby.

Heating, Ventilating & Air Conditioning (PWCL Category 15700-HVAC)

(Name)_____

(Address)_____

Idaho Public Works Contractors License No._____

Idaho HVAC Contractors License No. _____

FAILURE TO NAME A PROPERLY LICENSED SUBCONTRACTOR IN EACH OF THE ABOVE CATEGORIES WILL RENDER THE BID UNRESPONSIVE AND VOID.

Should the listing of subcontractors change due to selection of alternates or other similar circumstances, attach explanation.

The Undersigned notifies that he is of this date duly licensed as an Idaho Public Works Contractor, per Idaho Code 67-2310, and further that he possess Idaho Public Works Contractor's License No. _____, and is domiciled in the State of _____.

Dated this _____ day of _____ 20___.

Respectfully submitted,

By:_____
(Company)

_____
(Business Address)

_____

_____
(Seal - if bid is by a Corporation) (Authorized Signature)

_____
(Title)

_____
(Telephone Number)

_____
(Email Address**)**

END OF BID PROPOSAL

BUHL SCHOOL DISTRICT
BIDDER CERTIFICATION FORM

1. **Debarment and Suspension** – In submitting this bid proposal, we hereby certify that we have not been suspended or in any way excluded from Federal procurement actions by any Federal Agency. We fully understand that if information contrary to this certification subsequently becomes available, such evidence may be grounds for non-award or nullification of a bid contract.

2. **Anti-Collusion** – In submitting this bid proposal, we hereby certify this proposal was developed and prepared without any collusion with any competing bidder or District employee. The content of this proposal has not been disclosed to any competing or potentially competing bidder prior to the proposal due date and time. Furthermore, no action to persuade any person, partnership or corporation to submit or withhold a bid has been made.

3. **Anti-Lobbying** – In submitting this bid proposal, we hereby certify that to the best of our knowledge and belief, no appropriated Federal funds have been paid or will be paid by or on behalf of person associated with this proposal to any person for influencing or attempting to influence and officer or employee of any agency, a member of Congress, an office 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 of any cooperative agreement and the extension, continuation, renewal, amendment or modification of any Federal contract, grant, loan or cooperative agreement.

4. **Equal Employment Opportunity Certification -**In submitting this bid proposal, you certify to the District that your company and the subcontractors you hire will comply with the requirements of 41 CFR 60-1.4(a), 60-300.5(a) and 60-741.5(a). These regulations prohibit discrimination against qualified individuals based on their status as protected veterans or individuals with disabilities and prohibit discrimination against all individuals based on their race, color, religion, sex, sexual orientation, gender identity or national origin. Moreover, these regulations require that covered prime contractors and subcontractors take affirmative action to employ and advance in employment individuals without regard to race, color, religion, sex, sexual orientation, gender identity, national origin, protected veteran status or disability.

5. **National Sexual Offender Registry** – In submitting this bid proposal, you certify to the District that your company will prohibit any persons in your employ who are registered or required to register under the Idaho Sex Offender Registration Act from participation in company business with the District if such participation would require them to be present on school property. You certify further that you have cross checked such employees against the National Sex Offender Registry found at the following web link: http://www.nsopr.gov/

6. **Israeli Related Boycotts** – In submitting this bid proposal and in accordance with Idaho Code 67-2346, the Contractor certifies it does not, and will not for the life of this contract, boycott goods or services from Israel or from territories under the control of Israel.

7. **Ownership or Operation by China** – In submitting this bid and in accordance with Idaho Code 67-2359, the Contractor certifies it is not currently owned or operated by the government of China and will not for the duration of the Contract be owned or operated by the government of China.

8. **Disclosure of Abortion Related Matters -**In submitting this bid and in accordance with Idaho Code 18-8701-18-8711, The Contractor certifies the following: that Contractor will disclose, unless Contractor is within one of the exemptions provided in the Act, if it or an affiliate is or becomes, during the term of the Contract, an abortion provider and if it will use District facilities or public funds to provide, perform, participate in, promote or induce, assist, counsel in favor, refer or train a person for an abortion related activity. Please refer to the Act for definitions of the terms used in this section.

Signed: _____

Name & Title: _____

Company: _____

Address: _____

City & State: _____

Date: _____

SEALED BID LABEL – CUT OUT

Cut this label along with outer border and affix it to your sealed bid envelope to identify it as a "SEALED BID". Affix a return address label for your company to your bid envelope.

Deliver the envelope to the address on the label before the date of bid opening shown on the label.

SEALED BID----DO NOT OPEN

REBID Gymnasium Boiler Replacement
Buhl School District

DUE: April 22, 2025; 3:00 p.m.

Deliver to:

Buhl School District Office
920 Main St.
Buhl, ID 83316

CONTRACTORS AFFIDAVIT OF PAYMENT OF DEBTS AND CLAIMS

AIA Document G706, Contractors Affidavit of Payment of Debts and Claims is hereby included by reference and shall be a part of the Contract Documents. Copies of AIA Document G706 are available for review at the offices of the Architect. Copies of the document may be purchased from the American Institute of Architects or its local distributor.

IDAHO
State Tax Commission

Form WH-5
Public Works Contract Report

Contractors awarded Idaho public works contracts must submit this form to the Tax Commission within 30 days of receiving the award. (Idaho Code sections 54-1904A and 63-3624(g)).

Contract awarded by (public body and address)

Contract awarded to (contractor's name and address)

State of incorporation	Federal Employer Identification Number (EIN)	Date qualified to do business in Idaho
Business operates as ☐ Sole Proprietorship ☐ Partnership ☐ Corporation ☐ LLC		Public works contractor license number
Sole proprietor's Social Security number	Idaho sellers permit number	Idaho withholding tax permit number
Awarding agency project number		Amount of contract $

Description and location of work to be performed

Project Dates

Scheduled project start date: _____ Completion date: _____

If the following information isn't available at this time, please enter date it will be: _____

All Subcontractors

Name			Federal EIN
Address			Public works contractor license number
City	State	ZIP Code	Amount of subcontract $
Description of work			

Name			Federal EIN
Address			Public works contractor license number
City	State	ZIP Code	Amount of subcontract $
Description of work			

Name			Federal EIN
Address			Public works contractor number
City	State	ZIP Code	Amount of subcontract $
Description of work			

Name			Federal EIN
Address			Public works contractor license number
City	State	ZIP Code	Amount of subcontract $
Description of work			

All Subcontractors (*continued*)

Name			Federal EIN
Address			Public works contractor license number
City	State	ZIP Code	Amount of subcontract $
Description of work			

Name			Federal EIN
Address			Public works contractor license number
City	State	ZIP Code	Amount of subcontract $
Description of work			

Name			Federal EIN
Address			Public works contractor license number
City	State	ZIP Code	Amount of subcontract $
Description of work			

Suppliers

List your major suppliers of materials, equipment, and supplies. Include items removed from inventory and items provided to you by the government agency for use in this project.

Name		Federal EIN	Total value $
Address		Materials and equipment purchased and used	
City, State, ZIP Code	Phone number	Please select how sales or use tax was paid. ☐ Tax paid to supplier ☐ Tax paid to state* ☐ No tax was paid	

Name		Federal EIN	Total value $
Address		Materials and equipment purchased and used	
City, State, ZIP Code	Phone number	Please select how sales or use tax was paid. ☐ Tax paid to supplier ☐ Tax paid to state* ☐ No tax was paid	

Name		Federal EIN	Total value $
Address		Materials and equipment purchased and used	
City, State, ZIP Code	Phone number	Please select how sales or use tax was paid. ☐ Tax paid to supplier ☐ Tax paid to state* ☐ No tax was paid	

*If you're reporting any untaxed materials, equipment, or supplies as "items subject to use tax" on your Idaho return, provide the period when you did or will report it: ____________________

If you paid tax to a state other than Idaho, write the name state next to "total value" boxes, above. For any tax due that you haven't reported yet, include payment with this form. You can make copies of this form is you need more room.

Sign Here	Authorized signature	Print name	Phone number	Date

File with the Idaho State Tax Commission, PO Box 36, Boise ID 83722-0410

For more information, call (208) 334-7618 | Fax: (208) 332-6619 | Email: **contractdesk@tax.idaho.gov**

CONSENT OF SURETY COMPANY TO FINAL PAYMENT

AIA Document G707, Consent of Surety Company to Final Payment is hereby included by reference and shall be a part of the Contract Documents. Copies of AIA Document G707 are available for review at the offices of the Architect. Copies of the document may be purchased from the American Institute of Architects or its local distributor.

AGREEMENT BETWEEN OWNER AND CONTRACTOR

AIA Document A101, 2017 Edition, Standard Form of Agreement Between Owner and Contractor will be used as the agreement for this project. Copies of AIA Document A101 are available for review at the office of the Architect. Copies of the document may be purchased from the American Institute of Architects or its local distributors.

GENERAL CONDITIONS

AIA Document A201, General Conditions of the Contract for Construction, 2017 Edition is hereby included by reference and shall be a part of the Contract Documents. Copies of AIA Document A201 are available for review at the office of the Architect.

SUPPLEMENTARY GENERAL CONDITIONS

The following supplements modify the "General Conditions of the Contract for Construction", AIA Document A201, 2017. Where a portion of the General Conditions is modified or deleted by these Supplementary Conditions, the unaltered portions of the General Conditions shall remain in effect.

ARTICLE 2 OWNER

2.1 General

Delete subparagraph 2.1.2

2.3 Information and Services Required of the Owner

Delete subparagraph 2.3.6 and substitute the following:

2.3.6 The Contractor will be furnished free of charge 5 copies of Drawings and Project Manuals. Additional sets will be furnished at the cost of reproduction, postage and handling.

ARTICLE 3 CONTRACTOR

3.7 Permits, Fees and Notices and Compliance with Laws

Add to 3.7.1 the following:

3.7.1.1 A Building Permit is required for this project. The Contractor shall obtain and pay for all licenses and permits and shall pay all fees and charges for connections to outside services and for the use of municipal or private property for storage of materials, parking, utility services, temporary obstructions, enclosures, opening and patching of streets, etc., off of the property of the Owner arising from the construction and completion of the Work. The Contractor is not responsible for and will not be required to pay impact fees, sewer capacity fees and similar forms of taxes imposed by local taxing bodies.

Modify 3.7.3 as follows:

a. Remove the phrase “knowing it to be “ from 3.7.3
b. At the end of the first sentence 3.7.3 add the phrase “unless specifically directed to do so by the Contract Documents.”
c. Add the following sentence to the end of 3.7.3: “If the Contractor is aware or suspects that work shown in the Contract Documents is or may be contrary o applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall notify the Architect immediately and prior to construction of the work in question and request information and/or clarification.”

ARTICLE 7 CHANGES IN THE WORK

7.2 Change Orders

Add to 7.2 the following:

7.2.2 Any Change Order prepared, including but not limited to those arising by reason of the parties’ mutual agreement or by mediation, shall constitute a final and full settlement of all matters relating to or affected by the change in the work, including, but not limited to, all direct, indirect and consequential costs associated with such change and any and all adjustments to the Contract Sum and Contract Time. In the event a Change Order increases the Contract Sum, the Contractor shall include the work covered by such Change Order in the Application for Payment as if such work were originally part of the Project and Contract Documents.

7.2.3 By the execution of a Change Order, the Contractor agrees and acknowledges that he has had sufficient time and opportunity to examine the change in work which is the subject of the Change Order and that he has undertaken all reasonable efforts to discover and disclose any concealed or unknown conditions which may to any extent affect the Contractor's ability to perform in accordance with the Change Order. Aside from those matters specifically set forth in the Change Order, the Owner shall not be obligated to make any adjustments to either the Contract Sum or Contract Time by reason of any conditions affecting the change in work addressed by the Change Order which could have reasonably been discovered or disclosed by the Contractor's examination.

7.3 Construction Change Directives

Add to subparagraph 7.3.5 the following:

In the second line after the word "claim" insert the following words: "in writing within forty-eight hours ".... The balance of the subparagraph remains unchanged.

In subparagraph 7.3.7, in the last sentence, delete "recorded as a" and substitute "incorporated into a future". In subparagraph 7.3.9 delete the last two sentences.

ARTICLE 8 TIME

8.1 Definitions

Add to subparagraph 8.1.1 the following:

8.1.1.1 The Contractor shall substantially complete the work as indicated in the Bid Proposal.

8.3 Delays and Extensions of Time

Add to 8.3 the following:

8.3.4 If the Contractor submits a progress report or schedule indicating, or otherwise expressing an intention to achieve completion of the Work prior to any completion date required by the Contract Documents or expiration of the Contract Time, no liability of the Owner to the Contractor for any failure of the Contractor to so complete the Work shall be created or implied.

ARTICLE 9 PAYMENTS AND COMPLETION

9.3 Applications for Payment

In subparagraph 9.3.1, in the first sentence, delete the words "At least ten days" and substitute the following:

"At least 2 days before the date of the monthly progress meeting, but not more than thirty days"

Delete subparagraph 9.3.1.1.

Add 9.3.1.3 The form of Application for Payment shall be AIA Form 706 and 707, or a pre-approved contractor's form containing the same line items. Submit one original.

Delete the last two sentences of 9.3.2 regarding payment of materials and equipment stored off site, and replace with the following: "payment for offsite storage will not be approved."

9.6 Progress Payments

Add to 9.6.1 the following:

9.6.1.1 Until conditions set forth in paragraph 9.10 are met, the Owner shall pay ninety-five percent (95%) of the amount due the Contractor on account of progress payments. If the Architect determines that the Contractor has made or is making satisfactory progress on any uncompleted portions of the work, the Owner may, at its discretion, release a portion of the retainage to the Contractor prior to the actual final completion of the conditions set forth in Paragraph 9.10.

9.6.1.2 Progress Payments shall fall due twenty-one (21) days after the Architects Certificate for Payment is received by the Owner.

Add to 9.6.2 the following:

9.6.2.1 The Contractor shall not withhold from a subcontractor or supplier more than the percentage withheld from a payment certificate for the subcontractor or suppliers portion of the work.

9.8 Substantial Completion

In subparagraph 9.8.5 delete the last two sentences.

9.10 Final Completion and Final Payment

Add to 9.10.1 the following:

9.10.1.1 The final retainage shall become due and payable to the Contractor in not more than thirty (30) days after issuance of the final Certificate for Payment by the Architect, provided that the conditions of subparagraph 9.10.2 are fully satisfied.

Add to Article 9 the following:

9.11 Liquidated Damages

9.11.1 The Owner will suffer financial loss in an amount that is difficult to quantify if the Project is not Substantially Complete on the date set forth in the Contract Documents. The Contractor (and his Surety) shall be liable for and shall pay to the Owner the sums hereinafter stipulated as fixed, agreed and liquidated damages, and not as a penalty, for each calendar day of delay until the Work is substantially completed:

Three hundred fifty DOLLARS ($ 350.00)

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

10.2 Safety of Persons and Property

Add to 10.2.4 the following:

10.2.4.1 The Contractor shall give the Owner 5 days advance written notice of his intent and receive approval prior to beginning the work.

10.3 Hazardous Materials

Add to 10.3.1 the following:

10.3.1.1 Reference to asbestos or polychlorinated biphenyl (PCB) in this Article does not negate the appropriate abatement of asbestos and PCB containing materials as specifically required by the Contract Documents.

ARTICLE 11 INSURANCE AND BONDS

11.1 Contractor's Liability Insurance

Add to 11.1.1 the following:

The insurance required by Subparagraph 11.1.1 shall be written for not less than the following limits:

1. Workers' Compensation:

(a)	State:	Statutory
(b)	Employer's Liability:	$100,000 per Accident $500,000 Disease, Policy Limit $100,000 Disease, Each Employee

2. Comprehensive or commercial general liability including premises operation; owners and contractors protective liability, products and completed operations liability, personal injury liability (including employee acts), broad form property damage liability and blanket contractual liability:

(a) For any claim for bodily injury, property damage or due to a contractual liability, limits of not less than $1 million per occurrence.

(b) For products and completed operations coverage, coverage is to be maintained for a period of two (2) years following final payment.

(c) For the hazards of explosion, collapse, and underground, commonly referred to as XCU, coverage shall be required if the exposures exist. This coverage may be provided by the subcontractor if the State and prime contractor are named as additional insureds.

(d) For personal injury liability, limits of not less than $100,000 per occurrence.

3. Business auto liability (including owned, non-owned and hired vehicles) in an amount of not less than $1 million combined single limit.

4. If the General Liability coverages are provided by a Commercial Liability policy, the:

(a) General Aggregate shall be not less than $2,000,000.

(b) Fire legal liability shall be provided in an amount not less than $50,000 per occurrence.

5. Umbrella Excess Liability:

An umbrella policy may be used in combination with other policies to provide a minimum coverage of $1,000,000.

11.1.2.2 The Owner shall be named as an additional insured on the insurance required in 11.1.2.1 items 2, 3 and 5 above and the insurance shall contain the severability of interest clause as follows:

"The insurance afforded herein applies separately to each insured against whom claim is made or suit is brought, except with respect to the limits of the company's 'liability'."

11.1.2.3 The Contractor shall require all subcontractors of any tier to provide Commercial General Liability Insurance with liability limits of not less than $1,000,000 for bodily injury and property damage, and Business Automobile Liability Insurance for all owned, non-owned and hired vehicles with liability limits of not less than $1,000,000.

Add to 11.1.3 the following:

11.1.3.1 If this insurance is written on the Comprehensive General Liability policy form, the Certificates shall be AIA Document G705, Certificate of Insurance of ACORD form 25. If this insurance is written on a Commercial General Liability policy form, ACORD form 25S will be acceptable.

11.3 Property Insurance

Delete subparagraph 11.3.1 and substitute the following:
11.3.1 The owner maintains an insurance program of property insurance supplemented by an insurance policy sufficient to cover the total insurable value of this project. This insurance program covers the interests of the State of Idaho.

Delete subparagraphs 11.3.1.1, 11.3.1.2, 11.3.1.3, 11.3.1.4 and 11.3.1.5 and substitute the following:

Add to Article 11 the following:

11.5 Indemnity

11.5.1 The Contractor shall indemnify, defend and save harmless the Owner, the Architect, and the Architect's Consultant from and against all claims, damages, costs, legal fees, expenses, actions and suits whatsoever including injury or death of others or any employee of the Contractor, subcontractors, or the sub-subcontractors, agents or employees, caused by failure to comply fully with any term or condition of the Contract, or caused by damage to or loss of use of property, directly, or indirectly, by the carrying out of the work, or caused by any matter or thing done, permitted or omitted to be done by the Contractor, his agents, subcontractors or employees and occasioned by the negligence of the Contractor, his agents, subcontractors or employees.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

12.2 Correction of Work

In subparagraph 12.2.2.1 delete the second sentence.

ARTICLE 13 MISCELLANEOUS PROVISIONS

13.1 Governing Law

In paragraph 13.1 after the word "located" delete the balance of the sentence.

Add to 13.1 the following:

13.1.1 Each Contractor and his subcontractors and sub-subcontractors shall comply with all Idaho Statutes with specific reference to Public Works Contractor's State License Law, Title 54, Chapter 19, Idaho Code, as amended.

13.1.2 Pursuant to Sections 44-1001 and 44-1002, Idaho Code, it is provided that each Contractor "must employ ninety-five percent (95%) bona fide Idaho residents as employees, except where under such contracts fifty or less persons are employed, the Contractor may employ ten percent (10%) non-residents, provided, however, in all cases employers must give preference to the employment of bona fide residents in the performance of said work, and no contract shall be let to any person, firm, association or corporation refusing to execute an agreement with the above-mentioned provisions in it; provided that in contracts involving the expenditure of Federal Aid Funds this act shall not be enforced in such a manner as to conflict with or be contrary to the federal statutes prescribing a labor preference to honorable discharged soldiers, sailors, or marines, prohibiting as unlawful any other preference or discrimination among citizens of the United States."

13.2 Successors and Assigns

In subparagraph 13.2.1, in the second sentence, delete “Except as provided in Subparagraph 13.2.2,”.

Delete subparagraph 13.2.2.

13.5 Interest.

Delete paragraph 13.5 and substitute the following:

13.6 Payments due and unpaid under the Contract Documents (21 days from date received by the Owner) shall bear no interest until 30 days past due, thereafter they shall bear interest at the rate of 8% per annum until the date of the check as posted by the owner.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

14.1 Termination by the Contractor

In subparagraph 14.1.1, in the first sentence, delete the number "30" and substitute the number "60".

Delete subparagraphs 14.1.1.3 and 14.1.1.4.

Delete subparagraph 14.1.2.
In subparagraph 14.1.3 delete “or 14.1.2”.

Delete subparagraph 14.1.4.

14.2 Termination by the Owner for Cause

In subparagraph 14.2.2.3 delete the last sentence.

14.4 Termination by the Owner for Convenience

Delete subparagraph 14.4.3 and substitute the following:
14.4.3 In the case of such termination for the Owner convenience, the Contractor shall be entitled to receive payment from the Owner on the same basis provided in Subparagraph 14.1.3, as modified.

ARTICLE 15 CLAIMS AND DISPUTES

15.1 Claims

Delete subparagraph 15.1.2 and substitute the following:

15.1.2 Notice of Claims. A Claim by either party must be made by written notice to the Architect within ten (10) days from the date of the occurrence of the event or discovery of the condition giving rise to the Claim or within ten (10) days from the date that the Claimant knew or should have known of the event or condition. Unless the Claim is made within the aforementioned time requirements, it shall be deemed to be waived. The written notice of Claim shall include a factual statement of the basis for the Claim, pertinent dates, contract provisions offered in support of the Claim, additional materials offered in support of the Claim and the nature of the resolution sought by the Claimant. The Architect will not consider, and the Owner shall not be responsible or liable for, any Claims from subcontractors, suppliers, manufacturers, or other persons or entities not a party to this Contract. Once a Claim is made, the Claimant shall cooperate with the Architect and the party against whom the Claim is made in order to mitigate the alleged or potential damages, delay or other adverse consequences arising out of the condition.

Add to 15.1 the following:

15.1.8 Concealed or Unknown Conditions. If conditions are encountered at the site which are subsurface or are otherwise concealed or unknown physical conditions which differ materially from those indicated in the Contract Documents or which were not reasonably susceptible of being disclosed by the Contractor's examination of the site in accordance with Subparagraph 15.1.7.1 of these Supplementary Conditions, then notice by the observing party shall promptly be given to the Architect and the other party before the conditions are disturbed and in no event later than ten (10) days after first observance of the conditions. The Architect will promptly investigate such conditions and, if they differ materially from the Contract Documents or if they were not reasonably susceptible of being disclosed by the Contractor's examination of the site, will recommend an equitable adjustment in the Contract Sum or Contract Time, or both, if the conditions cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Contract. If the Architect determines that the conditions at the site do not warrant an adjustment in the Contract terms, the Architect shall so notify the Owner and Contractor in writing, stating the reasons. If the Owner and the Contractor cannot agree on an equitable adjustment to the Contract terms or otherwise disagree with the determination of the Architect, the matter shall be subject to further proceedings in accordance with Paragraph 15.2

Add to 15.1. the following:

15.1.9 The Contractor agrees and acknowledges that he has had sufficient time and opportunity to examine the Contract Documents and the site of the work in order to undertake any necessary actions to determine the character of the subsurface materials and site conditions to be encountered. No adjustment in the Contract Time or Contract Sum shall be permitted in connection with a subsurface, concealed or unknown site condition which does not differ in any material respect from those conditions disclosed or which reasonably should have been disclosed or identified by the Contractor's examination of the Contract Documents and the site of the work.

Add to 15.1 the following:

15.1.10 The Contractor shall not be entitled to an adjustment in Contract Time or in Contract Sum for any delay or failure of performance to the extent such delay or failure was caused by the Contractor or anyone for whose acts the Contractor is responsible. The Contractor shall be entitled to an equitable adjustment in Contract Time, and may be entitled to an equitable adjustment in Contract Sum, if the cost or time of Contractor's performance is delayed or changed due to the fault of the Owner. To the extent any delay or failure of performance was concurrently caused by the Owner and Contractor, the Contractor shall be entitled to an adjustment in the Contract Time for that portion of the delay or failure of performance that was

concurrently caused, but shall not be entitled to an adjustment in Contract Sum. In the event that the Contractor is entitled to an adjustment in Contract Sum, the Owner will pay only for the following verifiable costs directly associated with the time extension or delay: 1) the actual labor costs, fringe benefits, employment taxes and insurance related to the Project Superintendent; 2) the cost associated with the fair rental value of the Project Superintendent's vehicle directly related to the time extension; 3) the direct costs attributable to the extension for the field office facility, including telephone lines, utilities, power, lights, water, and sewer (toilets). Mark-up on these costs will not be allowed. The Contractor shall make all reasonable efforts to prevent and mitigate the effects of any delay regardless of cause.

Add to 15.1 the following:

15.1.11 All Claims for costs related to Claims for additional time shall be pursuant to Paragraph 15.1.4. The Contractor shall not be entitled to make a Claim for adjustment in the Contract Sum based upon the matter of adverse weather conditions or force majeure.

15.3 Mediation

In subparagraph 15.3.2 delete the last two sentences.

15.4 Arbitration

Delete entirely all subparagraphs in 15.4 and substitute the following:

15.4.1 The Contractor and the Owner shall not be obligated to resolve any Claim or dispute related to this Contract by arbitration. Upon agreement of the parties and following the exhaustion of mediation, any Claim related to this Contract may be submitted to arbitration, either binding or non-binding, upon mutually agreeable terms and conditions. In the absence of such agreement, any reference in this Contract to arbitration is deemed void and has no force or effect.

END OF SUPPLEMENTARY CONDITIONS

CONTRACTORS AFFIDAVIT CONCERNING TAXES

STATE OF_____

COUNTY OF_____

Pursuant to the Idaho Code, Title 63, Chapter 15, I, the undersigned, beings duly sworn, depose and certify that all taxes, excise and license fees due to the State of Idaho and its taxing units, for which I or my property is liable, then due or delinquent, have been paid, or arrangements have been made, before entering into a contract for construction of any public works in the State of Idaho

_____
Name of Contractor

_____
Address

_____
City and State

By _____
Authorized Representative

Subscribed and sworn to before me this_____day of_____, _____.

_____
Notary Public, residing at

_____

Commission expires:_____

CONTRACTOR'S AFFIDAVIT
CONCERNING ALCOHOL AND DRUG-FREE WORKPLACE

STATE OF _____

COUNTY OF _____

Pursuant to the Idaho Code, Section 72-1717, I, the undersigned, being duly sworn, depose and certify that_____ is in compliance with the provisions of Idaho Code section 72-1717; that _____provides a drug-free workplace program that complies with the provisions of Idaho Code, title 72, chapter 17 and will maintain such program throughout the life of a state construction contract and that _____ shall subcontract work only to subcontractors meeting the requirements of Idaho Code, section 72-1717(1)(a).

_____
Name of Contractor

_____
Address

_____
City and State

By: _____
(Signature)

Subscribed and sworn to before me this _____day of _____ _____

Commission expires:

_____
NOTARY PUBLIC, residing at

_____

_____

SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Access to site.
4. Coordination.
5. Work restrictions.
6. Specification and drawing conventions.
7. Miscellaneous provisions.

1.2 PROJECT INFORMATION

A. Project Identification: Gymnasium Boiler Replacement.

1. Project Location: 601 Maple Street, Buhl, ID.

B. Owner: Buhl School District, 920 Main St., Buhl, ID 83316.

1. Owner's Representative: Angie Oparnico, Superintendent

C. Architect: Hutchison Smith Architects, 270 N. 27th Street, Suite 200, Boise, Idaho, 83702.

1.3 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work consists of Boiler Replacement is defined by the Contract Documents and consists of the following:

Scope of work includes but is not limited to the following:

Install new boiler system and associated components. Remove existing exterior door, cut existing masonry wall, install steel support frame and install new hollow metal frame and door with a new concrete landing.

B. Type of Contract:

1. One Prime Contract.

1.4 ACCESS TO SITE

A. General: Contractor shall have limited use of Project site for building installation. Use of site and summer activities will be discussed at the Pre-Construction meeting.

B. Use of Site: Limit use of Project site to work in areas indicated

1.5 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 5:00 p.m., Monday through Friday, unless otherwise indicated.

C. Nonsmoking Building: Smoking is not permitted within the building or anywhere on site.

D. Controlled Substances: Use of tobacco products and other controlled substances within the existing building and on project site is not permitted.

E. Employee Identification: Provide identification tags for Contractor personnel working on Project site. Require personnel to use identification tags at all times.

1.6 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 the Contractor unless specifically stated otherwise.

B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:

1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
2. Abbreviations: Materials and products are identified by abbreviations published as part of the U.S. National CAD Standard and scheduled on Drawings.
3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

SECTION 012300 - ALTERNATES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for alternates.

1.2 DEFINITIONS

A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be added to or deducted from the base bid amount if the Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternates into the Work. No other adjustments are made to the Contract Sum.

1.3 PROCEDURES

A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.

1. Include, as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation, whether or not indicated as part of alternate.

B. Execute accepted alternates under the same conditions as other Work of the Contract.

C. Schedule: A Part 3 "Schedule of Alternates" Article is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)
PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

A. Alternate No. 1: Horizontal Boiler.

1. Base Bid: New vertical tube steam boiler and equipment as indicated on Drawing M-1 &

M-2 and as specified in Sections 235239 and 235250 "Aldrich series DG Vertical Firetube boilers and Steam Vertical Boiler."

2. Alternate: Provide Aldrich Horizontal Firetube Boiler as indicated on Drawing M-1 and as specified in Section 235237 "Aldrich Horizontal Firetube Boilers."

END OF SECTION 012300

SECTION 012500 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

B. Related Requirements:

1. Section 016350 "Substitution Procedures" for administrative procedures for handling requests for substitutions made after the Contract award.

1.3 MINOR CHANGES IN THE WORK

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

1.4 PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

1. Work Change Proposal Requests issued by Architect are not instructions either to stop work in progress or to execute the proposed change.
2. Within time specified in Proposal Request after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.

a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
c. Include costs of labor and supervision directly attributable to the change.
d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish

times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect.

1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
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 01635 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
7. Proposal Request Form: Use form acceptable to Architect.

1.5 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Work Changes Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on form included in Project Manual.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012500

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 012500 "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.

1.2 DEFINITIONS

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

1.3 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. Items required to be indicated as separate activities in Contractor's construction schedule.

2. Submit the schedule of values to Architect at the pre-construction meeting.
3. Arrange the schedule of values in tabular form with separate columns to indicate the following for each item listed:

a. Related Specification Section or Division.
b. Description of the Work.
c. Name of subcontractor.
d. Name of manufacturer or fabricator.
e. Name of supplier.
f. Change Orders (numbers) that affect value.
g. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.

1) Labor.
2) Materials.

3) Equipment.

4. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
5. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
6. Provide separate line items in the schedule of values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
7. 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.

8. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders result in a change in the Contract Sum.

1.4 APPLICATIONS FOR PAYMENT

A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.

   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 forms provided by Owner for Applications for Payment. Sample copies are included in Project Manual.

D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.

E. Stored Materials: Payment for material stored off site is not allowed.

F. Transmittal: Submit one signed original copy of each Application for Payment to Architect by a method ensuring receipt within 24 hours.

G. 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 not including retainage.

   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 Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

H. 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, "Contractor's Affidavit of Payment of Debts and Claims."
5. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
6. AIA Document G707, "Consent of Surety to Final Payment."
7. Evidence that claims have been settled.
8. Final liquidated damages settlement statement if any.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012900

SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:

1. General coordination procedures.
2. Coordination drawings.
3. Requests for Information (RFIs).
4. Project meetings.

B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.

C. Related Requirements:

1. Section 017700 "Closeout Procedures" for coordinating closeout of the Contract.

1.3 DEFINITIONS

A. RFI: Request from Owner, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Use CSI Form 1.5A or a pre-approved equal. 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.

B. Key Personnel Names: At the Pre-Construction Meeting, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including

home, office, and cellular telephone numbers and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.

1.5 GENERAL COORDINATION PROCEDURES

A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.

B. Coordination: Each contractor shall coordinate its construction operations with those of other contractors and entities to ensure efficient and orderly installation of each part of the Work. Each contractor shall coordinate its operations with operations, included in different Sections, that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components with other contractors to ensure maximum performance and accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.

C. 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.

D. 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.

E. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.

1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work.

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.
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 suggested resolution 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.

a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.

C. RFI Forms: AIA Document G716.

1. Attachments shall be electronic files in Adobe Acrobat PDF format.

D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven working days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.

1. The following Contractor-generated RFIs will be returned without action:

a. Requests for approval of submittals.
b. Requests for approval of substitutions.
c. Requests for approval of Contractor's means and methods.
d. Requests for coordination information already indicated in the Contract Documents.
e. Requests for adjustments in the Contract Time or the Contract Sum.
f. Requests for interpretation of Architect's actions on submittals.
g. Incomplete RFIs or inaccurately prepared RFIs.

2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt 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 01250 "Contract Modification Procedures."

a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 2 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. or use software log that is part of Project Web site. Include the following in the Software log with not less than the following:

1. Project name.
2. Name and address of Contractor.
3. Name and address of Architect.
4. RFI number including RFIs that were returned without action or withdrawn.
5. RFI description.
6. Date the RFI was submitted.
7. Date Architect's response was received.

F. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within five days if Contractor disagrees with response.

1.7 PROJECT MEETINGS

A. General: Coordinate with Architect and schedule meetings and conferences at Project site unless otherwise indicated. Architect will conduct meetings.

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner, Architect and testing agency of scheduled meeting dates and times.
2. Agenda: Contractor shall prepare the meeting agenda. Distribute the agenda to all invited attendees. Follow the format listed below.
3. Minutes: Architect will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Contractor, within three days of the meeting.

B. Preconstruction Conference: Architect will coordinate with the Contractor and schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner, Architect and Contractor.

1. Conduct the conference to review responsibilities and personnel assignments.
2. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Discuss items of significance that could affect progress, including the following:

    a. Tentative construction schedule.
    b. Critical work sequencing and long-lead items.
    c. Designation of key personnel and their duties.
    d. Lines of communications.
    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. Contractor is responsible for all safety.
    x. Security.
    y. Progress cleaning.

4. 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 of scheduled meeting dates.
2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:

a. Contract Documents.
b. Options.
c. Related RFIs.
d. Related Change Orders.
e. Purchases.
f. Deliveries.
g. Submittals.
h. Review of mockups.
i. Possible conflicts.
j. Compatibility requirements.
k. Time schedules.
l. Weather limitations.
m. Manufacturer's written instructions. Contractor shall provide at meeting.
n. Warranty requirements.
o. Compatibility of materials.
p. Acceptability of substrates.
q. Temporary facilities and controls.
r. Space and access limitations.
s. Regulations of authorities having jurisdiction.
t. Testing and inspecting requirements.
u. Installation procedures.
v. Coordination with other work.
w. Required performance results.
x. Protection of adjacent work.
y. Protection of construction and personnel.

3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

D. Progress Meetings: Architect will conduct progress meetings at monthly intervals.

1. Coordinate dates of meetings with preparation of payment requests.
2. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to

do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

1) Review schedule for next period.

b. Review present and future needs of each entity present, including the following:

1) Interface requirements.
2) Sequence of operations.
3) Resolution of BIM component conflicts.
4) Status of submittals.
5) Deliveries.
6) Off-site fabrication.
7) Access.
8) Site utilization.
9) Temporary facilities and controls.
10) Progress cleaning.
11) Quality and work standards.
12) Status of correction of deficient items.
13) Field observations.
14) Status of RFIs.
15) Status of proposal requests.
16) Pending changes.
17) Status of Change Orders.
18) Pending claims and disputes.
19) Documentation of information for payment requests.

4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.

a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

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

B. Related Requirements:

1. Section 012900 "Payment Procedures" for submitting Applications for Payment and the schedule of values.
2. Section 013100 "Project Management and Coordination" for submitting coordination drawings and subcontract list and for requirements for web-based Project software.
3. Section 017700 "Closeout Procedures" for submitting closeout submittals and maintenance material submittals.
4. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.

1.2 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."

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

1.3 SUBMITTAL SCHEDULE

A. Submittal Schedule: Submit, as an action submittal, a list of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.

1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
2. Initial Submittal Schedule: Submit concurrently with startup construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.

3. Final Submittal Schedule: Submit concurrently with the first complete submittal of Contractor's construction schedule.

    a. Submit revised submittal schedule as required to reflect changes in current status and timing for submittals.

4. Format: Arrange the following information in a tabular format:

    a. Scheduled date for first submittal.
    b. Specification Section number and title.
    c. Submittal Category: Action; informational.
    d. Name of subcontractor.
    e. Description of the Work covered.
    f. Scheduled date for Architect's final release or approval.
    g. Scheduled dates for purchasing.
    h. Scheduled date of fabrication.
    i. Scheduled dates for installation.
    j. Activity or event number.

1.4 SUBMITTAL FORMATS

A. Submittal Information: Include the following information in each submittal:

1. Project name.
2. Date.
3. Name of Architect.
4. Name of Construction Manager.
5. Name of Contractor.
6. Name of firm or entity that prepared submittal.
7. Names of subcontractor, manufacturer, and supplier.
8. Unique submittal number, including revision identifier. Include Specification Section number with sequential alphanumeric identifier and alphanumeric suffix for resubmittals.
9. Category and type of submittal.
10. Submittal purpose and description.
11. Number and title of Specification Section, with paragraph number and generic name for each of multiple items.
12. Drawing number and detail references, as appropriate.
13. Indication of full or partial submittal.
14. Location(s) where product is to be installed, as appropriate.
15. Other necessary identification.
16. Remarks.
17. Signature of transmitter.

B. Options: Identify options requiring selection by Architect.

C. Deviations and Additional Information: On each submittal, clearly indicate deviations from requirements in the Contract Documents, including minor variations and limitations; include relevant additional information and revisions, other than those requested by Architect on previous submittals. Indicate by highlighting on each submittal or noting on attached separate sheet.

D. Paper Submittals:

1. Place a permanent label or title block on each submittal item for identification; include name of firm or entity that prepared submittal.
2. Provide a space approximately 6 by 8 inches (150 by 200 mm) on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
3. Action Submittals: Submit three paper copies of each submittal unless otherwise indicated. Architect will return two copies.
4. Informational Submittals: Submit two paper copies of each submittal unless otherwise indicated. Architect will not return copies.
5. Additional Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.
6. Transmittal for Submittals: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using transmittal form.

E. Electronic Submittals: Prepare submittals as PDF package, incorporating complete information into each PDF file. Name PDF file with submittal number.

F. Submittals Utilizing Web-Based Project Software: Prepare submittals as PDF files or other format indicated by Project management software.

1.5 SUBMITTAL PROCEDURES

A. Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.

1. Email: Prepare submittals as PDF package and transmit to Architect by sending via email. Include PDF transmittal form. Include information in email subject line as requested by Architect.

    a. Architect will return annotated file. Annotate and retain one copy of file as a digital Project Record Document file.

2. Web-Based Project Management Software: Prepare submittals in PDF form, and upload to web-based Project management software website. Enter required data in web-based software site to fully identify submittal.
3. Paper: Prepare submittals in paper form and deliver to Architect.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.

4. Coordinate transmittal of submittals for related parts of the Work specified in different Sections, so processing will not be delayed because of need to review submittals concurrently for coordination.

    a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
3. Resubmittal Review: Allow 15 days for review of each resubmittal.
4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 21 days for initial review of each submittal.

5. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Architect and to Architect's consultants, allow 15 days for review of each submittal. Submittal will be returned to Architect before being returned to Contractor.

    a. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect.

D. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

1. Note date and content of previous submittal.
2. Note date and content of revision in label or title block, and clearly indicate extent of revision.
3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.

E. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

F. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

1.6 SUBMITTAL REQUIREMENTS

A. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard published data are unsuitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:

    a. Manufacturer's catalog cuts.
    b. Manufacturer's product specifications.
    c. Standard color charts.
    d. Statement of compliance with specified referenced standards.
    e. Testing by recognized testing agency.
    f. Application of testing agency labels and seals.
    g. Notation of coordination requirements.
    h. Availability and delivery time information.

4. For equipment, include the following in addition to the above, as applicable:

    a. Wiring diagrams that show factory-installed wiring.
    b. Printed performance curves.
    c. Operational range diagrams.
    d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.

5. Submit Product Data before Shop Drawings, and before or concurrently with Samples.

B. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data 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. Paper 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).

    a. Two opaque (bond) copies of each submittal. Architect will return one copy(ies).
    b. Three opaque copies of each submittal. Architect will retain two copies; remainder will be returned.

C. Samples: Submit Samples for review of type, color, pattern, and texture for a check of these characteristics with other materials.

1. Transmit Samples that contain multiple, related components, such as accessories together in one submittal package.
2. Identification: Permanently attach label on unexposed side of Samples that includes the following:

    a. Project name and submittal number.
    b. Generic description of Sample.
    c. Product name and name of manufacturer.
    d. Sample source.
    e. Number and title of applicable Specification Section.
    f. Specification paragraph number and generic name of each item.

3. Email Transmittal: Provide PDF transmittal. Include digital image file illustrating Sample characteristics and identification information for record.
4. Paper Transmittal: Include paper transmittal, including complete submittal information indicated.
5. 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.

6. 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.

7. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

    a. Number of Samples: Submit three sets of Samples. Architect will retain two Sample sets; remainder will be returned. Mark up and retain one returned Sample set as a project record Sample.

        1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.

2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.

D. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:

1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
2. Manufacturer and product name, and model number if applicable.
3. Number and name of room or space.
4. Location within room or space.

E. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.

F. Design Data: Prepare and submit written and graphic information indicating compliance with indicated performance and design criteria in individual Specification Sections. Include list of assumptions and summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Number each page of submittal.

G. Test and Research Reports:

1. 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 substrate preparation and primers required.
2. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
3. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
4. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
5. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
6. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:

    a. Name of evaluation organization.
    b. Date of evaluation.
    c. Time period when report is in effect.
    d. Product and manufacturers' names.

e. Description of product.
f. Test procedures and results.
g. Limitations of use.

1.7 DELEGATED DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1. If criteria indicated are insufficient to perform services or certification required, submit a written request for additional information to Architect.

B. Delegated Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF file paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.

1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

1.8 CONTRACTOR'S REVIEW

A. Action Submittals and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.

B. Contractor's Approval: Indicate Contractor's approval for each submittal with a uniform approval stamp. Include name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

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

1.9 ARCHITECT'S REVIEW

A. Action Submittals: Architect will review each submittal, indicate corrections or revisions required, and return.

1. PDF Submittals: Architect will indicate, via markup on each submittal, the appropriate action.

2. Paper Submittals: Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.

B. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.

C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.

D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.

E. Architect will return without review submittals received from sources other than Contractor.

F. Submittals not required by the Contract Documents will be returned by Architect without action.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013300

SECTION 013516 - ALTERATION PROJECT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes special procedures for alteration work.

1.2 DEFINITIONS

A. Alteration Work: This term includes remodeling, renovation, repair, and maintenance work performed within existing spaces or on existing surfaces as part of the Project.

B. Consolidate: To strengthen loose or deteriorated materials in place.

C. Design Reference Sample: A sample that represents the Architect's prebid selection of work to be matched; it may be existing work or work specially produced for the Project.

D. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

E. Match: To blend with adjacent construction and manifest no apparent difference in material type, species, cut, form, detail, color, grain, texture, or finish; as approved by Architect.

F. Refinish: To remove existing finishes to base material and apply new finish to match original, or as otherwise indicated.

G. Repair: To correct damage and defects, retaining existing materials, features, and finishes. This includes patching, piecing-in, splicing, consolidating, or otherwise reinforcing or upgrading materials.

H. Replace: To remove, duplicate, and reinstall entire item with new material. The original item is the pattern for creating duplicates unless otherwise indicated.

I. Replicate: To reproduce in exact detail, materials, and finish unless otherwise indicated.

J. Reproduce: To fabricate a new item, accurate in detail to the original, and from either the same or a similar material as the original, unless otherwise indicated.

K. Retain: To keep an element or detail secure and intact.

L. Strip: To remove existing finish down to base material unless otherwise indicated.

1.3 COORDINATION

A. Alteration Work Subschedule: A construction schedule coordinating the sequencing and scheduling of alteration work for entire Project, including each activity to be performed, and based on Contractor's Construction Schedule. Secure time commitments for performing critical construction activities from separate entities responsible for alteration work.

1. Schedule construction operations in sequence required to obtain best Work results.
2. Coordinate sequence of alteration work activities to accommodate the following:

    a. Owner's continuing occupancy of portions of existing building.
    b. Owner's partial occupancy of completed Work.
    c. Other known work in progress.
    d. Tests and inspections.

3. Detail sequence of alteration work, with start and end dates.
4. Utility Services: Indicate how long utility services will be interrupted. Coordinate shutoff, capping, and continuation of utility services.
5. Use of elevator and stairs.
6. Equipment Data: List gross loaded weight, axle-load distribution, and wheel-base dimension data for mobile and heavy equipment proposed for use in existing structure. Do not use such equipment without certification from Contractor's professional engineer that the structure can support the imposed loadings without damage.

1.4 PROJECT MEETINGS FOR ALTERATION WORK

A. Preliminary Conference for Alteration Work: Before starting alteration work, conduct conference at Project site.

1. Attendees: In addition to representatives of Owner, Architect, and Contractor, testing service representative, specialists, and chemical-cleaner manufacturer(s) shall be represented at the meeting.
2. Agenda: Discuss items of significance that could affect progress of alteration work, including review of the following:

    a. Alteration Work Subschedule: Discuss and finalize; verify availability of materials, specialists' personnel, equipment, and facilities needed to make progress and avoid delays.
    b. Fire-prevention plan.
    c. Governing regulations.
    d. Areas where existing construction is to remain and the required protection.
    e. Hauling routes.
    f. Sequence of alteration work operations.
    g. Storage, protection, and accounting for salvaged and specially fabricated items.
    h. Existing conditions, staging, and structural loading limitations of areas where materials are stored.
    i. Qualifications of personnel assigned to alteration work and assigned duties.
    j. Requirements for extent and quality of work, tolerances, and required clearances.

k. Embedded work such as flashings and lintels, special details, collection of waste, protection of occupants and the public, and condition of other construction that affects the Work or will affect the work.

3. Reporting: Record conference results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from conference.

1.5 INFORMATIONAL SUBMITTALS

A. Alteration Work Subschedule:

1. Submit alteration work subschedule within seven days of date established for commencement of alteration work.

B. Preconstruction Documentation: Show preexisting conditions of adjoining construction and site improvements that are to remain, including finish surfaces, that might be misconstrued as damage caused by Contractor's alteration work operations.

1.6 QUALITY ASSURANCE

A. Safety and Health Standard: Comply with ANSI/ASSP A10.6.

1.7 STORAGE AND HANDLING OF SALVAGED MATERIALS

A. Salvaged Materials:

1. Clean loose dirt and debris from salvaged items unless more extensive cleaning is indicated.
2. Pack or crate items after cleaning; cushion against damage during handling. Label contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area indicated on Drawings.
5. Protect items from damage during transport and storage.

B. Salvaged Materials for Reinstallation:

1. Repair and clean items for reuse as indicated.
2. Pack or crate items after cleaning and repairing; cushion against damage during handling. Label contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment unless otherwise indicated. Provide connections, supports, and miscellaneous materials to make items functional for use indicated.

C. Existing Materials to Remain: Protect construction indicated to remain against damage and soiling from construction work. Where permitted by Architect, items may be dismantled and taken to a suitable, protected storage location during construction work and reinstalled in their original locations after alteration and other construction work in the vicinity is complete.

1.8 FIELD CONDITIONS

A. Survey of Existing Conditions: Record existing conditions that affect the Work by use of preconstruction photographs.

B. Discrepancies: Notify Architect of discrepancies between existing conditions and Drawings before proceeding with removal and dismantling work.

PART 2 - PRODUCTS - (Not Used)

PART 3 - EXECUTION

3.1 PROTECTION

A. Protect persons, motor vehicles, surrounding surfaces of building, building site, plants, and surrounding buildings from harm resulting from alteration work.

1. Use only proven protection methods, appropriate to each area and surface being protected.
2. Provide temporary barricades, barriers, and directional signage to exclude the public from areas where alteration work is being performed.
3. Contain dust and debris generated by alteration work, and prevent it from reaching the public or adjacent surfaces.
4. Provide shoring, bracing, and supports as necessary. Do not overload structural elements.
5. Protect floors and other surfaces along hauling routes from damage, wear, and staining.

B. Temporary Protection of Materials to Remain:

1. Protect existing materials with temporary protections and construction. Do not remove existing materials unless otherwise indicated.
2. Do not attach temporary protection to existing surfaces except as indicated as part of the alteration work program.

C. Comply with each product manufacturer's written instructions for protections and precautions. Protect against adverse effects of products and procedures on people and adjacent materials, components, and vegetation.

D. Utility and Communications Services:

1. Notify Owner, Architect, authorities having jurisdiction, and entities owning or controlling wires, conduits, pipes, and other services affected by alteration work before commencing operations.
2. Disconnect and cap pipes and services as required by authorities having jurisdiction, as required for alteration work.
3. Maintain existing services unless otherwise indicated; keep in service, and protect against damage during operations. Provide temporary services during interruptions to existing utilities.

3.2 GENERAL ALTERATION WORK

A. Have specialty work performed only by qualified specialists.

B. Ensure that supervisory personnel are present when work begins and during its progress.

C. Perform surveys of Project site as the Work progresses to detect hazards resulting from alterations.

D. Notify Architect of visible changes in the integrity of material or components whether from environmental causes including biological attack, UV degradation, freezing, or thawing or from structural defects including cracks, movement, or distortion.

1. Do not proceed with the work in question until directed by Architect.

END OF SECTION 013516

SECTION 016350 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for substitutions.

1.2 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.

1.3 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 form acceptable to Architect.
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. 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.
j. Cost information, including a proposal of change, if any, in the Contract Sum.
k. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
l. 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.

1.4 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.

1.5 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. Requested substitution provides sustainable design characteristics that specified product provided.
    c. Substitution request is fully documented and properly submitted.
    d. Requested substitution will not adversely affect Contractor's construction schedule.
    e. Requested substitution has received necessary approvals of authorities having jurisdiction.
    f. Requested substitution is compatible with other portions of the Work.
    g. Requested substitution has been coordinated with other portions of the Work.
    h. Requested substitution provides specified warranty.
    i. 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 016350

SECTION 017300 - EXECUTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes general administrative and procedural requirements governing execution of the Work, including, but not limited to, the following:

1. Installation.
2. Cutting and patching.
3. Coordination of Owner's portion of the Work.
4. Progress cleaning.
5. Starting and adjusting.
6. Protection of installed construction.
7. Correction of the Work.

1.2 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of subsequent work.

B. Patching: Fitting and repair work required to restore construction to original conditions after installation of subsequent work.

1.3 PREINSTALLATION MEETINGS

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

1. Prior to commencing work requiring cutting and patching, review extent of cutting and patching anticipated and examine procedures for ensuring satisfactory result from cutting and patching work. Inform Architect of scheduled meeting. Require representatives of each entity directly concerned with cutting and patching to attend, including the following:

a. Contractor's superintendent.
b. Trade supervisor responsible for cutting operations.
c. Trade supervisor(s) responsible for patching of each type of substrate.
d. Mechanical, electrical, and utilities subcontractors' supervisors, to the extent each trade is affected by cutting and patching operations.

2. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

B. Layout Conference: Conduct conference at Project site.

1. Review meanings and intent of dimensions, notes, terms, graphic symbols, and other layout information indicated on the Drawings.
2. Review requirements for including layouts on Shop Drawings and other submittals.
3. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

1.4 QUALITY ASSURANCE

A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.

1. Structural Elements: When cutting and patching structural elements, or when encountering the need for cutting and patching of elements whose structural function is not known, 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. Mechanical systems piping and ducts.
    c. Control systems.
    d. Communication systems.
    e. Fire-detection and -alarm systems.
    f. Electrical wiring systems.

3. 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.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Comply with requirements specified in other Sections.

1. For projects requiring compliance with sustainable design and construction practices and procedures, use products for patching that comply with sustainable design requirements.

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. Use materials that are not considered hazardous.

C. 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 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, and other construction affecting the Work.

1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, gas service piping, and water-service piping; underground electrical services; and other utilities.

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, including Specification Section number and paragraph, and Drawing sheet number and detail, where applicable.
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, submit a request for information to Architect in accordance with requirements in Section 013100 "Project Management and Coordination."

3.3 INSTALLATION

A. Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb, and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure satisfactory results as judged by Architect. 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 of type expected for Project.

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: Select tools or equipment that minimize production of excessive noise levels.

G. Templates: Obtain and distribute to the parties involved templates for Work specified to be factory prepared and field installed. Check Shop Drawings of other portions of the Work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions with manufacturer.

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, as judged by Architect. Fit exposed connections together to form hairline joints.

3.4 CUTTING AND PATCHING

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. Temporary Support: Provide temporary support of Work to be cut.

C. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

D. 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.

E. 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, as judged by Architect. Provide materials and comply with installation requirements specified in other Sections, where applicable.
1. 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.

a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
b. Restore damaged pipe covering to its original condition.

2. 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, corner to corner of wall and edge to edge of ceiling. Provide additional coats until patch blends with adjacent surfaces.

3. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
4. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.

F. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.5 PROGRESS CLEANING

A. Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
1. 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).
2. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, in accordance with regulations.

a. Use containers intended for holding waste materials of type to be stored.

3. 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 in accordance with 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: 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.

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.6 STARTING AND ADJUSTING

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

B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

3.7 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Protection of Existing Items: Provide protection and ensure that existing items to remain undisturbed by construction are maintained in condition that existed at commencement of the Work.

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

3.8 CORRECTION OF THE WORK

A. Repair or remove and replace damaged, defective, or nonconforming Work. Restore damaged substrates and finishes.

1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.

B. Repair Work previously completed and subsequently damaged during construction period. Repair to like-new condition.

C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.

D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.

E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 017300

SECTION 017700- PROJECT CLOSEOUT

PART 1 - GENERAL

1.1 SUMMARY

. This Section specifies administrative and procedural requirements for project closeout, including but not limited to:

1. Inspection procedures.
2. Reinspection.
3. Final Acceptance.
4. Closeout Procedures

B. Related Sections include the following:

1. Division 1, Section "PROJECT RECORD DOCUMENTS" for project record document requirements.

C. Closeout requirements for specific construction activities are included in the appropriate Sections in Divisions-2 through -16.

1.2 SUBSTANTIAL COMPLETION

A. **Procedures: Before <u>requesting inspection</u> for certification of Substantial Completion, complete the following. (List exceptions in the request).**

1. Submit record drawings, maintenance and operational manuals, and similar final record information.
2. Complete final clean up requirements, including touch-up painting. Touch-up and otherwise repair and restore marred exposed finishes.

B. Substantial Completion Inspection Procedures: On receipt by the Architect of a written request from the Contractor for substantial completion inspection (punch list items), the Architect will proceed with inspection. The Architect will prepare the Certificate of Substantial Completion following inspection, or advise the Contractor of construction that must be completed or corrected before the certificate will be issued.

1. The certificate of substantial completion will be issued when the project is substantially complete.
2. Results of the completed inspection will form the basis of requirements for final acceptance.

1.3 FINAL ACCEPTANCE TO MAKE FINAL PAYMENT

A. **Procedures: Before requesting final inspection for certification of final acceptance and final payment the following has to be completed. List exceptions in the request.**

1. Submit the final payment request at the end of the final phase of work with releases and supporting documentation not previously submitted and accepted.
2. Submit a signed copy of the Architect's substantial completion inspection list of items that were to be completed and corrected, stating that each item has been completed or otherwise resolved for acceptance.
3. Submit specific warranties, final certifications and similar documents.
4. Consent of Surety (A.I.A. Form G707) and Contractor's Affidavit of Payment of Debts and Claims (A.I.A. Form G706) must be executed by the contractor and submitted to the Architect.
5. A final pay estimate must be submitted requesting 100% payment including retainage. The documents in item 1-4 above must be attached to the Final Pay Request.

B. Final Inspection Procedure: The Architect will reinspect the Work upon receipt of notice that the Work, including punch list items from earlier inspections, have been completed.

1. Upon completion of reinspection, the Architect will prepare a letter of final acceptance or advise the Contractor of Work that is incomplete or of obligations that have not been fulfilled but are required for final acceptance.

PART 2 - PRODUCTS (Not Applicable)

PART 3 – EXECUTION (Not Applicable)

END OF SECTION 017000

SECTION 017810 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for Project Record Documents, including the following:

1. Record Drawings.
2. Record Specifications.
3. Record Product Data.

1.2 SUBMITTALS

A. Record Drawings: Comply with the following:

1. Number of Copies: Submit one set of marked-up Record Prints.
2. Number of Copies: Submit copies of Record Drawings as follows:

a. Final Submittal: Submit one set of marked-up Record Prints. Print each Drawing, whether or not changes and additional information were recorded.

B. Record Specifications: Submit one copy of Project's Specifications, including addenda and contract modifications.

C. Record Product Data: Submit one copy of each Product Data submittal.

1. Where Record Product Data is required as part of operation and maintenance manuals, submit marked-up Product Data as an insert in manual instead of submittal as Record Product Data.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

A. Record Prints: Maintain one set of blue- or black-line white prints of the Contract Drawings and Shop Drawings.

1. Preparation: Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.

a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.

b. Accurately record information in an understandable drawing technique.
c. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.

2. Content: Types of items requiring marking include, but are not limited to, the following:

a. Dimensional changes to Drawings.
b. Revisions to details shown on Drawings.
c. Depths of foundations below first floor.
d. Locations and depths of underground utilities.
e. Revisions to routing of piping and conduits.
f. Revisions to electrical circuitry.
g. Actual equipment locations.
h. Duct size and routing.
i. Locations of concealed internal utilities.
j. Changes made by Change Order or Work Change Directive.
k. Changes made following Architect's written orders.
l. Details not on the original Contract Drawings.
m. Field records for variable and concealed conditions.
n. Record information on the Work that is shown only schematically.

3. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, show cross-reference on the Contract Drawings.
4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
5. Mark important additional information that was either shown schematically or omitted from original Drawings.
6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

B. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.

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. For each principal product, indicate whether Record Product Data has been submitted in operation and maintenance manuals instead of submitted as Record Product Data.
5. Note related Change Orders, Record Product Data and Record Drawings where applicable.

2.3 RECORD PRODUCT DATA

A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3. Note related Change Orders, Record Specifications and Record Drawings where applicable.

2.4 MISCELLANEOUS RECORD SUBMITTALS

A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

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

END OF SECTION 017810

SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Exterior standard steel doors and frames.

B. Related Requirements:

   1. Section 081119 "Stainless-Steel Doors and Frames" for hollow-metal doors and frames manufactured from stainless steel.
   2. Section 083473.13 "Metal Sound Control Door Assemblies" for packaged, acoustically rated hollow-metal door and frame assemblies.
   3. Section 087100 "Door Hardware" for door hardware for hollow-metal doors.
   4. Section 119812 "Detention Doors and Frames" for hollow-metal doors and frames for detention facilities.
   5. Section 134900 "Radiation Protection" for lead-lined, hollow-metal doors and frames.

1.2 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings in accordance with NAAMM-HMMA 803 or ANSI/SDI A250.8.

1.3 COORDINATION

A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

B. Coordinate requirements for installation of door hardware, electrified door hardware, and access control and security systems.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.5 ACTION SUBMITTALS

A. Product Data:
   1. Exterior standard steel doors and frames.

B. Product Data Submittals: For each product.

1. Include construction details, material descriptions, core descriptions, and finishes.

C. Shop Drawings: Include the following:

1. Elevations of each door type.
2. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
4. Locations of reinforcement and preparations for hardware.
5. Details of each different wall opening condition.
6. Details of anchorages, joints, field splices, and connections.

D. Product Schedule: For hollow-metal doors and frames, prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final door hardware schedule.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow-metal doors and frames palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.

1. Provide additional protection to prevent damage to factory-finished units.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store hollow-metal doors and frames vertically under cover at Project site with head up. Place on minimum 4-inch- (102-mm-) high wood blocking. Provide minimum 1/4-inch (6-mm) space between each stacked door to permit air circulation.

PART 2 - PRODUCTS

2.1 HOLLOW METAL DOORS AND FRAMES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following
1. Steelcraft
2. Curries Co.

2.2 PERFORMANCE REQUIREMENTS

A. Thermally Rated Door Assemblies: Provide door assemblies with U-factor of not more than 0.38 deg Btu/F x h x sq. ft. (2.16 W/K x sq. m) when tested in accordance with ASTM C1363 or ASTM E1423.

2.3 EXTERIOR STANDARD STEEL DOORS AND FRAMES

A. Construct hollow-metal doors and frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

B. Extra-Heavy-Duty Doors and Frames: ANSI/SDI A250.8, Level 3; ANSI/SDI A250.4, Level A. At locations indicated in the Door and Frame Schedule on Drawings.

1. Doors:

   a. Type: As indicated in the Door and Frame Schedule on Drawings.
   b. Thickness: 1-3/4 inches (44.5 mm).
   c. Face: Metallic-coated steel sheet, minimum thickness of 0.053 inch (1.3 mm), with minimum A60 (ZF180) coating.
   d. Edge Construction: Model 2, Seamless.
   e. Edge Bevel: Provide manufacturer's standard beveled or square edges.
   f. Bottom Edges: Close bottom edges of doors where required for attachment of weather stripping with end closures or channels of same material as face sheets. Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape.
   g. Core: Manufacturer's standard.

2. Frames:

   a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch (1.3 mm), with minimum A60 (ZF180) coating.
   b. Construction: Full profile welded.

3. Exposed Finish: Prime.

2.4 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Inserts, Bolts, and Fasteners: Hot-dip galvanized in accordance with ASTM A153/A153M.

C. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.

D. Mineral-Fiber Insulation: ASTM C665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E136 for combustion characteristics.

2.5 FABRICATION

A. Hollow-Metal Frames: Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as frames.
   1. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.

2.6 STEEL FINISHES

A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.

   1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

PART 3 - EXECUTION

3.1 PREPARATION

A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces. Touch up factory-applied finishes where spreaders are removed.

B. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.2 INSTALLATION

A. Install hollow-metal doors and frames plumb, rigid, properly aligned, and securely fastened in place. Comply with approved Shop Drawings and with manufacturer's written instructions.

B. Hollow-Metal Frames: Comply with ANSI/SDI A250.11.

   1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces without damage to completed Work.

      a. Where frames are fabricated in sections, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces. Touch-up finishes.
      b. Install frames with removable stops located on secure side of opening.
   2. Floor Anchors: Secure with postinstalled expansion anchors.

      a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.

   3. Solidly pack mineral-fiber insulation inside frames.

4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout or mortar.
5. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
6. Installation Tolerances: Adjust hollow-metal frames to the following tolerances:

    a. Squareness: Plus or minus 1/16 inch (1.6 mm), measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
    b. Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.
    c. Twist: Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
    d. Plumbness: Plus or minus 1/16 inch (1.6 mm), measured at jambs at floor.

C. Hollow-Metal Doors: Fit and adjust hollow-metal doors accurately in frames, within clearances specified below.

1. Non-Fire-Rated Steel Doors: Comply with ANSI/SDI A250.8.

3.3 FIELD QUALITY CONTROL

A. Repair or remove and replace installations where inspections indicate that they do not comply with specified requirements.

B. Reinspect repaired or replaced installations to determine if replaced or repaired door assembly installations comply with specified requirements.

3.4 REPAIR

A. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

B. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

END OF SECTION 081113

SECTION 099114 - EXTERIOR PAINTING (MPI STANDARDS)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Surface preparation and application of paint systems on the following exterior substrates:
   a. Concrete masonry units (CMUs).
   b. Steel and iron.

1.3 DEFINITIONS

A. MPI Gloss Level 1: Not more than five units at 60 degrees and 10 units at 85 degrees, according to ASTM D523.

B. MPI Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D523.

C. MPI Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D523.

D. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D523.

E. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D523.

F. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D523.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include preparation requirements and application instructions.
2. Include printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
3. Indicate VOC content.

B. Samples: For each type of topcoat product.

C. Samples for Initial Selection: For each type of topcoat product.

D. Samples for Verification: For each type of paint system and each color and gloss of topcoat.

1. Submit Samples on rigid backing, 8 inches (200 mm) square.
2. Apply coats on Samples in steps to show each coat required for system.
3. Label each coat of each Sample.
4. Label each Sample for location and application area.

E. Product List: Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in the Exterior Painting Schedule to cross-reference paint systems specified in this Section. Include color designations.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Paint: 5 percent, but not less than 1 gal. (3.8 L) of each material and color applied.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).

B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Rodda Paint Co.
2. Sherwin-Williams Company (The)

B. Source Limitations: Obtain paint from single source from single manufacturer.

2.2 PAINT PRODUCTS

A. MPI Standards: Provide products complying with MPI standards indicated and listed in its "MPI Approved Products List."

B. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.

C. Colors: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.

C. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates and paint systems indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

D. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer but not less than the following:

1. SSPC-SP 2.
2. SSPC-SP 3.
3. SSPC-SP 7/NACE No. 4.
4. SSPC-SP 11.

E. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

3.3 INSTALLATION

A. Apply paints in accordance with manufacturer's written instructions and recommendations in "MPI Manual."

1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
3. Paint both sides and edges of exterior doors and entire exposed surface of exterior door frames.
4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
5. Primers specified in the Exterior Painting Schedule may be omitted on items that are factory primed or factory finished if compatible with intermediate and topcoat coatings and acceptable to intermediate and topcoat paint manufacturers.

B. Tint undercoats same color as topcoat, but tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

3.4 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

1. Do not clean equipment with free-draining water and prevent solvents, thinners, cleaners, and other contaminants from entering into waterways, sanitary and storm drain systems, and ground.
2. Dispose of contaminants in accordance with requirements of authorities having jurisdiction.
3. Allow empty paint cans to dry before disposal.
4. Collect waste paint by type and deliver to recycling or collection facility.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.5 EXTERIOR PAINTING SCHEDULE

A. Steel and Iron Substrates:

1. Alkyd System MPI EXT 5.1D:

a. Alkyd Prime Coat: Primer, alkyd, anticorrosive, for metal.

1) Sherwin Williams, Pro-Cryl B66W01310.

b. Intermediate Coat: Exterior, alkyd enamel, matching topcoat.

c. Topcoat: High Performance Architectural Latex, MPI Goss Level 3-4, MPI #315.

1) Sherwin Williams, Duration, K33W00200.

END OF SECTION 099114

SECTION 230501 - COMMON HVAC REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. Related Sections: Refer to "Electrical Requirements for Heating-Ventilation and Air-Conditioning (HVAC) Equipment" Section 230000 for basic electrical requirements for all mechanical equipment. Special and specific electrical requirements are specified within each respective equipment specification section. See Sections 220000 Plumbing and Section 260000 Electrical.

1.2 SCOPE OF WORK - GENERAL

A. This section specifies the basic requirements for HVAC installations and includes requirements common to more than one section of. It expands and supplements the requirements specified in sections of Division 01.

B. The work covered by the HVAC Sections of the Specifications shall include the furnishing of all materials, labor, transportation, tools, permits, fees, inspections, utilities and incidentals necessary for the complete installation of all mechanical work required in the Contract Drawings.

C. It is the intent of the Contract Documents to provide an installation complete in every respect. In the event that additional details or special construction is required for work indicated or specified under this section of work or work specified in other sections, it shall be the responsibility of the Contractor to provide all material and equipment which is usually furnished with such systems in order to complete the installation, whether mentioned or not.

D. The Contractor shall review all Contract Drawings and Specifications and include in his bid any work specifically as being performed in the HVAC. The Contractor shall be responsible for all work performed by his subcontractors.

1.3 DEFINITIONS

A. "Provide" shall mean "furnish and install complete and ready for intended use."

B. "Indicated" shall mean "indicated on drawings".

C. "Concealed" shall mean "hidden from sight as in trenches, chases, furred spaces or hung ceilings.

D. "Exposed" shall mean "not concealed", as defined above.

E. "Noted" shall mean "noted on drawings or in specifications".

F. "Contractor" also referred to as "this Contractor" or "the Contractor", shall mean "HVAC".

1.4 CODES AND STANDARDS

A. All mechanical work shall be in strict accordance with the most current edition of the International Building Code (IBC), International Mechanical Code (IMC), Uniform Plumbing Code (UPC), National Fire Protection Association (NFPA), International Fire Code (IFC), National Electrical Code (NEC), Energy Code IECC and ASHRAE-90.1, and all applicable state and local codes, laws and ordinances.

1.5 PERMITS AND FEES

A. The Contractor shall obtain and pay for all required permits and fees necessary to fully complete all work included in the Contract Drawings and Specifications.

1.6 CONSTRUCTION OBSERVATIONS:

A. During the course of construction of this project, the engineer shall visit the project site periodically on an as-needed basis. The construction observation intervals may vary depending on the progress and/or stage of construction and whether piping and/or ductwork, etc., is being placed below grade and/or concealed, surface mounted items, setting of equipment, equipment connections, etc. However, written field questions are encouraged and welcomed throughout the course of construction and shall be answered promptly in writing, to keep the project construction on schedule. The project foreman should have the building plans, construction schedules, etc., affixed in mind, so the mechanical systems being assembled, the setting of equipment, of parts and pieces, related to the project are anticipated, to prevent delays or emergencies.

(1) The engineer shall make one (1) final inspection. The contractor shall notify the engineer that the installation is complete, i.e., the systems are operating and have been tested and balanced, and everything is complete and operational, all equipment connections have been made and the owner's representatives have been trained. At this time the engineer, the contractor, and the owner's representative shall schedule a time to walk the project for evaluation, and record in writing the items found to be incomplete. The contractor shall make the corrections within one (1) week after this inspection. If at the conclusion of the observation tour the owner and engineer determine that additional visits are required to complete this project.

B. On extra visits, the contractor shall report to the engineer that all systems are complete, and the project is ready for the owner's acceptance.

1.7 INTENT AND INTERPRETATION

A. The Drawings and Specifications are intended to supplement each other, and any details contained in one and not the other shall be included as if contained in both. Items not specifically mentioned in the specifications or noted on the drawings, but which are obviously necessary to make a complete working installation shall be included.

B. The drawings are partly diagrammatic and do not necessarily show the exact location of all new piping and existing utilities, unless specifically dimensioned.

C. Riser and other diagrams are schematic only and do not necessarily show the physical arrangement of the equipment. They shall not be used for obtaining quantities or lineal runs of piping.

D. All grilles, fixtures or other pieces of equipment shall be centered on windows, wall spaces, or other items, unless specifically dimensioned otherwise.

E. The location of the ductwork shall be checked to determine that it clears all openings and structural members; that it may be properly concealed; and that it clears cabinets, lights and equipment having fixed locations.

F. HVAC drawings shall serve as the working drawings for this portion of the work, but the Contractor shall refer to the Architectural, Structural, Plumbing and Electrical drawings for additional detail affecting the installation of his work. Architectural drawings shall take precedence over the HVAC drawings if any dimensional discrepancies exist.

G. The approximate location of each item is indicated on the drawings. These drawings are not intended to give complete and exact details in regard to location. Exact locations are to be determined by actual measurements at the building and will in all cases be subject to the approval of the Architect and he reserves the right to make any reasonable changes in the locations indicated without additional cost.

H. The contractor shall not make a change in a system, system layout, and/or equipment, except he receives written approval or drawing over the signature of the engineer.

1.8 SUBMITTAL OF EQUIPMENT FOR APPROVAL

A. Refer to the Conditions of the Contract (General and Supplementary) and Division 01 General Requirements for submittal definitions, requirements and procedures.

B. Engineer Approved Shop Drawings of Data on Product and/or Equipment Being Installed in this Project: After the contract is awarded the project and prior to the production of the specified equipment, the manufacturer shall have in hand an engineer approved shop drawing on that equipment being installed on this project. The manufacturer shall produce the product to comply with approved data. A brief description of submission to the engineer for evaluation is given below. Refer to identified sections for detailed submittal requirements.

C. The **contractor shall submit one set of shop drawings** in a single binder (as stated in Section 1.11). From the submitted data the Design Engineer will review, make comments on or disapprove the submittals. The submittal will then be returned to the contractor via e-mail. Upon receipt of the e-mail, the contractor shall produce and assemble the required sets of shop drawings, operation and maintenance material, forming a manual that can be used by the owner in operating and maintaining the equipment.

D. Confirm equipment approved for the project.

1. Confirm that the equipment is approved for installation. It must be defined as to name, catalog number or both in the bid documents, which includes the published addendums. **If not approved, do not submit**.
2. Each unit shall state the name of the equipment manufacturer (name, address, phone, email, etc.) catalog number, size, physical dimensions and weight, energy characteristics (electrical and/or fuel), operating characteristics, materials from which constructed, any special conditions that may apply to the construction of the unit, etc.

3. The equipment must explain and define in detail the components that make-up the unit, so the owner and engineer can determine, define the replaceable parts during the life of the unit.
4. Complete operating instruction, normal maintenance recommendations, start-up procedures, etc.
5. In general, the contractor shall acquaint himself with the equipment to confirm that it can be installed as shown on the plans and from his experience perform the indicated function in the system where installed.
6. In the course of reviewing the shop drawings, **the Contractor shall confirm the energy usage** (gas, power, air, water, drains, etc.) and determine if these services are available at the equipment characteristics. Namely: confirm voltage, phase, etc., with the electrical contractor. Natural gas available with the plumber, also drains, water (hot and cold) pipe sizes, etc., or if there are discrepancies in the services. If the indicated equipment services are not available, inform the engineer by phone and in writing, also note on the shop drawing. This cooperative effort will correct a problem before the equipment arrives at the job site.

   The shop drawings shall also indicate the scheduled delivery dates the equipment will be at the site.

   If the contractor foresees any problems with equipment size, weight, delivery, etc., it shall be noted in writing, attached to the shop drawings.

1.9 RECORD DOCUMENTS

A. Contractor shall record differences between mechanical work as installed and as shown in Contract Documents on a set of prints of mechanical drawings to be furnished by Architect. Return these prints to Architect at completion of project. Notations made on drawings shall be neat and legible. Comply with Division 1 General Requirements.

1.10 OPERATION AND MAINTENANCE MANUALS

A. Contractor shall prepare and submit Operation and Maintenance Manuals for mechanical systems provided under this Contract. Comply with Division 1 requirements for procedures and requirements for preparation and submittal of manuals.

B. Manual binder shall have permanent lettering of a contrasting color. Information to be included on the binder is as follows:

1. The front cover shall be lettered as follows:

HVAC
OPERATION AND MAINTENANCE
MANUAL
(PROJECT NAME)
(CITY AND STATE)
(YEAR)

OWNER: (NAME)
ARCHITECT: (NAME)
HVAC ENGINEER: Nielson Engineering Inc.
GENERAL CONTRACTOR: (NAME)
HVAC CONTRACTOR: (NAME)
The spine shall be lettered as follows:

HVAC O & M MANUAL (Year)
(Project Name)

C. Provide a master index at beginning of Manual showing items included. Use plastic tab indexes for sections of Manual.

D. Cover section shall consist of name, address, and phone number of Project Architect, General Contractor, Plumbing and HVAC Engineer, HVAC Contractor, and all HVAC Sub-Contractors.

E. Provide a separate section for each section of the specifications. Provide index for each section listing equipment included. Include all items specified in Section 23. Provide a list of each type of equipment supplied with the local supplier's name, address and phone number.

F. Include descriptive literature (manufacturer's catalog data) of each manufactured item. Literature shall show capacities and size of equipment used and be marked indicating each specific item with applicable data underlined. Data sheets shall be original. Copies are not acceptable.

G. When complete (before constructions begins) one (1) copy of the O & M Manual with approved submittals shall be placed in the Mechanical contractor's construction shack. At the close of the project, submit three (3) copies of manual shall be delivered to the owner at start-up and instruction for Owners use. Follow Division 01 requirements for additional manuals. Information to be included in manual:

1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of all replaceable parts.
2. Manufacturer's printed operating procedures to include start-up, break-in, routine and normal operating instructions; regulation, control, stopping shut down, 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.
5. Schematic control diagrams (as built status) for each automatic control system. Mark correct operating setting for each control instrument on these diagrams. A second complete set of control diagrams encased in clear plastic laminate shall be furnished.
6. Valve schedule indicating the valve symbol (tag number), valve location by room number and description, valve purpose and system served, and valve size. Provide one corresponding set of full-size mechanical prints (as-builts status) showing these valve locations for cross-reference. A second complete set of valve schedules (8-1/2 in. x 11 in.) encased in clear plastic laminate and fitted in an aluminum holding frame shall be furnished to the Owner.
7. Testing & Adjusting Report.
8. Test records and certifications.
9. Instruction period checklist.
10. Warranty information.

1.11 OPERATION AND MAINTENANCE INSTRUCTION AND TRAINING

A. The Contractor shall instruct the Owner's Representative(s) in the Operation and Maintenance procedures described in the Operation and Maintenance Manual. Comply with Division 1 requirements.

B. Individuals present shall include Contractors, Subcontractors, and equipment factory representatives. These individuals shall assist in instruction and start-up.

C. Minimum instruction time shall be eight (8) hours unless otherwise specifically noted.

D. All mechanical systems shall be properly functioning prior to instruction period.

E. Contractor shall prepare a checklist of all equipment and systems requiring instruction and maintenance for verification by the Owner's Representative of satisfactory start-up and instruction. A copy of this checklist shall be included in the Operation and Maintenance Manual.

1.12 GUARANTEE

A. Contractor shall guarantee the satisfactory operation of all material and equipment installed under Division 23 and shall repair or replace to the satisfaction of the Owner or Architect, any defective materials, equipment, or workmanship which may show itself within one year from the date of acceptance.

1.13 CLEANING

A. The Contractor shall, at all times, keep the premises free from accumulations of waste material or rubbish.

B. At completion of the job, the Contractor shall remove all tools, scaffolding, and surplus materials.

PART 2 - PRODUCTS

2.1 GENERAL MATERIALS AND EQUIPMENT REQUIREMENTS

A. All materials, in general, shall conform to the requirements of all agencies or publications specified and described in Division 01 of the Contract Specifications.

B. Materials and equipment to be provided shall be the standard catalog products of manufacturers regularly engaged in the manufacture of products conforming to these specifications and shall essentially duplicate materials and equipment that have been in satisfactory use at least two years.

C. All specified materials and equipment shall be American manufactured and made.

2.2 LISTED EQUIPMENT

A. The current Electrical Code requires that all materials, devices, appliances, and equipment, shall be of a type that conforms to applicable standards or be indicated as acceptable by the established standards of the Underwriter's Laboratories, Inc. or other electrical product testing laboratories which are accredited by the department.

B. This statement is being interpreted by the State Electrical Inspector as follows: It is understood that many specialty items such as cast-iron boilers, certain items of air handling equipment and other building components are not available with a UL label covering the entire piece of equipment. The State will impose no requirement that an item of equipment be UL labeled unless it is available as a UL labeled items from at least two manufacturers. Electrical components of unlabeled equipment, such as motors, shall be labeled if they are available from at least two manufacturers.

C. If any building component is available with a UL label from at least two manufacturers, an identical or similar unlabeled component shall not be acceptable for installation in the State of Idaho. Should any such component be installed in the State of Idaho, it shall either be inspected and labeled by a UL representative or other authority approved by the State or it shall be replaced with a UL labeled component, before the building will be accepted by the State Electrical Inspector.

D. Consequently, it shall be the sole responsibility of the Contractor (through project suppliers and equipment manufacturers) to purchase and install only equipment bearing the UL label whenever that equipment so labeled is available. The Contractor, (should any equipment be installed without the proper UL label) shall bear the entire cost of correction to the satisfaction of the Idaho State Electrical Inspector.

2.3 SUBSTITUTIONS AND PRODUCT OPTIONS

A. Substitute equipment is encouraged if it is truly an equal to the specified items.

1. The items and/or equipment specified in the contract documents are standard manufacturers items found in suppliers' catalogs, except it be indicated as special. The designer has taken time and effort to analyze, evaluate and prove to himself that the specified units will perform the function needed, wherein it is placed. This means the responsibility for the function of the specified equipment rests with the designer, who knows and understands what is to be accomplished.
2. If a **supplier** and/or the **contractor** desire to substitute equipment in place of a specified item, he may do so, but he takes upon himself or herself the **full responsibility** that the substituted equipment will equal all of the performing characteristics, functions, etc., and/or exceed the performance of the specified item. The substitute equipment shall be of such a physical size and weight that it will mount in the designated location without alterations to the building and the structure will carry the load. If for any reason the substituted equipment requires alterations or modification, in any form to the building and/or the structure, the costs shall be paid by the contractor and/or those requesting the substitutions.
3. Those interested in requesting a substitution shall submit a substitution request. The **Substitution request will be considered if it is at the office of the Engineer eight (8) working days prior to the day of bidding. The request shall include the following:**
   a. A statement certifying that the equipment proposed is equal to that specified; that it has the same mechanical operating characteristics, compatible dimensions, weight, electrical characteristics and meets the function and intent of the equipment named in the contract documents;
   b. The specification and catalog numbers of the substituted equipment;
   c. A pictorial and specification brochure.

4. Because of the short bidding period, (from issuance of drawing to bid date), between the substitution request and the bid date, the designer does not have adequate time to make a full evaluation of substitute equipment. Therefore, **those requesting the substitution** must accept **full responsibility** for the items being submitted for substitution (operating characteristics, physical size, weight, output, not increase the load, etc.). If at any time during the course of construction, **even up into the final completion**, if the designer finds the equipment does not meet the design criteria, comply with the performance, etc., **those requesting the substitution and the contractor have the responsibility to remove the substituted equipment and install the specified item at their expense.** There shall be no cost assessed to the owner and/or the designer and the replacement will not delay the completion of the project.

B. Discrepancies between equipment specified and the intended function of equipment shall be brought to the attention of the Architect/Engineer in writing prior to bidding. Failure to report any conflict, including catalog numbers, discontinued products, etc., does not relieve the Contractor from meeting the intent of the contract documents, nor shall it change the contract cost. If the Contractor is unable to interpret any part of the plans and/or specifications, or should he find discrepancies therein, he shall bring this to the attention of the Architect/Engineer, who will issue interpretation and/or additional instructions to Bidders before the project is bid.

C. Any conflict arising from the use of **substituted equipment shall be the responsibility of the contractor,** who shall bear all costs required to make the equipment comply with the intent of the contract documents.

D. Samples may be required for non-standard or substituted items before installation during construction. Provide all samples as required.

E. No materials or apparatus may be substituted after the bid opening except where the equipment specified has been discontinued. This substitution may be made by a change order.

F. Approved equipment shall be so noted, in writing in a formally issued **Project Addendum**

PART 3 - EXECUTION

3.1 COORDINATION

A. Each Contractor shall at all times cooperate with other trades on the job to avoid friction and delay to the progress of work. All points in dispute shall be referred to the Architect.

3.2 SUPERVISION

A. This Contractor shall have in charge of the work at all times a thoroughly competent superintendent. Comply with Division 01 requirements.

3.3 WORKMANSHIP

A. The work under the mechanical contract shall be performed by workers skilled in the particular trade and include all work necessary to properly complete the installation in a professional manner so as to present a neat and finished appearance.

3.4 EXAMINATION OF SITE

A. The Contractor shall visit the site of the proposed work and become familiar with the conditions affecting the work. Contractor shall verify all measurements at the building before beginning work.

3.5 SITE UTILITY SERVICES

A. Where applicable, the Contractor shall make connections to existing permanent source utilities related to his contract immediately so as to provide the use of this service by other trades. Comply with Division 01 requirements.

REMODEL ONLY

3.6 EXISTING HVAC SYSTEMS

A. Confirm the locations of existing HVAC Equipment in the area of the facility being remodeled and relate on how it is adapted into the new scheme of things. The Contractor shall assume that connection points are as indicated on the plans. Where connection points are not within this radius, the Contractor shall contact the Architect for a decision before proceeding or may proceed at his own expense.

3.7 LAYING OUT WORK

A. Locations of equipment and devices, as shown on the drawings, are approximate unless dimensioned. Exact locations of such items shall be determined by the Architect's representative and/or secured from special details and drawings. Verify the physical dimensions of each item of mechanical equipment to fit the available space and promptly notify the Architect/Engineer prior to roughing-in if conflicts appear. Coordination of equipment to the available space and to the access routes through the construction shall be the Contractor's responsibility.

B. The contractor **shall hand deliver to the general contractor** a written statement and/or a manufacturer's brochure on the equipment being installed at each location. The information shall give the dimensions and weight (loads) of each unit being installed. The general contractor shall forward a copy of this information to the structural engineer and obtain from him confirmation that the building structure will accommodate the loads. If there be any problem the questioning party shall notify the mechanical engineer by phone and in writing.

3.8 CONTRACTOR COORDINATION

A. In the course of installing the systems defined in the contract documents, the contractor shall closely follow the plans, details and specifications (contract documents). The system design has been a careful and laborious undertaking, with the intent purpose of producing a system and/or systems that will serve the owner well with a minimum of maintenance. Thence, the contractor shall adhere as closely as possible to the plans, details, and specifications for each system. Questions and suggestions are encouraged as the project is being assembled. If for any reason, the contractor feels to deviate from the defined information, and finds a way, to improve the system, to make the system more easily assembled, make it operate more efficiently, etc., the contractor shall suggest the change to the engineer. Systems are designed to perform a specific function; the most minute change in assembly may change the function. If the engineer agrees with the change, he will authorize the contractor to proceed. Contractor cooperation and coordination is appreciated. If the contractor proceeds on construction without the designer's authorization, it shall be reworked, in accordance to plans and specifications, which work shall be at the contractor's expense.

3.9 CUTTING AND PATCHING

A. All cutting and patching of new or existing construction required for installation of mechanical systems and equipment specified in Division 23 shall be the responsibility of the Mechanical Contractor unless otherwise noted. Comply with Division 1 for general requirements for cutting and patching.

B. All cutting shall be performed with masonry saws, core drills or similar equipment to provide neat and uniform openings.

C. All patching shall match adjacent surfaces in materials and finish. Do not endanger or damage installed work through procedures and processes of cutting and patching.

D. Arrange for repairs required to restore other work, because of damage caused as a result of HVAC installations.

E. No additional compensation will be authorized for cutting and patching work that is necessitated by ill-timed, defective, or non-conforming installations.

F. Perform cutting, fitting, and patching of HVAC 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. Install equipment and materials in existing structures.

G. Upon written instructions from the Architect/Engineer, uncover and restore work to provide for Architect/Engineer observation of concealed work.

H. Cut, remove and legally dispose of selected HVAC equipment, components, and materials as indicated, including, but not limited to removal of HVAC piping, heating units, ductwork plumbing, etc., and other HVAC items made obsolete by the new work.

I. Protect the structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.

J. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.

3.10 OPENINGS IN PIPING

A. All temporary openings in ducts shall be capped or sealed during construction. Caps shall be removed for final connections.

3.11 PROTECTION OF MATERIALS AND EQUIPMENT

A. Contractor shall be held responsible for any and all materials and equipment to be installed under this contract and will be required to make good at his own cost any injury or damage which materials or equipment may sustain from any source or cause whatsoever before final acceptance. Comply with Division 01 requirements.

3.12 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to project properly identified with names, model numbers, types, grades, compliance labels, and similar information needed for distinct identifications; adequately packaged and protected to prevent damage during shipment, storage, and handling.

B. Store equipment and materials at the site, unless off-site storage is authorized in writing. Protect stored equipment and materials from damage.

C. Coordinate deliveries of HVAC materials and equipment to minimize construction site congestion. Limit each shipment of materials and equipment to the items and quantities needed for the smooth and efficient flow of installations.

3.13 ACCESSIBILITY

A. Install equipment and materials to provide required access for servicing and maintenance. Coordinate the final location of concealed equipment and devices requiring access with final location of required access panels and doors. Allow ample space for removal of all parts that require replacement or servicing.

B. Access doors or hatches required for servicing of mechanical equipment shall be furnished and installed as specified in the other Divisions and Sections of the Specifications.

3.14 PAINTING

A. Contractor shall touch-up scratched, or damaged factory finishes of HVAC equipment. Comply with Division 01 requirements.

B. Unless otherwise noted, all other painting of HVAC related items shall be according Section 099123 "PAINTING".

3.15 LUBRICATION

A. Contractor shall properly lubricate all pieces of equipment before turning the building over to the Owner. Comply with Division 01 requirements.

3.16 FINAL CLEANING

A. Refer to Division 01 for general requirements for final cleaning.

B. At time of final cleanup, all fixtures and equipment shall be thoroughly cleaned and left in condition for use.

3.17 FIRE PENETRATION SEALS

A. All penetrations through fire rated floors and walls shall be sealed to prevent the spread of smoke, fire, toxic gas, or water through the penetration either before, during or after a fire. The fire rating of the penetration seal shall be at least that of the floor to wall into which it is installed so that the original fire rating of the floor or wall is maintained.

B. The sealant shall remain soft and pliable to allow for the removal and/or addition of piping without the necessity of drilling holes. It shall adhere to itself to allow any and all repairs to be made with the same material. It shall permit the vibration, expansion and/or contraction of piping and ducts going through the penetration without the seal cracking or crumbling.

C. When damming materials are to be left in place after the seal is complete, all such materials shall be non-flammable.

D. When sealant is injected into a penetration, the foam shall expand to surround all items within the penetration and maintain pressure against the walls of the penetration. The foam shall cure within five minutes and be fire resistant at that time. No heat shall be required to further expand the foam to block the passage of fire and smoke or water.

E. All wall or floor penetration openings shall be as small as possible.

F. The foam sealant shall meet the entire fire test and hose stream test requirements of ASTM E119-73 and shall be UL classified as a Wall Opening Protective Device. The sealant shall be CHASE-FOAM, CTC PR-855 Fire Resistant Foam Sealant from Chase Technology Corporation, Huntington Station, New York 11746 or 3M Brand Fire Barrier caulk CP25, putty 303, wrap/strip FS 195 or sheet CS 195 from 3M Products Divisions, 224-4N 3M Center, St. Paul, MN 55144-1000.

END OF SECTION 230501

SECTION 230513 - ELECTRICAL REQUIREMENTS AND MOTORS FOR HVAC EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of contract, including General and Supplementary Conditions and Division 01 Specification sections, apply to work of this section.

B. Section 230501 Basic Mechanical Materials and Methods sections apply to work of this section.

1.2 SUMMARY

A. This section specifies the basic requirements for electrical components which are an integral part of packaged mechanical equipment. These components include, but are not limited to factory installed motors, starters, and disconnect switches furnished as an integral part of packaged mechanical equipment.

B. Specific electrical requirements for electric motor (i.e. horsepower, voltage, phase and electrical characteristics) for the mechanical equipment are specified within the individual equipment specifications and/or noted in the schedule on the drawings.

C. All magnetic motor starters and disconnect switches not furnished as an integral part of packaged mechanical equipment shall be provided under Division 23 - Mechanical.

D. Wiring from motors of mechanical equipment to disconnect switches or junction boxes, including pushbuttons, pilot lights, interlocks, speed controllers, and similar devices shall be the responsibility of this Contractor under Division 23 where not specifically indicated under Division 26.

E. Wiring of field-mounted float control switches, flow control switches, and similar mechanical/electrical devices provided for mechanical systems, to equipment control panels shall be the responsibility of this Contractor under Division 23 where not specifically indicated under Division 26.

F. Wiring required for Automatic Controls Section 23 0933 shall be the responsibility of this Contractor under Division 23.

1.3 REFERENCES

A.	NEMA Standard MG 1:	Motors and Generators.
B.	NEMA Standard ICS 2:	Industrial Control Devices, Controllers and Assemblies.
C.	NEMA Standard 250:	Enclosures for Electrical Equipment.
D.	NEMA Standard KS 1:	Enclosed Switches. Comply with National Electrical Code (NFPA 70).

1.4 SUBMITTALS

A. No separate submittal is required. Submit product data for motors, starters, and other electrical components with submittal data required for the equipment for which it serves as required by the individual equipment specification sections.

1.5 QUALITY ASSURANCE

A. All electrical components and materials shall be labeled by an approved testing agency (UL, ETL, CSA, etc.).

PART 2 - PRODUCTS

2.1 MOTORS

A. The following are basic requirements for simple or common motors. For special motors, more detailed and specific requirements are specified in the individual equipment specifications.

1. Torque characteristics shall be sufficient to satisfactorily accelerate the driven loads.
2. Motor sizes shall be large enough so that the driven load will not require the motor to operate in the service factor range.
3. Two-speed motors shall have two separate windings on poly-phase motors.
4. Single speed motors shall be inverter - duty motors.
5. Temperature Rating: Rated for 40/C environment with maximum 50/C temperature rise for continuous duty at full load (Class A insulation). Service Factor: 1.15 for poly-phase motors and 1.35 for single phase motors.

B. Motor Construction: NEMA Standard MG 1, general purpose, continuous duty, Design "B", except "C" where required for high starting torque.

C. Frames: NEMA Standard No. 48 or 54; use driven equipment manufacturer's standards to suit specific application.

D. Bearings: Ball or roller bearings with inner and outer shaft seals; re-greaseable, except permanently sealed where motor is normally inaccessible for regular maintenance; designed to resist thrust loading where belt drives or other drives produce lateral or axial thrust in motor; for fractional horsepower, light duty motors, sleeve type bearings are permitted.

E. Enclosure Type: Open drip-proof motors for indoor use where satisfactorily housed or remotely located during operation; guarded drip-proof motors where exposed to contact by employee or building occupants; weather-protected Type I for outdoor use, Type II where not housed.

F. Overload Protection: Built-in thermal overload protection and, where indicated, internal sensing device suitable for signaling and stopping motor at starter.

G. Noise Rating: "Quiet" rating on motors located in occupied spaces of building.

H. Efficiency: "Energy efficient" motors shall have a minimum efficiency as scheduled in accordance with IEEE Standard 112, test method "B". If efficiency not specified, motors shall have a higher efficiency than "average standard industry motors", in accordance with IEEE Standard 112, test method "B".

I. Nameplate: Indicate the full identification of manufacturer, ratings, characteristics, construction, special features, and similar information.

2.2 STARTERS, ELECTRICAL DEVICES, AND WIRING

A. Motor Starter Characteristics: Enclosures NEMA, general purpose enclosures with padlock ears, except in wet location shall be NEMA 3R with conduit hubs. Type and size of starter shall be as recommended by motor manufacturer and the driven equipment manufacturer for applicable protection and startup condition.

B. Manual switches shall have pilot lights and extra positions for multi-speed motors. Overload protection shall be melting alloy type thermal overload relays.

C. Magnetic starters shall have maintained contact pushbuttons and pilot lights, properly arranged for single speed or multi-speed operation as indicated; trip-fee thermal overload relays each phase, interlocks, pneumatic switches and similar devices as required for coordination with control requirements of Division 23 Controls sections, built-in 120 volt control circuit transformer, fused from line side, where service exceeds 240 volts; externally operated manual reset, under-voltage release or protection.

D. Motor connections shall have flexible conduit, except where plug-in electrical cords are specifically indicated.

2.3 CAPACITORS

A. Features shall include individual unit cells, all welded steel housing, each capacitor internally fused, non-flammable synthetic liquid impregnated, craft tissue insulation and aluminum foil electrodes.

B. KVAR size shall be as required to correct motor power factor to 90% or better and shall be installed on all motors 1 horsepower or larger, that have an uncorrected power factor of less than 85% at rated load.

PART 3 - EXECUTION
(Not Applicable)

END OF SECTION 230513

SECTION 230548 - VIBRATION AND SEISMIC CONTROL FOR PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Includes but not limited to:

1. Quality of and requirements for anchorage and seismic restraint systems and vibration isolation systems for piping and equipment.

B. Related Sections:

1. Furnishing and installing of seismic restraint and vibration isolation systems is by installer of equipment requiring such systems. Manufacturers of equipment specified for seismic restraint shall provide product data needed for calculation of seismic restraint needs. This information shall include, but not be limited to, equipment dimensions, dimensioned anchor points, operating weight, and center of gravity dimension.

1.2 REFERENCES

A. American Society for Testing and Materials:

1. ASTM A 615-04b, 'Standard Specification for Deformed & Plain Billet-Steel Bars for Concrete Reinforcement.'

1.3 SUBMITTALS

A. Product Data:

1. Restraint system and anchorage method to be used for each piece of equipment.
2. Seismic restraints and calculations for all flexible mounted equipment.
3. Vibration isolators and flexible couplings.
4. Clearly outlined procedures for installing and adjusting isolators, seismic bracing anchors, and snubbers.

B. Shop Drawings:

1. Show size, hanger length, and location of seismic restraints for piping.
2. Show details for each isolator and seismic brace with snubbers proposed for specified equipment.
3. Show details for proposed structural steel frames and rails and for anchors to be used in conjunction with isolation of equipment.
4. Show locations of piping and ductwork restraints on installation and fabrication floor plans (not bid set of documents of floor plans), noting size and type of restraint to be used.

5. Show details of supports, hangers, anchorage, and bracing for isolated equipment as designed or proposed by professional engineer employed by Restraint Manufacturer and qualified with seismic experience in bracing for mechanical equipment. Shop drawings submitted for seismic bracing and anchors shall bear engineer's signed professional seal.
6. Include anchor bolt calculations, signed and stamped by registered engineer, showing adequacy of bolt sizing and type.
    a. Calculations shall include anchor embedment, minimum edge distance and minimum center distance.
    b. Design lateral forces shall be distributed in proportion to mass distribution of equipment.
    c. Furnish calculations for anchors on restraint devices, cable, isolators, and on rigidly mounted equipment.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements: System design and installation shall meet seismic requirements as defined in current edition of International Building Code, Section 1621 and applicable state and local codes in accordance with the site's Seismic Zone and with the minimum restraint capability of .2 g. Explicit requirements and details can be found in referenced SMACNA Manual.

B. Seismic Requirements: Mechanical equipment and piping shall be braced, snubbed, or supported to withstand seismic disturbances and remain operational.

C. Vibration Isolation Requirements: Isolate equipment from structure by means of resilient vibration and noise isolators.

PART 2 - PRODUCTS

PROJECT SPECIFIC: Edit materials list below to include only those materials or elements that are actually part of the Mechanical design.

2.1 MATERIALS

A. Isolation and Seismic Equipment:

1. Piping: Restrain piping in accordance with Figures 4.11 to 4.19 in SMACNA Manual.
2. Equipment with Fixed Anchor or Support:
    a. Restraint designed according to the International Building Code.
    b. Horizontal force factor for elements of structures:
        1) In addition, vertical force restraint requirement shall be computed at 1/2 value of horizontal forces.
        2) Restrain equipment not anchored directly to floors by cable system designed and furnished by Restraint Manufacturer.

B. Vibration Isolation Requirements:

1. Design and install isolation equipment, hangers, connections, and other isolating devices to prevent transmission of vibration to structure from equipment and associated piping.

2. For floor-mounted equipment, use recommendations of Table 45.
3. For roofs and floors constructed with open web joints, thin long span slabs, wooden construction and unusual light weight construction, evaluate equipment weighing more than 300 pounds to determine additional deflection of structure caused by equipment weight. Isolator deflection shall be 15 times additional deflection or deflection shown in Table 45, whichever is greater.
4. Under-Equipment Spring Isolators:
    a. Equal to Mason SSLFH earthquake motion restrained spring mounts with freestanding stable steel springs, leveling bolts, corrosion resistant finish, motion limiting design, uplift restraining bolts, and ¼" ribbed neoprene noise stop pad.
    b. Isolators shall accept force in any direction up to 1.0 g without failure and shall limit movement to ¾" in any direction.
    c. Springs shall have 50% overload capacity.
    d. Size as required to achieve specified static deflection.
    e. Outer diameter of spring proper shall not be less than 0.8 of spring height when in loaded position.

5. Overhead Support Spring and Rubber Hangers:
    a. Combination spring and neoprene hangers.
    b. Hanger bracket shall have 500% overload capability and shall allow up to 15º hanger rod misalignment without short-circuiting.
    c. Springs shall have 50% overload capacity.
    d. Provide seismic bracing as required.

6. Isolate piping in mechanical equipment room and piping three supports away or 50' from other mechanical equipment, whichever is greater, from structure by means of vibration and noise isolators.
    a. Isolate suspended piping with combination spring and fiberglass hangers in supporting rods.
    b. Support floor-mounted piping directly on spring mounts.

7. Isolate vertical pipe risers from structure using vibration and noise isolating expansion hangers having minimum rated deflection of four times anticipated pipe movement. Enclose in housing for fail-safe equipment.
8. Incorporate flexible connectors in piping adjacent to reciprocating equipment.
9. Elastomeric Isolator: Neoprene or high-quality synthetic rubber with anti-ozone and anti-oxidant additives.
10. Nuts, Bolts, And Washers: Electroplated zinc.
11. Isolators Exposed to Weather: Cadmium plated and neoprene coated springs.

C. Seismic restraint equipment and resilient isolation devices shall be designed and furnished by single Manufacturer:

D. Type One Acceptable Manufacturers:

1. Amber / Booth Company, Houston, TX www.amberbooth.com
2. Mason Industries Inc, Hauppauge, NY www.mason-ind.com.
3. Vibration Mountings and Control Inc, Bloomington, NJ (201) 838-1780.
4. Equal as approved by Architect before bidding. See Section 01 6000.

2.2 FINISHES

A. Clean and paint steel components. Thoroughly clean structural steel bases of welding slag and prime with zinc-chromate or metal etching primer. Etch and paint hot dipped galvanized steel components.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Isolation Equipment:

1. Mount vibration isolated equipment on rigid steel frames or concrete bases unless Equipment Manufacturer certifies direct attachment capability.
2. Install snubbers with factory set clearances.
3. Piping:
    a. Protect isolated and non-isolated piping 2½" inside diameter and larger in all planes by restraints to accommodate thermal movement as well as restrain seismic motions.
    b. Locations shall be as scheduled and include, but not be limited to:
        1) At drops to equipment and at flexible connections.
        2) At 45º or greater changes in direction of pipe.
        3) At horizontal runs of pipe 30" maximum on center spacing.
        4) Gas piping shall have additional restraints as scheduled.

B. Vibration Isolation: Install piping and ductwork to prevent transmission of noise and vibration into structure.

END OF SECTION 230548

SECTION 230554 - MECHANICAL IDENTIFICATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to this section.

1.2 SUMMARY

A. This section includes mechanical identification materials and devices.

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specifications Sections.

B. Product data for identification materials and devices.

C. Samples of color, lettering style, and other graphic representation required for each identification material and device.

D. Valve Schedules: Submit valve schedules for each piping system. Reproduce on standard-size bond paper. Tabulate valve number, piping system, system abbreviation (as shown on tag), location of valve (room or space), and variations for identification. Mark valves intended for emergency shutoff and similar special uses. Furnish extra copies (in addition to mounted copies) for Maintenance Manuals.

1.4 QUALITY ASSURANCE

A. Comply with ASME A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices.

1.5 SEQUENCING AND SCHEDULING

A. Coordinate installation of identifying devices after completion of covering and painting where devices are applied to surfaces. Install identifying devices prior to installation of acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 IDENTIFYING DEVICES AND LABELS

A. General: Products specified are manufacturer’s standard products of categories and types required for each application as referenced in other Division 23 Sections. Where more than single type is specified for listed application, selection is Installer’s option, but provide since selection for each product category.

B. Stencils: Standard stencils, prepared with letter sizes conforming to recommendations of ASME A13.1. Minimum letter height is 1¼" for ducts and ¾" for access door signs and similar operational instructions.

1. Material: Fiberboard or brass.
2. Stencil Paint: Exterior, oil based alkyd gloss black enamel, except as otherwise indicated. Paint may be in pressurized spray-can form.
3. Identification Paint: Exterior, oil-based alkyd enamel in colors according to ASME A13.1, except as otherwise indicated.

C. Pressure-Sensitive Pipe Markers: Manufacturer's standard pre-printed, color-coded, pressure-sensitive vinyl pipe markers, with permanent adhesive conforming to ASME A13.1.

D. Pipes Smaller Than 6": Full-band pipe markers, extending 360º around pipe at each location.

E. Pipes 6" And Larger: Either full-band or strip-type pipe markers, at least 3 times the letter height and of the length required for the label.

F. Lettering: Manufacturer's standard pre-printed terms as selected by Architect.

G. Lettering: Use piping system terms as indicated and abbreviate only as necessary for each application length.

1. Arrows: Either integrally with piping system service lettering (to accommodate both directions), or as separate unit, on each pipe marker to indicate direction of flow.

H. Plastic Tape: Manufacturer's standard color-coded, pressure sensitive, self-adhesive, vinyl tape, at least 3-mils thick.

1. Width: 1-1/2" wide on pipes with outside diameters (including insulation) less than 6"; 2½" wide for larger pipes.
2. Color: Comply with ASME A13.1, except where another color selection is indicated.

I. Valve Tags: Stamped or engraved with ¼" letters for piping system abbreviation and ½" sequenced numbers. Provide a 5/32" hole for fastener.

1. Material: 19-gauge polished brass
2. Material: 0.032" thick aluminum
3. Material: 19-gauge stainless steel
4. Material: 3/32" thick plastic laminate having 2 black surfaces and a white inner layer.
5. Material: Valve manufacturer's standard solid plastic.
6. Material: Size: 1½" diameter, except as otherwise indicated.
7. Shape: As indicated for each piping system.

J. Valve Tag Fasteners: Brass chain (wire link or beaded type) or brass S-hooks.

K. Access Panel Markers: 1/16" thick engraved plastic-laminate markers, with abbreviated terms and numbers corresponding to concealed valve. Provide 1/8" center hole for attachment.

L. Valve Schedule Frames: Glazed extruded aluminum display frame, with screws for removable mounting on masonry walls for each page of valve

1. Glazing: ASTM C 1036, 2.5 mm, single thickness, sheet glass.
    a. Type: Type I, flat transparent.
    b. Class: Class 1, clear.
    c. Quality: Glazing B, for general applications.

M. Engraved Plastic-Laminate Signs: ASTM D 709, Type I, cellulose, paper-base, phenolic-resin-laminate engraving stock; Grade ES-2, black surface, black phenolic core, with white (letter color) melamine sub core, except when other colors are indicated. Fabricate in sizes required for message. Provide holes for mechanical fastening.

1. Engraved with engraver's standard letter style, of sizes and with terms to match equipment identification.
2. Thickness: 1/16”, for units up to 20 in^2 or 8” length; 1/8” for larger units.
3. Fasteners: Self-tapping stainless steel screws or contact-type permanent adhesive.

N. Plastic Equipment Markers: Laminated plastic, in the following color code:

1. Green: Cooling equipment and components.
2. Yellow: Heating equipment and components.
3. Yellow/Green: Combination cooling and heating equipment and components.
4. Brown: Energy reclamation equipment and components.
5. Blue: Equipment and components that do not meet any of above criteria.
6. For hazardous equipment, use colors and designs recommended by ASME A13.1.
7. Terminology: Include following, matching schedules as closely as possible:
    a. Name and plan number.
    b. Equipment service.
    c. Design capacity.
    d. Other design parameters such as pressure drop, entering and leaving conditions and rpm.

8. Size: Approximate 2½” by 4” for control devices, dampers and valves; and 4½” by 6” for equipment.

O. Plasticized Tags: Pre-printed or partially pre-printed accident-prevention tags, of plasticized card stock with matt finish suitable for writing.

1. Size: Approximately 3¼” by 5-5/8”.
2. Fasteners: Brass grommets and wire.
3. Nomenclature: Large-size primary wording such as "DANGER," "CAUTION" or "DO NOT OPERATE."

P. Lettering and Graphics: Coordinate names, abbreviations and other designations used in mechanical identification, with corresponding designations indicated. Use numbers, letters, and terms indicated for proper identification, operation, and maintenance of mechanical systems and equipment.

1. Multiple Systems: Where multiple systems of same name are indicated, identify individual system number as well as service (such as Boiler No. 3, Air Supply No. 1H or Standpipe F12.)

PART 3 - EXECUTION

3.1 LABELING AND IDENTIFYING

A. Piping Systems: Install pipe markers on each system. Include arrows showing normal direction of flow.

1. Stenciled Markers: Complying with ASME A13.1.
2. Plastic markers, with application systems. Install on pipe insulation segment where required for hot non-insulated pipes.
    a. Fasten markers on pipes smaller than 6” by one of following methods:
        1) Snap-on application of pre-tensioned semi-rigid plastic pipe marker.
        2) Adhesive lap joint in pipe marker overlap.
        3) Laminated or bonded application of pipe marker to pipe (or insulation).
        4) Taped to pipe (or insulation) with color-coded plastic adhesive tape, not less than ¾” wide, lapped 1½” minimum at both ends of pipe marker and covering full circumference of pipe.
    b. Fasten markers on pipes 6” and larger by one of following methods:
        1) Laminated or bonded application of pipe marker to pipe (or insulation).
        2) Taped to pipe (or insulation) with color-coded plastic adhesive tape, not less than 1-1/2” wide, lapped 3” minimum at both ends of pipe marker and covering full circumference of pipe.
        3) Strapped to pipe (or insulation) with manufacturer's standard stainless steel bands.

3. Locate pipe markers and color bands as follows wherever piping is exposed in finished spaces, machine rooms, accessible maintenance spaces (shafts, tunnels, plenums) and exterior non-concealed locations.
    a. Near each valve and control device.
    b. Near each branch connection, excluding short take-offs for fixtures and terminal units. Mark each pipe at branch, where flow pattern is not obvious.
    c. Near penetrations through walls, floors, ceilings or enter non-accessible enclosures.
    d. At access doors, manholes and similar access points that permit view of concealed piping.
    e. Near major equipment items and other points of origination and termination.
    f. Spaced at a maximum of 50’ intervals along each run. Reduce intervals to 25’ in congested areas of piping and equipment.
    g. On piping above removable acoustical ceilings, except omit intermediately spaced markers.

B. Valve Tags: Install valve tag on valves and control devices in piping systems, except check valves, valves within factory-fabricated equipment units, plumbing fixture supply stops, shut-off valves, faucets, convenience and lawn-watering hose bibbs, and HVAC terminal devices and similar roughing-in connections of end-use fixtures and units. List tagged valves in valve schedule.

1. Install mounted valve schedule in each major equipment room.

C. Equipment: Install engraved plastic laminate signs or equipment markers on or near each major item of mechanical equipment. Provide signs for following general categories of equipment:

1. Main control and operating valves, including safety devices and hazardous units such as gas outlets.
2. Meters, gages, thermometers and similar units.
3. Fuel-burning units including boilers, furnaces, heaters, stills and absorption units.
4. Pumps, compressors, chillers, condensers and similar motor- driven units.
5. Heat exchangers, coils, evaporators, cooling towers, heat recovery units and similar equipment.
6. Tanks and pressure vessels.
7. Strainers, filters, humidifiers, water treatment systems and similar equipment.

D. Optional Sign Types: Stenciled signs may be provided instead of engraved plastic, at Installer's option, where lettering larger than 1” high is needed for proper identification because of distance from normal location of required identification.

1. Lettering Size: Minimum ¼” for name of unit where viewing distance is less than 2’, ½” for distances up to 6’, and proportionately larger lettering for greater distances. Provide secondary lettering 2/3 to ¾ of size of principal lettering.
2. Terms on Signs: In addition to name of identified unit distinguish between multiple units, indicate operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations.

E. Plasticized Tags: Install within concealed space to reduce amount of text in exposed sign (outside concealment), where equipment to be identified is concealed above acoustical ceiling or similar concealment.

1. Identify operational valves and similar minor equipment items located in unoccupied spaces (including machine rooms) by installing plasticized tags.

3.2 ADJUSTING AND CLEANING

A. Relocate mechanical identification materials and devices which have become visually blocked by work of this Division or other Divisions.

END OF SECTION 230554

SECTION 230719 - STEAM AND CONDENSATE RETURN PIPING INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of contract, including General and Supplementary Conditions and Division-01 Specification sections, apply to work of this section.

B. Section 230501 Basic Mechanical Materials and Methods sections apply to work of this section.

1.2 SUMMARY

A. Includes but not limited to

1. Insulate piping mains, branches, risers, fittings, and valves.

PART 2 - PRODUCTS

2.1 APPROVED PRODUCTS

A. Six lb/ft³ density (R-3.7 per inch) fiberglass with fire retardant vapor barrier jacket with self-sealing laps.

1. Thickness shall be 2½” on steam and condensate return lines less than 1½" diameter.
2. Thickness shall be 3” on steam and condensate return lines greater than 1½" diameter.

2.2 APPROVED MANUFACTURERS

A. Owens-Corning Fiberglass heavy density with ASJ-SSL jacket.

B. Equals by johns-Manville or CSG.

C. Zeston covers for valves and fittings.

PART 3 - EXECUTION

3.1 PIPES

A. Install in accordance with manufacturer's directions on clean dry pipes.

B. Butt joints firmly together.

C. Seal vapor barrier longitudinal seam overlap with vapor barrier adhesive.

D. Wrap butt joints with 4” strip of vapor barrier jacket material cemented with vapor barrier adhesive.

E. Finish with bands applied at mid-section and at each end of insulation.

3.2 VALVES AND FITTINGS

A. Insulate and finish by one of the following methods:

1. With hydraulic setting insulating cement, or equal, to a thickness equal to adjoining pipe insulation.
2. With segments of molded insulation securely wired in place.
3. With prefabricated covers made from molded pipe insulation finished with vapor barrier adhesive.
4. With Zeston covers.

B. Finish all fittings and valves with four-ounce canvas and coat with vapor barrier adhesive unless using Zeston covers.

END OF SECTION 230719

SECTION 230800 - COMMISSIONING OF HVAC

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of contract, including General and Supplementary Conditions and other Division-01 Specification Sections, apply to work of this section.

1.2 SUMMARY

A. Section in includes commissioning process requirements for the steam system, assemblies, and equipment.

B. Related Sections:

1. Division 01 Section “General Commissioning Requirements” for general commissioning process requirements.

1.3 DEFINITIONS

A. Commissioning Plan: A document that outlines the organization, schedule, allocation of resources, and documentation requirements of the commissioning process.

B. CxA: Commissioning Authority.

C. Systems, Subsystems, Equipment, and Components: Where these terms are used together or separately, they shall mean “as-built” systems, subsystems, equipment, and components.

1.4 INFORMATIONAL SUBMITTALS

A. Certificates of readiness

B. Certificates of completion and installation, prestart, and start up activities.

1.5 ALLOWANCES

A. Labor, instrumentation, tools, and equipment costs for technicians for the performance of commissioning testing are covered by the “Schedule of Allowances” Article in Division 01 Section “Allowances.”

1.6 UNIT PRICES

A. Commissioning testing allowance may be adjusted up or down by the “List of Unit Prices” Article in Division 01 Section “Unit Prices” when actual man-hours are computed at the end of commissioning testing.

1.7 CONTRACTOR'S RESPONSIBILITIES

A. Perform commissioning tests at the direction of the Engineer.

B. Attend construction phase controls coordination meeting.

C. Attend testing, adjusting, and balancing review and coordination meeting.

D. Participate in HVAC & R systems, assemblies, equipment, and component maintenance orientation and inspection as directed by Engineer.

E. Provide information requested by Engineer for final commissioning documentation.

F. Provide measuring instruments and logging devices to record test data and provide data acquisition equipment to record data for the complete range of testing for the required test period.

1.8 COMMISSIONING OF DOCUMENTATION

A. Provide the following information to Engineer for inclusion in the commissioning plan:

1. Plan for delivery and review of submittals, systems manuals, and other documents and reports.
2. Identification of installed systems, assemblies, equipment, and components including design changes that occurred during the construction phase.
3. Process and schedule for completing construction checklists and manufacturer's prestart and startup checklists for the steam system, assemblies, equipment, and components to be verified and tested.
4. Certificate of completion certifying that installation, prestart checks, and startup procedures have been completed.
5. Certificate of readiness certifying that the steam system, equipment, and associated controls are ready for testing.
6. Test and inspection reports and certificates.
7. Corrective action documents.
8. Verification of testing, adjusting, and balancing reports.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TESTING PREPARATION

A. Certify that the steam system, and equipment have been installed, calibrated, and started and are operating according to the Contract Documents.

B. Certify that the steam instrumentation and control systems have been completed and calibrated, that they are operating according to the Contract Documents, and that pretest set points have been recorded.

C. Certify that testing, adjusting, and balancing procedures have been completed and that testing, adjusting, and balancing reports have been submitted, discrepancies corrected, and corrective work approved.

D. Set systems, subsystems, and equipment into operating mode to be tested (e.g., normal shutdown, normal auto position, normal manual position, unoccupied cycle, and alarm conditions).

E. Inspect and verify the position of each device and interlock identified on checklists.

F. Check safety cutouts, alarms, and interlocks with smoke control and life-safety systems during each mode of operation.

G. Testing Instrumentation: Install measuring instruments and logging devices to record test data as directed by Engineer.

3.2 GENERAL TESTING REQUIREMENTS

A. Provide technicians, instrumentation, and tools to perform commissioning test at the direction of the engineer.

B. Scope of the steam testing shall include entire steam boiler installation, from central equipment for heat generation and through the distribution system to each conditioned space. Testing shall include measuring capacities and effectiveness of operational and control functions.

C. Test all operating modes, interlocks, control responses, and responses to abnormal or emergency conditions, and verify proper response of building automation system controllers and sensors.

D. Engineer along with the boiler subcontractor, shall prepare detailed testing plans, procedures, and checklists for the boiler system, subsystems, and equipment.

E. Tests will be performed using design conditions whenever possible.

F. Simulated condition may need to be imposed using an artificial load when it is not practical to test under design conditions. Before simulating conditions, calibrate testing instruments. Provide equipment to simulate loads. Set simulated conditions as directed by engineer and document simulated conditions and methods of simulation. After test, return settings to normal operating conditions.

G. Engineer may direct that set points be altered when simulating conditions is not practical.

H. Engineer may direct that sensor values be altered with a signal generator when design or simulating conditions and altering set points are not practical.

I. If tests cannot be completed because of a deficiency outside the scope of the steam system, document the deficiency and report it to the engineer. After deficiencies are resolved, reschedule tests.

J. If the testing plan indicates specific seasonal testing, complete appropriate initial performance tests and documentation and schedule seasonal tests.

3.3 HVAC & R SYSTEMS, SUBSYSTEMS, AND EQUIPMENT TESTING PROCEDURES

A. Boiler Testing and Acceptance Procedures: Testing requirements are specified in Division 23 boiler sections. Provide submittal, test data, inspector record, and boiler certification to engineer.

B. Pipe system cleaning, flushing, hydrostatic tests, and chemical treatment requirements are specified in Division 23 piping sections. The boiler subcontractor shall prepare a pipe system cleaning, flushing, and hydrostatic testing plan. Provide cleaning, flushing, testing, and treating plan and final report to engineer. Plan shall include the following:

1. Sequence of testing and testing procedures for each section of pipe to be tested, identified by pipe zone or sector identification marker. Markers shall be keyed to drawings for each pipe sector, showing the physical location of each designated pipe test section. Drawings keyed to pipe zones or sectors shall be formatted to allow each section of piping to be physically located and identified when referred to in pipe system cleaning, flushing, hydrostatic testing, and chemical treatment plan.
2. Description of equipment for flushing operations.
3. Minimum flushing water velocity.
4. Tracking checklist for managing and ensuring that all pipe sections have been cleaned, flushed, hydrostatically tested, and chemically treated.

C. The steam Distribution System of Testing: Provide technicians, instrumentation, tools, and equipment to test performance of the steam, system, and equipment.

D. Vibration and Sound Tests: Provide technicians, instrumentation, tools, and equipment to test performance of vibration isolation and seismic controls.

END OF SECTION 230800

SECTION 231120 - FACILITY NATURAL GAS SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. General conditions Division 01 and Section 220501 apply to this section.

1.2 SUMMARY

A. The gas contractor shall provide and install the gas piping (Natural Gas) from the existing gas main to the boiler being served, as shown on the plans.

B. The gas piping shall be supported as outlined in Section 220529.

C. The gas contractor shall provide under this contract all the valves, connection components, etc. required to connect all the gas equipment.

1.3 QUALITY ASSURANCE

A. Qualifications

1. Welders shall be certified and bear evidence of certification 30 days prior to commencing work on project. If there is doubt as to proficiency of welder, Owner's Representative may require welder to take another test. This shall be done at no cost to Owner. Certification shall be by Pittsburgh Testing Laboratories or other approved authority.

PART 2 - PRODUCTS

2.1 MANUFACTURING

A. All pipe and fittings shall be domestic (USA) manufactured.

B. All valves shall be domestic (USA) manufactured.

2.1 FOR PIPING AND INSTALLATION SEE SECTIONS

A. Meet requirements of ASTM A 53-89a, "Specification for Pipe, Steel, Black & Hot-Dipped Zinc-Coated Welded & Seamless".

B. Carbon steel, butt welded, Schedule 40 black steel pipe.

2.2 FITTINGS

A. Black Pipe

1. Welded forged steel fittings meeting requirements of ASTM A 234-89a, "Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures", or standard weight 150 lbs, malleable iron screwed.

2.3 VALVES

A. 125 psi bronze body ball valve, UL listed.

B. Approved Manufacturers & Models

1. ConBraCo - "Apollo" series 80-100
2. Jenkins - FIG-30-A
3. Jomar - Model T-204
4. McDonald - 3410
5. PGL Corp - "Red Cap" gas ball valve
6. Watts - Model B-6000-UL

PART 3 - EXECUTION

3.1 FOR INSTALLATION ABOVE AND BELOW GRADE SEE SECTIONS

A. Pipes 2½" and larger shall be welded pipe and fittings. Other pipe may have screwed or welded fittings.

B. Install gas cocks on lines serving boilers, furnaces, duct heaters, and water heaters adjacent to boiler, furnace, or heater on outside of boiler, furnace, or heater cabinet and easily accessible.

C. Do not use flexible pipe connections to boilers, furnaces, duct heaters, or hot water heaters.

D. Install dirt leg with pipe cap, 6" long minimum, on each vertical gas drop to heating equipment.

E. Use fittings for changes of direction in pipe and for branch runouts.

F. Paint main gas valve red and label "Main Gas Shut-off" with a permanent label. Paint gas piping yellow and label in boiler room.

END OF SECTION 221320

SECTION 232213 - STEAM AND CONDENSATE PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of contract, including General and Supplementary Conditions and Division-01 Specification sections, apply to work of this section.

B. Section 230501 Basic Mechanical Materials and Methods sections apply to work of this section.

C. Section 221116 & 221119 - Pipe & Pipe Fittings

1.2 SUMMARY

A. Includes but not limited to

1. Furnish and install steam and condensate piping as described in Contract Documents.
2. All materials and equipment specified under this section shall be American manufactured and made.

PART 2 - PRODUCTS

2.1 COMPONENTS

A. General - Piping over 2½" shall be welded with full weld fittings.

B. Steam Supply Piping

1. Schedule 40-A-120 black steel piping.
2. Fittings shall be standard weight 150 lb malleable iron screwed pattern up to 2½".
3. All materials and equipment specified under this section shall be American manufactured and made.

C. Condensate Piping

1. Schedule 80 black steel piping.
2. Fittings shall be standard weight 300 lb malleable iron screwed pattern up to 2½".
3. All materials and equipment specified under this section shall be American manufactured and made.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Ream out pipe ends and remove burrs before making up into fittings. Use graphite and oil applied to male threads only in making pipe joint fittings.

B. Install unions where necessary and on both sides of equipment and drip traps.

C. Install float and thermostatic drip traps in sizes shown on Drawings.

1. Install at ends and on raises of steam mains.
2. Install dirt strainer and gate valve ahead of each drip trap.

D. Start main piping runs as high as possible.

1. Keep as close to ceiling as possible.
2. Make sufficient allowance for grade downward and for branches to be taken off top at 45º angles.

E. Grade steam and return mains downward in direction of flow 1" in 20'. Grade runouts and branches that grade against flow of steam at ¼"/ft.

3.2 FIELD QUALITY CONTROL

A. Site Tests, Inspections

1. Do not cover or conceal piping system until tested at 50 psi in excess of maximum working pressure (100 psi minimum) and inspected and approved by Engineer and local inspector having jurisdiction.
2. When directed by Engineer, conduct operating test on any piece of equipment to demonstrate its capacity and operating characteristics.

3.3 CLEANING

A. Thoroughly clean equipment, piping, and other material provided under this Section. Remove rust, scale, and other dirt before painting or covering and before operating system.

B. Operate heating system at 10 psi for 6 hours minimum, then:

1. Fill boiler to top with water to wash film, oil, and grease over top.
2. Drain boiler and refill to proper level with fresh water.
3. Use one pound tri-sodium phosphate for every 100 gallons of water during cleaning operation.

END OF SECTION 232213

SECTION 232214 - STEAM AND CONDENSATE SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of contract, including General and Supplementary Conditions and Division-01 Specification sections, apply to work of this section.

B. Section 230501 Basic Mechanical Materials and Methods sections apply to work of this section.

1.2 SUMMARY

A. Includes but not limited to

1. Furnish and install steam and steam condensate specialties as described in Contract Documents.
2. Replace existing building steam traps with new traps.

B. Related Sections

PART 2 - PRODUCTS

2.1 COMPONENTS

A. Drip Traps & Steam Coil Traps

1. Combination float and thermostatic (F&T) type. Thermostatic element shall form automatic air vent and conform to applicable requirements of thermostatic radiator traps.
2. Main trap body, float, and valve mechanism shall be capable of withstanding constant steam pressure of 15 psi.
3. Traps shall deliver rated capacity called for on Drawings at ½ lb. differential pressure.
4. Approved Manufacturers
   a. Illinois Series G
   b. Dunham-Bush
   c. Armstrong
   d. Spirax Sparco
   e. ITT Hoffman Series H

B. Thermostatic Traps

1. Rugged brass construction with union inlet.
2. Duplex phosphor bronze diaphragm.
3. Stainless steel valve cone and seat.
4. Diaphragms and seats both replaceable.
5. Rated for 25 psig to 25” vacuum.

6. Approved Manufacturers
    a. Spirax Sparco
    b. Armstrong
    c. Dunham-Bush
    d. Illinois
    e. ITT Hoffman
    f. Sterlco

C. Check Valve

1. Swing type disc.
2. Threaded connection
3. Stainless Steel 316.

D. Valves

1. Cutoff Service - Three-piece, full port, bronze ball valves rated at 400 psig WOG and 150 psig saturated steam.
2. Approved Manufacturers
    a. Apollo 82-100 Series
    b. Nibco Series 595
    c. Hammond Series 8600
    d. Watts Series B-6800

E. Condensate Pump

1. Duplex packaged unit with duplex heavy cast iron receiver with supports and two pumps all piped on one base. Each pump shall be operated from float switches, magnetic starter, and alternator provided with pump and mounted on pump assembly.
2. Approved Manufacturers
    a. Federal
    b. Pacific
    c. Roth
    d. Spirax Sparco
    e. ITT Hoffman

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install check valve and ball valves on pump discharge.

B. Run vent line for the condensate and feedwater tank and terminate as high as possible with return bends.

END OF SECTION 232214

SECTION 235137 - BREECHINGS, CHIMNEYS, AND STACKS

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 Section.

1.2 SUMMARY

A. This section includes the following:

1. Steel, positive-pressure, double-wall vents.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities; shipping, installed, and operating weights; furnished specialties; and accessories.

B. Shop Drawings: Show fabrication and installation details for breechings, chimneys, and stacks. Include plans, elevations, sections, details, and attachments to other Work. Detail assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, hangers and seismic restraints, and location and size of each field connection.

1. Wiring Diagrams: Detail power, signal, and control systems and differentiate between manufacturer-installed and field-installed wiring.

C. Welding Certificates: Copies of certificates for welding procedures and personnel.

D. Engineering Report: Certifying that stacks meet the design wind and seismic loads.

E. Maintenance Data: For vent fans to include in maintenance manuals specified in Division 1.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: A firm experienced in manufacturing refractory-lined stacks similar to those indicated for this Project and with a record of successful in-service performance.

B. Source Limitations: Obtain Type B vent system components through one source from a single manufacturer.

C. Welding Standards: Qualify procedures and personnel according to AWS D1.1, “Structural Welding Code–Steel”, for hangers and supports, and AWS D9.1, “Sheet Metal Welding Code”, for duct joint and seam welding.

D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.

E. Comply with AWS D1.1 for welder qualifications, welding details, and workmanship standards.

F. Comply with SMACNA's "Guide for Steel Stack Design and Construction".

G. Comply with SMACNA's "HVAC Duct Construction Standards, Metal and Flexible" for fabricated breechings.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Steel, Positive-Pressure, Double-Wall Vents:
    a. American Metal Products; a Masco Company
    b. General Products Co.; Air-Jet Div.
    c. Hart and Cooley, Inc.
    d. Selkirk Metalbestos.
    e. Simpson Dura-Vent Co., Inc.
    f. Van-Packer Co.

2.2 STEEL, POSITIVE-PRESSURE, DOUBLE-WALL VENTS (For Boilers)

A. Description: Double-wall metal stacks complying with NFPA 211, suitable for use with building heating equipment burning gas, solid, or liquid fuels.

B. Construction: Inner and outer metal shells separated by at least 1" insulation, with positive sealing joints.

C. Inner Shell: ASTM A 666, Type 304 stainless steel of the following thicknesses:

1. 6" to 22" size: 0.035" thick.
2. 23" to 48" size: 0.048" thick.

D. Outer Jacket: Aluminum-coated steel of the following thicknesses:

1. 6" to 24" size: 0.025" thick.
2. 26" to 48" size: 0.034" thick.

E. Accessories: Tees, elbows, increasers, draft hood connectors, termination, adjustable roof flashing, storm collar, support assembly, thimbles, firestop spacers, and fasteners; fabricated of similar materials and designs as vent-pipe straight sections.

2.3 GUYING AND BRACING MATERIALS

A. Cable: Galvanized, stranded wire of the following thickness:

1. Minimum Size: 1.4” in diameter.
2. For ID Sizes 4” to 15”: 5/16” in diameter.
3. For ID Sizes 18 to 24”: 3/8” in diameter.

B. Pipe: 1¼” diameter, galvanized steel.

C. Angle Iron: Galvanized steel 1½” by 1½” by 3/16”.

PART 3 - EXECUTION

3.1 INSTALLATION OF MANUFACTURED BREECHINGS, CHIMNEYS, AND STACKS

A. Install according to manufacturer’s written instructions. Locate to comply with minimum clearances from combustibles.

B. Install, support, and restrain according to requirements of seismic zone.

C. Seal between sections of positive-pressure vents according to manufacturer’s written installation instructions, using sealants recommended by manufacturer.

D. Support vents at intervals recommended by the manufacturer to support weight of vent and all accessories, without exceeding loading of appliances.

1. Where maximum unsupported lengths of stack are exceeded, support chimneys as follows:
   a. Guy wires.
   b. Rigid pipe braces.
   c. Rigid angle-iron braces.

3.2 INSTALLATION OF FABRICATED BREECHINGS

A. Install concrete inserts in formwork to support breeching independent of its appliance connection.

B. Assemble and erect fabricated breechings according to SMACNA’s “HVAC Duct Construction Standards, Metal and Flexible”.

C. Install, support, and restrain according to requirements of seismic zone.

D. Align breechings at connections, with smooth internal surface and 1/8” misalignment tolerance.

E. Slope breechings down to appliance, with condensate drain connection at lowest point piped to nearest drain.

F. Install accessories, dampers, fans, equipment, controls, and other supports.

G. Anchor breechings to building structure with bolts, concrete inserts, steel expansion anchors, welded studs, C-clamps, or special beam clamps.

H. Support vertical stacks at 12’ intervals by attaching to adjacent vertical structural surfaces or by direct bearing at floor penetrations and similar locations.

1. 24” by 20” and Smaller: Use straps or formed angles 1½” by 0.0598”.
2. Larger than 24” by 20”: Use steel angle brackets 1” by 1/8” for sizes 36” by 18” or smaller; 1½” by 1/8” for larger sizes.

I. Support horizontal breechings located against structural walls and other similar adjacent vertical surfaces at 96” intervals for units with horizontal dimensions of 40” and smaller, and at 48” intervals for larger breechings.

1. Where Width is Less than Height: With straps 1½” by 0.0598”.

2. Where Width is More than Height: With shelf-tape fabricated angle brackets; 1” by 1/8” for widths 18” and smaller; 1½” by 1/8” for larger widths.

J. Support horizontal rectangular breechings from overhead structure with bolted hangers at 120” intervals for unit widths 60” and smaller, and 96” intervals for larger breechings.

1. Breechings 60” and Smaller in Width: Straps 1 by 0.0598”.
2. Breechings 61” to 96” in Width: Straps 1½” by 0.1046”.

K. Trapeze Hangers: Support breechings with horizontal angles and vertical supports according to the following long-side dimensions:

1. 30” and Smaller Size: 1” x 1/8” angle, with 1” x-0.0478” or ¼” diameter hangers.

3.3 CLEANING

A. After completing system installation, including terminals, inspect exposed finishes. Remove paint splatters and other spots, dirt, and debris. Repair damaged finish to match original finish.

B. Clean breechings internally, during and on completion of installation, to remove dust and debris. Clean external surfaces to remove welding slag and mill film. Grind welds smooth.

C. Provide temporary closures at ends of breechings and chimneys that are not completed or connected to equipment.

3.4 COMMISSIONING

A. Engage a factory-authorized service representative to perform startup service for fans.

B. Verify that fans are installed and connected according to the Contract Documents.

C. Complete installation and startup checks according to manufacturer's written instructions, and confirm fan interlocks.

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain fans as specified below:

1. Train Owner's maintenance personnel on procedures and schedules for starting and stopping, troubleshooting, servicing, and maintaining fans.
2. Review data in maintenance manuals. Refer to Division 1 Section "Contract Closeout".
3. Review data in maintenance manuals. Refer to Division 1 Section "Operation and Maintenance Data".
4. Schedule training with Owner, through Architect, with at least seven days' advance notice.

END OF SECTION 235137

SECTION 235150 – FEEDWATER TANK

PART 1 – GENERAL

1.1 SCOPE

A. The work to be performed includes all new equipment, labor, and materials required to furnish and install a Fulton Vertical Feedwater (hereinafter referred to as “feedwater 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 feedwater 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 feedwater system shall be contained in a manual provided with each unit.

E. A wiring diagram corresponding to the feedwater system configuration shall be included with each unit.

1.4 QUALITY ASSURANCE

A. Manufacturer’s Qualifications: Firms regularly engaged in the manufacture of Feedwater Systems with steel tanks/pressure vessels, whose products have been in satisfactory use in service for not less than ten (10) years. The manufacturer must be an American company. The Feedwater Systems must be manufactured in the USA and be able to participate in projects that require a level of USA content of Feedwater Systems materials.

B. The entire Feedwater 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 Feedwater Systems manufacturer shall certify in writing that the equipment being submitted shall perform as specified.

1.5 WARRANTY

A. Fulton Steam Solutions 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 made by both Fulton and the component manufacturers.

B. Fulton 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 feedwater system and peripheral components and equipment. Warranties valid only if installed, operated, and maintained as outlined in the Fulton Installation and Operation Manual. No Sales Manager or other representative of Fulton other than the Quality Manager or an officer of the company has warranty authority. Fulton will not pay any charges unless they were pre-approved, in writing, by the Fulton 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. Fulton 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 Fulton Companies has been advised of the possibility of such damages. Fulton'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 Feedwater Systems as manufactured by Fulton Steam Solutions, Inc. Equivalent units and manufacturers must meet all design criteria.

1. Hurst
2. Shipco

B. Basis of Design: Fulton Steam Solutions, Inc. Models (Custom sizes and models available upon request:

1. HT/VT-30 – 1.2-30 Boiler Horsepower

C. The feedwater system manufacturer shall have the capability to construct an engineered system, skid mounted, for the above referenced feedwater 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, and condensate feedwater. 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 feedwater system manufacturer shall have the engineering capabilities for all aspects of the mechanical and electrical design aspects of the skid mounted system.

2.2 FEEDWATER SYSTEM DESIGN AND CONSTRUCTION

A. The feedwater system shall be designed to collect condensate returns, blend with incoming make-up supply water, and feed QTY 1, 25 HP steam boilers operating at 15 PSIG.

B. The feedwater system (non-code) shall be constructed of a minimum of 11 gauge carbon steel and shall utilize flat heads constructed of a minimum of 3/16" carbon steel. The tank shall be attached to a heavy duty angle iron stand.

C. The feedwater system can optionally be constructed to ASME Code, Sec. VIII Div 1.

D. The feedwater system shall come equipped with a thermometer, a water level gauge glass – including shut-off valves and protective rods – and a mechanical float type cold water make-up supply valve as standard on VT's. Internal float switch and cold water solenoid valves shall be supplied as standard on HT's.

E. The pumps supplied with the feedwater system shall be of the horizontal Turbine style on VT's. Turbine pumps are built specifically to handle boiler condensate up to 180°F.

F. The feedwater system may be supplied with any quantity of pumps to feed multiple boilers.

1. A base offering duplex (two pump) return system shall be provided with a tank and stand, two (2) pumps, pump suction piping (isolation valve, strainer, and vibration isolator), pump discharge pressure gauges, and a NEMA 1 panel box with pump controls, lighted Hand-Off-Auto (HOA) switches, and Control Circuit Transformer (CCT).

G. A steam-sparge tube preheat shall preheat feedwater. Steam sparge tube preheats can be set up for low pressure steam.

H. Steel condensate feedwater systems shall have a primer coat and a finish coat of alkyd enamel.

I. The Feedwater Systems shall be completely factory assembled as a self-contained unit. Each Feedwater System shall be neatly finished, thoroughly tested, and properly packaged for shipping.

J. The feedwater system shall have the following connections/openings:

1. Sight gauge glass connections

2. Cold water makeup connection

3. Outlet to pump suction connection
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. Cover plate (VT Only)

K. The Full Capacity of the Feedwater System shall not be less than:

1. VT -30 – 43 Gallons (163 liters)

L. The dimensions of the Vertical Feedwater tank shall be (Tank Diameter x Overall Height from Floor to Top of Tank):

1. VT -30 – 18 in x 65 in

2.2 ELECTRICAL PANELS

A. Feedwater Systems may optionally be provided with NEMA 1 electrical panels to house applicable accessories such as motor starters, switches, lights, alarms, relays, etc that are currently available in the Fulton catalog. Other NEMA ratings are available upon request.

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 feedwater 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 feedwater 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 feedwater systems, deliver to Owner, and obtain receipt.

END OF SECTION

SECTION 235200 - COMMERCIAL WATER SOFTENERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. General Conditions, Division 01, and Sections 220501 shall apply to this Section.

B. Sections 221116 Domestic Water Piping

1.2 SUMMARY

A. The contractor shall provide and install the indicated commercial water softener as indicated on the plans. The installation shall be in strict accordance with the manufacturer's recommendations.

B. Provide and install the recommended piping specialties as indicated in the manufacturer's installation instructions.

1.3 REFERENCES

A. The contractor shall follow the code conditions ANSI/NFPA-70, ASTM boiler and pressure vessel code, carry an ASME code stamp, etc.

PART 2 - PRODUCTS

2.1 MANUFACTURING

A. Softener shall be domestic (USA) manufactured.

2.1 EQUIPMENT

A. Provide water softener and accessories of the size and capacity indicated on the plans. With operating parameters for water temperatures of 35 to 100° F.

B. The softener tank shall be fiber glass wound polyethylene lined (FRP) water treatment mineral tanks with a working pressure of 150-psig. The brine tank shall be constructed of rigid polyethylene complete with cover and equipped with float operated shut-off valve to maintain an adequate supply of brine for regeneration.

C. Valves and controls provide the operating valves and controls shall be an automatic multi-part type, slow opening and closing. The valve shall be equipped with an automatic self-adjusting brine injector to draw in brine and rinse 30 to 100 psig. Single units shall have an internal bypass during regeneration.

D. Regeneration: Each tank shall be initiated by a signal from the automatic reset water meter programmed to a present quantity for a specific application or time clock control.

E. Piping, Valves and Fittings shall be schedule 40 galvanized carbon steel on steel tank systems and schedule 80 PVC or FRP systems. All brine systems shall be schedule 80 PVC or Poly Propylene tubing.

F. Softening Resin

1. The mineral furnished will be a high capacity strong acid cation resin (sodium cycle) having a minimum exchange capacity of 30,000 grains per ft^3 when regenerated with 15 lbs. Of salt per ft^3 of resign. It shall be of the proper particle size (not more than 4% through 40 mesh U.S. standard screens and not more than 1% through 50 mesh U.S. standard screens, wet screening) and will contain no agglomerates, shells, plates, or other shapes, which might interfere with the normal function of the water softener. Shall provide 15 ft^3 of cation exchange resin.

G. Standard Regeneration Sequence:

1. Service
2. Backwash
3. Brine
4. Slow Rinse
5. Fast Rinse

H. Flow Meters

1. Each flow metered, or flow sensor equipped softener shall be initiated by an automatic reset water meter, or flow sensor which will measure the flow of the softened water and schedule regeneration upon recording the preset amount of water. The meter will then automatically reset itself to again monitor the next flow of treated water.

I. Flow Controls

1. Flow control devises will be provided to regulate the backwash, and final rinse cycles. The flow controls will be automatic and preset with no field adjustments required. Brine in and slow rinse flows are determined by the ejector.

J. Internal Distribution

1. Internal distribution shall be designed for maximum efficiency of flow so as to prevent channeling. The lower distribution shall be hub and lateral, with pipecored poypropylene screened laterals, which prevent softening resin from passing through to the drain. On softener tanks over 54” in diameter, the lower distribution shall be header/lateral design. The upper distribution will be single point discharge type in tanks of 36” diameter or less and multiple point discharge type in larger tanks and shall be constructed of schedule 80 PVC, and oriented to direct flows upward toward the top of the tank. The distribution/underdrain system shall be covered with a minimum of four 4” of No. 20 washed graded flint (gravel) to evenly disperse the water and support the media.

K. Water Testing Equipment:

1. A water hardness test kit using color change indication as manufactured by Hach Corp. (Model 5B) or equal will be included.

L. Manufactured Units

1. Culligan
2. North Star
3. Miracle Water

PART 3 - EXECUTION

3.1 INSTALLATION OF WATER SOFTENERS

A. General

1. Install commercial/industrial water softeners as indicated, in accordance with manufacturer's installation instructions, and in compliance with applicable codes.

B. Support

1. Set softeners and brine tanks on concrete pads, orient so controls and devices needing service and maintenance have adequate access. Level and plumb unit.

C. Assembly

1. Assemble units with piping, controls and accessories as indicated, and as recommended by manufacturer. Relocate existing equipment; modify control systems and piping so as to produce a total, working system.

D. Equipment Connections

1. Connect to domestic water piping system with dielectric unions and isolation valves for each tank.

E. Start Up

1. Start up, test, and adjust water softener in presence of manufacturer's authorized representative. Operate units including regeneration, back washing, brining, rinsing, and flushing. Adjust unit to maintain required steady state effluent water quality. Water hardness at normal flow rate should not exceed 1 grain per gallon hardness.

F. Instruction

1. Provide services of factory authorized representative for one 8 hour day to instruct Owner's operating personnel in proper operation and maintenance of units, and testing of effluent.

G. Operations and Maintenance Manual

1. Complete instructions covering installation and operation of the softening system shall be provided in booklet form. An individual part number shall easily identify all component parts, in exploded views. As a part of the operating instructions, the manufacturer shall supply complete working drawings of the equipment which, in addition to operator procedures, will include calculations showing sizing of equipment, regeneration requirements, brine draw information, brine dilution data, salt storage capacities and flow rates, all of which shall be certified by a registered engineer qualified in this field.

END OF SECTION 223116

SECTION 235237 – ALDRICH HORIZONTAL FIRETUBE BOILERS

PART 1–GENERAL

1.1 SUMMARY

A. This section includes packaged, factory-fabricated and assembled, gas-fired, three pass firetube boilers, trim, and accessories for generating low pressure steam (7-12 psi).

1. Horizontal three pass firetube boiler
   a. Two pass boiler construction is not acceptable.

2. Natural gas burner

1.2 SUBMITTALS

A. Product Data: Include performance data, operating characteristics, furnished specialties, and accessories.

B. Shop Drawings: For boilers, boiler trim, and accessories; Include plans, elevations, sections, details, and attachments to other work.
1. Wiring Diagrams: Power, signal, and control wiring.
2. Fuel Train Schematic

1.3 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For boilers, components, and accessories to include in emergency, operation, and maintenance manuals.

B. Warranties: As specified in this section.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.

B. ASME Compliance: Fabricate and label boilers to comply with ASME Section IV Boiler and Pressure Vessel Code.

C. ASHRAE/IESA 90.1 Compliance: Boilers shall have minimum efficiency according to: Gas and Oil Fired Boilers – Minimum Efficiency Requirements."

D. UL Compliance: Control devices and control sequences according to requirements of UL.

E. CSD-1 Compliance: Boilers/burners equipped to meet current state code.

F. The boiler must be manufactured by a company having at least twenty-five (25) years documented boiler manufacturing experience in accordance with the ASME Section IV Boiler and Pressure Vessel Code.

1.5 COORDINATION

A. Furnish and coordinate size and location of concrete bases.

1.6 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer warrants the Boiler Pressure Vessel for five (5) years pro-rated after date of shipment with the first two (2) years non pro-rated. This warranty is to cover tube leaks and other damages to boiler tubes, tube sheets, furnace, and main shell due to thermal shock expansion stresses ("shock"). In addition to the above pressure vessel warranty the burner, trim, and controls are warranted for a period of one (1) year after installation.

PART 2 – PRODUCTS

2.1 HORIZONTAL THREE PASS FIRETUBE BOILER

A. Basis of Design Product: Subject to compliance with requirements, provide products as listed:
   1. Aldrich Company – Manufactured in Wyoming, IL, Model: **A3S-1000**

B. Description: Factory packaged and fire tested firetube boiler complete with gas burner, gas train, and controls mounted and wired, skid mounted requiring only supply, return, fuel, blowdown, electrical and vent connections.

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. Minimum 3/8" thickness for structural metal base.

D. Design: Modified Scotch design "Scotch Box" with straight steel tubes with a minimum wall thickness of .105". Three passes with wet-back design. Boilers not of the wetback design are not allowed. Include the following:

   1. Handholes or inspection tappings for water-side inspection.
   2. Lifting lugs on top of boiler.
   3. Minimum 1" drain valve
   4. Tappings or flanges for supply and return connections.

E. U-Type Flex Joint: The furnace must incorporate a "U-Type" flex joint. The "U-Type" flex joint burner port to furnace minimizes the effects of differential stress as the boiler furnace expands at a greater rate than the firetubes during operation. Boilers with other types of furnace to tube sheets construction are not allowed.

F. Front and Rear Smokeboxes: Sealed with heat-resistant gaskets and fastened with lugs and cap screws and designed so tubes and flues are fully accessible for inspection or cleaning when doors are open.

G. Rear Access Door: Constructed with ceramic fiber insulation in door construction.

H. Boiler Casing: The external surfaces shall be covered with a minimum of 1" mineral fiber insulation encased within an 18 gauge steel jacket.

2.2 FORCED DRAFT BURNER

A. Basis of Design Product: Subject to compliance with requirements, provide products as listed:

1. Riello – Model: **RS 38/E** with a minimum turndown of 5:1

B. Code Compliance: UL, CSD-1

C. Burner must be factory mounted and wired.

D. Light Package: Power On, Ignition, Fuel on, Alarm, Call for Heat

E. Quick Connect Wiring of Burner and Gas Train: Burner to include factory wired burner quick connect wiring. This provides quick and easy removal of the burner and gas train for applications when the burner may need to be shipped loose or removed for rigging purposes. The quick connect system reduces the time required for the installing contractor to remount and make wiring connections.

F. Burner to include a Siemens LMV3 linkageless modulation system consisting of independent servo motors to manage the air-fuel ratio. Burner also includes a Siemens RWF55 PID controller.
The use of linkage type or CAM type modulation is not acceptable.

G. Blower: Forward-curved centrifugal fan integral to burner, directly driven by motor.

H. Gas Train: Control devices shall comply with requirements in ASME CSD-1 and UL. Gas train to include pilot shut-off valve, regulator, pilot solenoid valve, intermittent electric spark pilot ignition with 100 percent main valve and pilot safety shutoff with electronic ultraviolet supervision of burner flame (flame rod not acceptable).

I. Main Gas Train: Factory piped and wired (may be removed for shipment as a complete assembly for protection), main gas regulator, main gas safety shut off valve, secondary gas safety shut off valve, isolation valve(s) with test cock(s), high and low gas pressure switches.

2.3 LOW PRESSURE STEAM BOILER TRIM

A. Boiler to include the following factory mounted/wired:
1. 4-1/2” steam gauge
2. ASME relief valve
3. Operating pressurestat
4. High limit pressurestat (Manual Reset)
5. Steam pressure transducer (0-15 PSI, 0-10vDC)
6. M&M #157S-MD Low water cut-off/feed control
7. M&M #FPC-1000 Probe type second low water cut-off (Manual Reset)
8. Stack Damper: 12” Flue stack damper (Manual type)
9. Stack Thermometer: 3” stack thermometer

2.4 SOURCE QUALITY CONTROL

A. Test and inspect factory-assembled boilers before shipping according to ASME Boiler and Pressure Vessel Code.

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. Boiler locations on drawings are approximate. Determine exact locations before roughing-in for piping and electrical connections and consult the mechanical engineering Project Manager for approval prior to proceeding.

B. Examine mechanical spaces for suitable conditions where boilers will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 BOILER INSTALLATION

A. Equipment Mounting: Install boilers on cast-in-place concrete equipment bases.
1. Coordinate sizes and locations of concrete bases with actual equipment provided.

2. Construct bases to withstand, without damage to equipment, seismic force as required by code.

3. Construct concrete bases 4” high and extend base not less than 6” in all directions beyond the maximum dimensions of boiler unless otherwise indicated.

C. Install gas-fired boilers according to NFPA-54.

D. Install electrical devices furnished with boiler but not specified to be factory mounted.

E. Refer to drawings for additional requirements.

3.3 START-UP SERVICE

A. The mechanical contractor is required to engage a factory authorized service representative to perform start-up services and provide owner’s maintenance personnel training on the adjustment, operation, and recommended maintenance of the boilers.

END OF SECTION 235239

SECTION 235238 - STEAM GENERATION SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of contract, including General and Supplementary Conditions and Division-01 Specification sections, apply to work of this section.

B. Section 230501 - Basic Mechanical Materials and Methods sections apply to work of this section.

C. Steam supply and return piping system specified in Section 232213.

D. Steam radiators specification in Section.

E. Electrical connections and service specified in Division 26.

1.2 SUMMARY

A. Includes but not limited to

1. Complete steam generating system including fuel line and burner controls.

B. Related Work Specified Elsewhere

C. Provide complete control diagram with operating manual containing complete instructions. Instruct Owner's Representative on operation and maintenance.

D. Authorized Representative of Boiler Manufacturer shall perform control setting and adjusting.

PART 2 - PRODUCTS

2.1 BOILER

A. See Steam Boiler Section 235250

B. Complete, factory assembled and wired vertical boiler including hand-hole clean-out, refractory base, combination fuel burning equipment, necessary fuel line and burner controls, and built-in boiler feed pump and condensate receiver complete with automatic make-up water feeder, all mounted on structural steel base. Assembly shall operate without objectionable vibration, noise, or pulsation with not more than 20% excess air and no carbon monoxide in products of combustion. Boiler shall have UL label and ASME stamp for 150 psi steam working pressure.

2.2 CONDENSATE TANK

A. Furnish and install a Sterling 4200 Series duplex condensate unit, having a capacity of 6000 sq. ft. E.D.R. 9 GPM against a discharge pressure of 20 PSI. The receiver shall have a capacity of 15 gallons and be of heavy-duty cast iron construction. Pump(s) shall be of the centrifugal type with two-piece enclosed brass impeller, cast iron housing, high temperature (250°F.) mechanical seal and stainless-steel motor shaft. The float switch shall be two-pole with plastic case, stainless steel float and shaft, and double-break silver contacts. Inlet "Y" strainer for installation on the tank return inlet for pump protection. The motor(s) shall be vertical, 3450 RPM, 1 phase, 120 volt, 60 cycle, 1/3 H.P. The complete unit is to be factory assembled and tested prior to shipment.

B. Control panel mounted to tank. Blank off plate and gasket. For replacing pump.

2.3 WATER SOFTENER AND BRINE TANK

A. See Water Softener Section 235200

2.4 CHEMICAL FEEDER (By owner)

A. Assembly consisting of 50 gallon polyethylene tank supported by a welded steel frame which also houses a proportioning pump, strainer, suction piping, and relief valve.

1. Proportioning pump shall be a high pressure, low volume, reciprocating plunger, positive displacement type with minimum capacity of 1.6 gph.

B. Approved Manufacturers

1. Cleaver Brooks Model 55-1-V-5.
2. Equal by Holrath

2.5 STEAM AND CONDENSATE SPECIALTIES

A. Electronic Reducers

1. Use in steam mains and branches where direction of steam and condensate is same.

B. Strainers

1. Same size as piping with cast semi-steel body and perforated monel strainer. Each strainer shall have blow-down valve same size as blow-down outlet installed on strainer.
2. Approved Manufacturers
   a. 2" and smaller - Crane 988½
   b. 2½" and larger - Crane 989½
   c. Equals by Walworth, Jenkins, Strong, or Sarco.

C. Bucket Traps

1. Inverted or vertical type with automatic air discharge with heavy, fine-grained cast iron body, brass bucket, bronze mechanism, and corrosion resistant stainless-steel valves and seats.
2. Traps shall have a working pressure of 125 psig saturated steam pressure.
3. Traps for condensate of high pressure (over 15 psig) saturated steam shall have capacities shown on Drawings except no trap shall have a capacity of less than 200 lbs condensate per hour with an inlet pressure of 80 psig and a pressure differential across trap of 20 psig.
4. Install a gate valve, strainer, and union ahead of each trap and a union, and horizontal swing check valve on discharge side.
5. Approved Manufacturers
    a. Armstrong
    b. Webster
    c. Strong
    d. Trerice
    e. Sarco

D. Pressure Gauges

1. Bourdon Spring type equipped with integral siphon.
2. 4½" dials set in iron cases with baked enamel finish.
3. Pressure ranges shall in general extend from zero to at least 150% of the normal vacuum or pressure expected at point of measurement.
4. Connect to main pipe by brass pipe and fittings with shut-off cocks as specified.
5. Liquid filled with mineral oil.
6. Approved Manufacturers
    a. Trerice
    b. Crosby - Ashton
    c. Marsh

END OF SECTION 235238

SECTION 235239 – ALDRICH SERIES DG VERTICAL FIRETUBE BOILERS

PART 1 – GENERAL

1.1 SUMMARY

A. This section includes packaged, factory-fabricated and assembled, gas-fired, vertical firetube boilers, trim, and accessories for generating low pressure steam (15 psi).

1. Vertical firetube boiler
2. Natural gas burner

1.2 SUBMITTALS

A. Product Data: Include performance data, operating characteristics, furnished specialties, and accessories.

B. Shop Drawings: For boilers, boiler trim, and accessories; Include plans, elevations, sections, details, and attachments to other work.

1. Wiring Diagrams: Power, signal, and control wiring.
2. Fuel Train Schematic

1.3 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For boilers, components, and accessories to include in emergency, operation and maintenance manuals.

B. Warranties: As specified in this section.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.

B. ASME Compliance: Fabricate and label boilers to comply with ASME Section IV Boiler and Pressure Vessel Code.

C. ASHRAE/IESA 90.1 Compliance: Boilers shall have minimum efficiency according to: Gas and Oil Fired Boilers – Minimum Efficiency Requirements."

D. UL Compliance: Control devises and control sequences according to requirements of UL.

E. CSD-1 Compliance: Boilers/burners equipped to meet current state code.

F. The boiler must be manufactured by a company having at least ten (10) years documented boiler manufacturing experience in accordance to ASME Section IV Boiler and Pressure Vessel Code.

1.5 COORDINATION

A. Furnish and coordinate size and location of concrete bases.

1.6 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer warrants the Boiler Pressure Vessel for five (5) years pro-rated after date of shipment with the first two (2) years non pro-rated. This warranty is to cover tube leaks and other possible damages to boiler tubes, tube sheets, furnace, and main shell due to thermal shock expansion stresses ("shock"). In additional to the above pressure vessel warranty the burner, trim, and controls are warranted for a period of one (1) year after installation.

PART 2 – PRODUCTS

2.1 VERTICAL FIRETUBE BOILER

A. Basis of Design Product: Subject to compliance with requirements, provide products as listed:

1. Aldrich Company – Manufactured in Wyoming, IL, Model: DG-900

B. Description: Factory packaged and firetested firetube boiler complete with gas burner, gas train, and controls mounted and wired, skid mounted requiring only supply, return, fuel, blowdown, electrical and vent connections.

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. Design: Vertical firetube design with straight steel tubes with a minimum wall thickness of .105". The boilers combustion chamber shall be water jacketed including a water surrounded furnace. Refractory sides or tube sheet protection is not allowed as these reduce the heat transfer. Boiler shall be sealed to permit positive combustion chamber pressure with turbulators installed in the firetubes. Boiler to have a minimum efficiency of 80 - 83%.

E. Include the following:

1. Handholes or inspection tappings for water-side inspection.
2. Lifting lug on to of boiler.
3. Minimum 1" drain valve.
4. Tappings or flanges for supply and return connections

F. Boiler Casing: The external surfaces shall be covered with a minimum of 1" mineral fiber insulation encased within an 18 gauge steel jacket.

2.2 FORCED DRAFT BURNER

A. Basis of Design Product: Subject to compliance with requirements, provide products as listed:

1. Riello – Manufactured in Hingham, MA., Model: RS38/E

B. Code Compliance: UL, CSD-1

C. Operation: Full Modulation with Open Damper Purge

D. Burner must be factory mounted and wired including control panel.

E. Blower: Forward-curved centrifugal fan integral to burner, directly driven by motor.

F. Gas Train: Control devices shall comply with requirements in ASME CSD-1 and UL. Gas train to include pilot shut-off valve, regulator, pilot solenoid valve, intermittent electric spark pilot ignition with 100 percent main valve and pilot safety shutoff with electronic ultra violet supervision of burner flame (flame rod not acceptable).

G. Main Gas Train: Factory piped and wired (may be removed for shipment as a complete assembly for protection), main gas regulator, motorized main gas safety shut off valve, secondary solenoid gas safety shut off valve, isolation valve(s) with test cock(s), high and low gas pressure switches.

2.3 LOW PRESSURE STEAM BOILER

A. Boiler to include the following factory mounted/wired:

1. 4-1/2" steam gauge
2. ASME relief valve
3. Operating pressurestat
4. High limit pressurestat (Manual Reset)
5. Appropriate firing rate control to work in conjunction with the specified type of operation: On-Off / Low-High-Off / Low-High-Low / Modulation
6. M&M #157S-RL Low water cut-off/feed control
7. M&M #750-MT Probe type second low water cut-off (Manual Reset)

2.4 Stack Damper: Flue stack damper (Manual type)

2.5 SOURCE QUALITY CONTROL

A. Test and inspect factory-assembled boilers, before shipping according to ASME Boiler and Pressure Vessel Code.

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. Boiler locations on drawings are approximate. Determine exact locations before roughing-in for piping and electrical connections and consult mechanical engineering Project Manager for approval prior to proceeding.

B. Examine mechanical spaces for suitable conditions where boilers will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 BOILER INSTALLATION

A. Equipment Mounting: Install boilers on cast-in-place concrete equipment bases.

1. Coordinate sizes and locations of concrete bases with actual equipment provided.

2. Construct bases to withstand, without damage to equipment, seismic force as required by code.

3. Construct concrete bases 4” high and extend base not less than 6” in all directions beyond the maximum dimensions of boiler unless otherwise indicated.

B. Install gas-fired boilers according to NFPA-54.

C. Install electrical devices furnished with boiler but not specified to be factory mounted.

D. Refer to drawings for additional requirements.

3.3 START-UP SERVICE

A. The mechanical contractor is required to engage a factory authorized service representative to perform start-up services and also provide owner’s maintenance personnel training on the adjustment, operation and recommended maintenance of the boilers.

END OF SECTION 235239

SECTION 235250 – STEAM VERTICAL BOILER

PART 1 – GENERAL

1.1 SCOPE

A. The work to be performed includes all new equipment, labor and materials required to furnish and install Vertical Tubeless Fulton ICS (Classic) Boilers as described in this product guide specification.

1.2 REFERENCES

A. ASME

B. CSD1, Controls and Safety Devices

C. GE GAP

D. NFPA

E. NEC, National Electric Code

F. UL-795, -508A

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 boiler 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.

1.4 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Firms regularly engaged in the manufacture of vertical tubeless boilers and pressure vessels, whose products have been in satisfactory use in service for not less than twenty (20) years. The manufacturer must be an American company. The boiler must be manufactured in the USA and be able to participate in projects that require a level of USA content of boiler materials.

B. The boiler package shall be certified to UL 795.

C. The boiler will be rated for a maximum allowable working pressure of 150 PSIG for ASME Section I or higher pressures upon request. Refer to job schedule for additional clarification.

D. The flame safeguard to control the supply of fuel and air to the boiler for combustion shall be either the Honeywell 7895 series for on/off operation, the Honeywell 7800 series for modulated linkage-type operation.

E. The entire boiler system and its installation shall conform to the manufacturer's instructions, applicable codes and associated National Board requirements.

F. The equipment shall be in strict compliance with the requirements of this specification and shall be the manufacturer's standard commercial 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 commercial product, shall be included in the equipment being furnished.

G. 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.

H. The equipment shall fit through the door and within the allocated space, leaving ample allowance for maintenance and inspection.

I. The equipment shall be new and fabricated from new materials. The equipment shall be free from defects in materials and workmanship.

J. All units of the same classification shall be identical to the extent necessary to ensure interchangeability of parts, assemblies, accessories, and spare parts wherever possible.

K. In order to provide unit responsibility for the specified capacities, efficiencies, and performance, the boiler manufacturer shall certify in writing that the equipment being submitted shall perform as specified.

L. Boilers must be fully factory test fired prior to shipment. Test firing shall include filling with water, adjusting operating and safety control settings, and setting combustion points. Manufacturer shall supply copies of the test fire report, including fuel air settings and combustion test results. Factory representatives, specifying engineers, installing contractors and/or end users/customers shall all be welcome to witness the boiler being built and/or test fired at the manufacturer's factory.

M. Boiler inspection shall include a hydrostatic test in the presence of an inspector having a National Board Commission. He shall certify a Data Report which shall be delivered with the boiler as evidence of ASME code compliance. In addition to the ASME symbol, the boiler shall bear a National Board Registration Number.

1.5 WARRANTY

A. Boiler

1. Five (5) Year (60 Months) Material and Workmanship Warranty:

a) The pressure vessel is covered against defective material or workmanship for a period of five (5) years from the date of shipment from the factory. Fulton will repair or replace F.O.B. factory any part of the equipment, as defined above, provided this equipment has been installed, operated and maintained by the buyer in accordance with approved practices and recommendations made by Fulton. The commissioning agency must also successfully complete and return the equipment Installation and Operation Checklists to Fulton's Quality Assurance department. This warranty covers any failure caused by defective material or workmanship; however, waterside corrosion or scaling is not covered. Therefore, it is imperative that the boiler water management and chemistry be maintained as outlined in the Installation and Operation Manual.

2. Parts Warranty:

a) Fulton 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 made by both Fulton and the component manufacturers and the commissioning agency has successfully completed and returned the equipment Installation and Operation Checklists to Fulton's Quality Assurance department.

3. General:

a) Fulton 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 boiler and peripheral components and equipment. Warranties valid only if installed, operated, and maintained as outlined in the Fulton Installation and Operation Manual. No Sales Manager or other representative of Fulton other than the Quality Manager or an officer of the company has warranty authority. Fulton will not pay any charges unless they were pre-approved, in writing, by the Fulton 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. Fulton 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 Fulton Companies has been advised of the possibility of such damages. Fulton's liability shall never exceed the amount paid for the original equipment found to be defective. To activate the warranty for this product, the appropriate commissioning sheets must be completed and returned to the Fulton Quality Assurance department for review and approval.

B. Premier Steam Engineered System

1. Ten (10) year (120 months) Material and Workmanship Warranty:

a) The pressure vessel is covered against defective material or workmanship for a period of ten (10) years from the date of shipment from the factory. Fulton will repair or replace F.O.B. factory any part of the equipment, as defined above, provided this equipment has been installed, operated and maintained by the buyer in accordance with approved practices and recommendations made by Fulton. The commissioning agency must also successfully complete and return the equipment Installation and Operation Checklists to Fulton's Quality Assurance department. This warranty covers any failure caused defective material or workmanship; however, waterside corrosion or scaling is not covered. Therefore, it is imperative that the boiler water management and chemistry be maintained as outlined in the Installation and Operation Manual. There is a $1,000 labor allowance for any failed pressure vessel that is covered under the above warranty.

2. Parts Warranty:

a) Fulton 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 made by both Fulton and the component manufacturers and the commissioning agency has successfully completed and returned the equipment Installation and Operation Checklists to Fulton's Quality Assurance department.

3. General:

a) The extended warranty is valid only for boilers that are purchased as part of a Premier Steam Engineered System. Generally, this system MUST include ALL of the following equipment in order for the warranty to apply. Any deviation or additional equipment specified by Fulton Engineering must be used and maintained per the Installation and Operation Manual as well: Fulton Boiler with model number as listed above; feedwater with preheat kit; manual blowdown, which must operate to maintain a TDS level as specified in the Installation and Operation Manual. Fulton 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 except as noted above. These warranties are contingent upon the proper sizing, installation, operation and maintenance of the boiler and peripheral components and equipment. Warranties valid only if installed, operated, and maintained as outlined in the Fulton Installation and Operation Manual. No Sales Manager or other representative of Fulton other than the Quality Manager or an officer of the company has warranty authority. Fulton will not pay any charges unless they were pre-approved, in writing, by the Fulton 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. Fulton 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 Fulton Companies has been advised of the possibility of such damages. Fulton's liability shall never exceed the amount paid for the original equipment found to be defective. This warranty applies only in the U.S.A. and Canada. To activate the warranty for this product, the appropriate commissioning sheets must be completed and returned to the Fulton Quality Assurance department for review and approval.

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. This specification is based on the ICS Series boilers as manufactured by Fulton Boiler Works, Inc. Equivalent units and manufacturers must meet all performance criteria for all fuel options, and will be considered upon prior approval.

1. Fulton
2. Hurst

B. Basis of Design: Fulton Boiler Works, Inc. Models:

1. ICS-25 – 863 lb/hr (837,000 BTU/hr)

Steam Output rating at 212 ^{o}F feedwater temperature, 0 psig (Sea Level to 2000 ft)

C. The boiler manufacturer shall have the capability to construct an engineered system, skid mounted, including but 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 feed-water tanks and pumps, and various relevant valves and other accessories. The 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 boiler manufacturer's factory to witness manufacturing, testing, and other operational safety inspections associated with the referenced boilers.

2.2 BOILER CONSTRUCTION

A. The boiler shall be completely factory assembled as a self-contained unit. Each boiler shall be neatly finished, thoroughly tested, and properly packaged for shipping.

B. The pressure vessel design and construction shall be in accordance with Section I of the ASME Code for steam boilers. The boiler shall comply with CSD-1 code requirements and carry a UL listing.

C. It shall be acceptable to vent the boiler using sealed combustion (drawing in fresh air from the outdoors) or to draw air from the mechanical room itself.

1. The flue (exhaust) stack and any components associated with the stack must be suitable for 1,000 F.
2. The stack arrangement must supply a negative .02" to negative .04" W.C. pressure with the burner off.

D. The pressure vessel shell, furnace, and heads shall be SA-53B ERW/SA106B pipe or SA-516 Grade 70 plate and have the following thickness (150 psig design):

ICS Model	Shell (Inches)	Head (Inches)	Furnace (Inches)
25	.313	.500	.500

E. The pressure vessel shall be insulated with compatible high temperature castable mixtures. The pressure vessel subject to direct flame shall be insulated with high strength, low permanent linear change, and high temperature limit castable. The remaining area shall be insulated with a lightweight, low thermal conductive castable. These castables assure strength so that cyclic thermal stress and cracking which can damage the insulation, does not occur. Insulation thickness shall be as follows:

1. 25 BHP – 4 ¼"

F. The jacket shall be carbon steel.

2.3 BOILER DESIGN

A. The boiler shall be a vertical tubeless design with a centrally located furnace. The top mounted forced draft burner will fire from the top of the boiler down through a circular furnace. The burner location and firing method shall be such that combustion takes place within the water-backed furnace of the boiler.

B. The boiler input shall not exceed the fuel usage specified on the Fulton ICS Product Data Submittal for the specified model size.

C. The capacity of each unit shall be able to produce continuously the steam rate specified by the steam output on the Fulton ICS Product Data Submittal for the specified model size.

D. Adequate hand-holes shall be provided for access to the water side of the boiler. Hand-holes and cleanout openings shall be provided at the lower part of the boiler so that the entire bottom of the boiler may be cleaned.

E. The boiler will make use of welded convection fins to enhance heat transfer and distribute the flow of flue gases.

F. The water volume of the boiler shall not be less than:

1. ICS-25 –82 Gallons (310 liters)

G. The dimensions of the boiler in operation shall not be less than (Overall Width with water column x Boiler Height with Trim and Fuel Train Assembly):

1. ICS-25 – 47 in x 93.5 in (1194 mm x 237 mm)

H. The approximate operating weight of the boiler shall not be less than:

1. ICS-25 – 4,374 lb (1,984 kg)

2.4 CONTROLS

A. The flame safeguard control shall be capable of either on/off or modulated type control and shall provide the following:

1. The control shall provide a 30 second minimum pre-purge and post-purge time.
2. The control shall maintain a running history of operating hours, number of cycles, and the most recent six control lockouts.

B. A flame observation port shall be provided.

C. The boiler shall be set up for 2:1 turndown for ICS 10-30 models when firing on natural gas with modulated controls.

D. For modulated units, airflow shall be controlled by an airgate. Fuel flow shall be controlled by a butterfly valve for gas operation. Both to be connected via linkage to modulation motor.

E. Burner selection and Burner and Safety Controls:

1. Burner location and firing method to be such that combustion takes place within the water backed furnace of the boiler. Burner to be top mounted and of the down fired design. Burner controls shall be of on/off or modulated as described above and are to include the following:

a) Operating pressure control for automatic start and stop of burner operation.

b) High Limit Pressure Controller with manual reset.
c) Two low water cut-off probes to cause shut down of unit when water level drops to minimum safe level (one in the water column and one in the boiler shell). The probe in the shell shall be manual reset to comply with ANSI/ASME CSD-1 Code.
d) Gas fired boilers shall have an air safety switch to prevent operation until sufficient combustion is assured.
e) Flame detector to prove combustion.
f) A contact for a feedwater pump shall be included and consist of a single phase motor starter or optional contacts for a 3 phase pump.
g) An electronic type combustion flame safeguard shall be included to provide full protection against flame failure. The control shall maintain a running history of operating hours, number of cycles, and the most recent six flame failures. This control shall have the capability to be connected to a key board display module which will retrieve that information.
h) 3-phase burner motor control shall have thermal overload protection.
i) Burner motors shall be provided with fuse type overcurrent protection.

2. All controls to be panel mounted in a NEMA 1 enclosure and so located on the boiler as to provide ease of servicing the burner and boiler without disturbing the controls. Panel shall be located to prevent possible damage by water, fuel or heat, of combustion gases. Controls connected to water or fuel shall be installed outside the main boiler control panel. All controls shall be mounted and wired according to Underwriters' Laboratories requirements.

2.5 MAIN FUEL TRAIN COMPONENTS

A. A factory mounted main gas train shall be supplied. The gas train shall be fully assembled, wired, and installed on the boiler and shall comply with CSD-1 code. Compliance with other codes is available upon request. The maximum pressure rating of the components shall not be less than 150.

B. Standard CSD-1 fuel trains shall comply with IRI, which has been replaced by GE GAP. Normally open vent valves are no longer required between the safety shut off valves. NFPA 85 compliance shall be available from the factory to comply with local codes or regulations that specifically require a vent valve.

2.6 BOILER FITTINGS & TRIM

A. The boiler shall be supplied with an ASME Section I safety relief valve. The safety relief valve size shall be in accordance with ASME code requirements and set at 150 psig for Section I Pressure Vessels. Custom set pressures upon request.

B. A water column shall be piped to the boiler at the factory. A gauge glass and drain valve will be supplied. The gauge glass shall be protected by four brass rods. The water column shall also include the primary low water cutoff prove to automatically shutoff burner operation when water falls below a predetermined level. An auxiliary low water cutoff probe shall be mounted in the boiler shell. The water column shall contain two water level probes, one to “start” and one to “stop” the feed water pump.

C. A steam pressure gauge shall be included with the boiler, mounted on the water column, and shall be complete with test connection.

D. Feedwater stop and check valve shall be supplied at factory in line to an internally baffled feed connection in boiler shell to prevent thermal shock.

E. Additional standard trim shall include Y-type blow down valve and water column blow down valve.

F. A surface blowdown connection shall be provided, and provided with a manual valve.

G. A high water connection shall be provided as standard.

H. The boiler shall come with lifting eyes accessible for rigging. Transporting by fork lift is also acceptable.

I. Instructions for installation, operation and maintenance of the boiler shall be contained in a manual provided with each boiler.

J. A wiring diagram corresponding to the boiler configuration shall be included with each boiler.

K. A factory test fire report corresponding to the boiler configuration shall be included with each boiler.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Equipment and materials shall be installed in an approved manner and in accordance with the boiler manufacturers’ 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. The boiler should be located in dry surroundings on a level base, making sure that there is sufficient room around the boiler to enable the operator and/or the maintenance engineer to gain access to all parts of the boiler. Check location for ease of water supply and electrical connections. Place the boiler on a non combustible floor with clearances to unprotected combustible materials, including plaster or combustible supports.

C. Assemble unit sections and parts shipped loose or unassembled for shipment purposes. Follow manufacturer's installation recommendations and instructions.

D. Install electrical control items furnished by manufacturer per wiring diagram provided by manufacturer.

E. Complete feedwater, steam, blowdown, fuel, safety valve discharge, and vent piping installation as required by manufacturer for operation of system.

F. Provide applicable air intake and exhaust piping, size and type as recommended by the manufacturer to maintain appropriate draft, and rated for the temperatures as listed above.

3.2 FIELD QUALITY CONTROL

A. After boiler 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 Boiler and Pressure Vessel Inspectors for inspection of boilers and piping. Obtain certification for completed boiler units, deliver to Owner, and obtain receipt.

END OF SECTION

SECTION 260501 - COMMON ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division - 01 Specification sections, apply to work of this section.

B. This is Division 26 of the project specifications; this coupled with the drawings are to be used in the construction of this project. Each section recorded hereafter makes reference to the electrical systems, equipment, materials, connections, etc., and apply to all the work making reference and/or titled Electrical and/or Electrical Contract Documents.

C. Architectural, Mechanical, and other applicable and related documents are considered a part of the electrical documents insofar as they apply as if referred to in full.

1.2 SCOPE OF WORK

A. The scope of this project is to construct a complete electrical system for the Buhl Gymnasium Boiler Replacement. Each area shall be developed electrically to give proper power utilization. When the project is complete all systems integrate into a total electrical network making the building a usable facility.

B. Extent of electrical work is indicated on drawings and/or specified in Divisions 26-28 sections of the specification. Provide all labor, materials, equipment, supervision and service necessary for a complete electrical system. Work includes, but is not necessarily limited to, the following items:

1. 260508 - Basic Electrical Materials and Methods
2. 260510 - Existing Facilities and Equipment
3. 260519 - Low Voltage Electrical Power Conductors and Cables
4. 260520 - Electrical Wiring Connections
5. 260526 - Grounding and Bonding
6. 260533 - Raceways for Electrical System
7. 260534 - Boxes, Pull Boxes, Conduit Bodies and Fitting
8. 260548 - Electrical Supports and Seismic Restraints
9. 260553 - Electrical Identification
10. 262726 - Wiring Devices
11. 262816 - Enclosed Switches and Circuit Breakers
12. 262910 - Overcurrent Protective Devices

C. Use of standard industry symbols together with the special symbols, notes, and instructions indicated on the drawings describe the work, materials, apparatus, and systems required as a portion of this work.

1.3 CONTRACT DOCUMENTS AND EXAMINATION OF THE SITE

A. Each bidder shall study the construction documents (plans and specifications), visit the site of the proposed work to fully acquaint himself with the conditions relating to the construction, so that he understands the difficulties and restrictions attending the execution of the work to be placed under contract. From all of the above information, together with the cost of equipment, materials, labor, etc., the bidder shall then assemble and submit his cost to complete the project. The failure or omission of any bidder to receive or examine any contract documents, form, instrument, addendum or other document or to visit the site and acquaint their self with existing conditions shall in no way relieve any bidder from obligations with respect to his bid or to the contract. Written addendums (formally issued) become a part and parcel to the construction documents. The submission of a bid shall be taken as prima facie evidence of compliance with this section.

1.4 INTERPRETATION OF DRAWINGS AND SPECIFICATIONS

A. Any person contemplating submitting a bid shall familiarize himself with the drawings, specifications, and project site. If for any reason, the bidder of the proposed contract, is in doubt as to the true meaning of any part of the drawings, specifications, or other contract documents, or finds discrepancies in, or omissions from, the drawings and specifications he shall submit a written request for an interpretation, correction and/or clarification to Architect/Engineer. The person submitting the request shall be responsible for its prompt delivery. Any interpretation or correction of the contract documents prior to bid shall be made only by addenda duly issued. An oral statement by anyone on any provision in the contract documents prior to the bidding is declared invalid.

B. After acceptance of the contract, the Contractor shall meet the intent, purpose and function of the contract documents and no changes shall be made to the contract documents, except it be in writing and/or a drawing, over the signature of the engineer and/or his representative. Any costs of materials, labor and equipment arising therefrom, shall be made known to the owner’s representative (Project Manager and/or the General Contractor) within 24 hours or the costs become the responsibility of the Contractor.

1.5 LAW AND REGULATION

A. The bidder's attention is directed to the fact of all applicable laws, ordinances and rules and regulations of all authorities having jurisdiction over construction of the project shall apply to contract throughout, and they shall be deemed to be included in the contract of the same as though here written out in full.

1.6 CONSTRUCTION OBSERVATIONS:

A. During the course of construction of this project, the engineer shall visit the project site periodically on an as-needed basis. The construction observation intervals may vary depending on the progress and/or stage of construction and to observe the electrical conduit rough-in above or below grade, setting of the main and branch panels, auxiliary units and panels, surface mounted items, setting of equipment, equipment connections, etc. However, written field questions are encouraged and welcomed throughout the course of construction and shall be answered promptly in writing, to keep the project construction on schedule. The project foreman should have the building plans, construction schedules, etc., affixed in mind, so the electrical systems being assembled, the setting of equipment, of parts and pieces, related to the project are anticipated, to prevent delays or emergencies.

B. The engineer shall make one (1) final inspection. The contractor shall notify the engineer that the installation is complete, i.e., the systems are operating and have been tested and balanced, and everything is complete and operational, all equipment connections have been made and the owner's representatives have been trained. At this time the engineer, the contractor, and the owner's representative shall schedule a time to walk the project for evaluation, and record in writing the items found to be incomplete. The contractor shall make the corrections within one (1) week after this inspection. If at the conclusion of the observation tour the owner and engineer determine that additional visits are required to complete the project, the contractor shall reimburse the engineer at the rate of $600 for each site visit required, plus out of pocket expenses, until all items are acceptable to the engineer and owner. The contractor shall pay the engineer in advance of each inspection.

C. Before scheduling an additional visit, the contractor shall report to the engineer that all systems are complete, and the project is ready for the owner's acceptance.

1.7 OFFICIAL, AGENT AND EMPLOYEES OF THE OWNER NOT PERSONALLY LIABLE

A. It is agreed, by and between the parties hereto that in no event shall any official, officer, employee, or agent of the Owner in any way be personally liable or responsible for any covenant or agreement herein contained whether expressed or implied, nor for any statement, representation or warranty made herein or in any connection with this agreement.

1.8 SUBLETTING AND SUBCONTRACTING

A. This Bidder is responsible for the construction stated or defined in this Contract and, as such, shall abide by the Subletting and Subcontracting Fair Practices Act as set forth and outlined in the General Conditions, Designation of Subcontractors.

1.9 CONTRACTOR COORDINATION

A. In the course of installing the systems defined in the contract documents, the contractor shall closely follow the plans, details and specifications (contract documents). The system design has been a careful and laborious undertaking, with the intent purpose of producing a system and/or systems that will serve the owner well with minimum maintenance. The contractor shall adhere as close as possible to the plans, details and specifications for each system. Questions and suggestions are encouraged as the project is being assembled. If for any reason, the contractor desires to deviate from the defined information, because he discovers a way to improve the system, make the system more easily assembled, make it operate more efficiently, etc., the contractor shall present the changes to the engineer. Systems are designed to perform a specific function; the smallest change in assembly may change the function. If the engineer agrees with the change, he will authorize the contractor to proceed. Contractor cooperation and coordination is appreciated. If the contractor proceeds with construction without the designer's authorization, it shall be reworked, in accordance to plans and specifications, at the contractor's expense.

1.10 QUALITY ASSURANCE

A. Comply with the requirements of State and Local Ordinances. If a conflict occurs between these requirements and the contract documents, the most stringent requirements shall govern. The contractor accepts this responsibility upon submitting his bid, and no extra charge will be allowed after the contract is awarded. This shall not be construed as relieving the Contractor from complying with any requirements of the contract documents which may be in excess of the aforementioned requirements, and not contrary to same.

B. Obtain all permits, inspections, etc. required by authority having jurisdiction. Include all fees in bid. Furnish a certificate of approval to the Owner's Representative from the Inspection Authority at completion of the work.

C. Employ only qualified craftsmen with at least three years of experience (in power equipment, conduit work, high voltage equipment, etc.). Workmanship shall be neat, have a good mechanical appearance and conform to best electrical construction practices (Media Standards of Installation). Provide a competent superintendent to direct the work at all times. Any person found incompetent by the General Contractor, Engineer, Architect, or Owner, shall be discharged from the project and replaced by satisfactory personnel.

D. Contractor shall have a current state contracting license applicable to type of work to be performed under this contract.

1.11 MATERIALS AND WORKMANSHIP

A. All materials and equipment furnished and installed shall be first quality, new and meet the standards of NEMA, IPCEA, LS, UL, NFPA, UBC, OSHA, NEC, and shall bear their label wherever standards have been established and label service is available. Where materials and equipment are specified by manufacturer's name, the type and quality required is thereby denoted. The Architect shall be afforded every facility deemed necessary to inspect and examine the materials and apparatus being installed to prove the material quality and skill/competency of workmanship.

1.12 DEMOLITION, PATCH AND REPAIR

A. The Contractor is responsible for all block-outs, demolition, patching and repair of all finished interior surfaces pertaining to the installation of this particular phase of work. All repaired surfaces shall be finished (painted, etc.) to match the adjacent materials, finished and color.

B. When conduit passes through a ceiling and/or floor, block-out as required and/or core-drill - do not break out with a hammer of any type. The hole shall not be larger than ½" more than the diameter of the conduit.

C. When conduit is indicated to be installed below an existing concrete slab, cut the slab with a diamond saw and/or cutting tool. Do not just rip up the surface unless the entire section is removed.

D. When conduit is to be installed below asphalt, concrete, lawn, etc. the surface shall be cut, not ripped up, with a back-hoe or other equipment (i.e., mechanically cut then remove material).

E. Seal around all electrical equipment penetrating outside walls, roofs, unheated spaces, air plenums, cold boxes, etc., with Dow Corning Silicone RTV foam.

F. All salvageable electrical equipment and materials that cannot be integrated into the new electrical network become the property of the Contractor and shall be removed from the premise.

G. Hard Surfaces: whenever demolition or excavation is required for the installation of the electrical system, it is the responsibility of the Contractor to make repairs and/or replacement of hard finish surfaces such as concrete, asphalt, etc.

H. The method of patching and repair shall follow good construction practices. All finished surfaces shall match materials, and finish (surface texture and finish - paint, etc.) wherein the demolition occurred.

1.13 PROGRESS AND COORDINATION OF WORK

A. The electrical work shall be laid out in advance of construction to eliminate unnecessary cutting, drilling, channeling, etc. Perform necessary cutting, drilling, or channeling with care. Use skilled mechanics of the trades involved and repair damage to building or equipment at no additional cost to the Owner. Cutting, drilling, or channeling through work performed by other trades shall only be done with the consent of the General Contractor. Cutting, drilling, or channeling through structural members shall only be done with the approval of the Architect.

B. Cooperate with other trades to coordinate locations of electrical outlets and apparatus.

C. Perform for other trades, the electrical wiring and connections for all devices or apparatus where not specified herein or indicated on the drawings. Consult the Architectural and Mechanical drawings to avoid hiding switches, outlets and other equipment behind doors, cabinets, counters, heating equipment, etc. Buried electrical devices and/or connections shall be relocated as directed by Engineer and/or authority having jurisdiction, at no additional cost to the Owner.

D. Where conduit, outlets or apparatus are to be cast in concrete or encased, it must be located and secured by a journeyman or foreman present at the point of installation. He shall check the locations of the electrical items before and after the concrete and masonry installation and shall relocate displaced items.

E. No changes shall be made in the design or location of apparatus unless specifically approved in writing.

1.14 SUBMITTALS OF EQUIPMENT FOR APPROVAL

A. SHOP DRAWINGS AND PRODUCT DATA BEING INSTALLED IN THE PROJECT: After the contract is awarded, but prior to manufacture or installation of any equipment, prepare complete Shop Drawings and Brochures for materials and equipment as required by each section of this specification. A brief submittal description of equipment that is approved for installation (bid documents or addendums), is given below. Refer to identified sections for detailed submittal requirements.

1 Conductors and Cables (Section 260519)
2 Metallic and Non-Metallic Conduit (Section 260533)
3 Receptacles, Switches, Low Voltage Switching, Coverplates, Cord Caps, Cord Connectors, Phone Jacks and Plates, Phone/Data Jacks and Plates, and Power Poles (Section 262726)
4 Motor and Circuit Disconnect Switches (Section 262816)
5 Overcurrent Protective Devices (Section 262910)

This list is not all inclusive. The contractor shall submit product information for all items being installed on the project, contained in the drawings or elsewhere in this specification.

B. The electrical foreman, to acquaint himself with the project, is asked to review the shop drawings prior to submission to confirm size, voltages, loads, etc. This cooperative effort will prevent problems from occurring during the course of construction. Any problems that may arise shall be phoned to the engineer and noted in writing and submitted with the shop drawings.

C. Submit project information in electronic format per architectural submission requirements.

D. A minimum period of two weeks, exclusive of transmittal time, will be required each time a Shop Drawing and/or Brochure is submitted or resubmitted for review. This period shall be considered by the Contractor when scheduling submittal data.

E. Review of Shop Drawings and Brochures shall not relieve the Contractor of responsibility for dimensions and/or errors that may be contained therein, or deviations from the Contract Document's requirements. It shall be clearly understood that the noting of some errors but overlooking others does not grant the Contractor permission to proceed in error. Regardless of any information contained in the Shop Drawings and Brochures, the requirements of the Contract Documents shall govern and are not waived or superseded in any way by the review of the Shop Drawings and Brochures.

F. Certifications shall be written or in the form of rubber stamp impressions as follows:

I hereby certify that this Shop Drawing and/or Brochure has been checked prior to submittal and that it complies in all respects with the requirements of the Contract Drawings and Specifications for this Project.

(Name of Electrical Subcontractor)

Signed _____

Position _____ Date _____

Observe the following rules when submitting Shop Drawings and Brochures.

1. Each Shop Drawing shall indicate in the lower right hand corner, and each Brochure shall indicate on the front cover the following: Title of the sheet or brochure, name and location of the building; names of the Architect and Electrical Engineer, Contractor, Subcontractors, Manufacturer, Supplier/Vendor, etc., date of submittal, and the date of correction and revision. Unless the above information is included, the submittal will be returned for re-submittal.
2. Shop Drawings shall be done in an easily legible scale and shall contain sufficient plans, elevations, sections, and isometrics to clearly describe the equipment or apparatus, and its location. Drawings shall be prepared by an Engineer/Drafter skilled in this type of work. Shop Drawings shall be drawn to at least 1/4"-1-0" scale.
3. Brochures to be submitted shall be published by the Manufacturers and shall contain complete and detailed engineering and dimensional information. Brochures submitted shall contain only information relevant to the particular equipment or materials to be furnished. The Contractor shall not submit catalogs which describe several different items in addition to those items to be used, unless all irrelevant information is marked out, or unless relevant information is clearly marked. Brochures from each manufacturer shall be identified and submitted separately.

1.15 OPERATION AND MAINTENANCE MANUALS

A. Provide operating instructions and maintenance data books for all equipment and materials furnished under this Division.

B. Submit operating and maintenance data books for review at least four weeks before final review of the project. Assemble all data in a completely indexed volume or volumes and identify the size, model, and features indicated for each item. Comply with architectural submission requirements.

C. Include complete cleaning and servicing data compiled in clearly and easily understandable form. Show serial numbers of each piece of equipment, complete list of replacement parts, motor ratings, etc. Each unit shall have its own individual sheet. (Example: If two items of equipment A and D appear on the same sheet, an individual sheet shall be provided for each unit specified.)

D. Include the following information where applicable:

1. Identifying name and mark number.
2. Certified outline Drawings and Shop Drawings.
3. Parts list.
4. Performance curves and data.
5. Wiring diagrams.
6. Manufacturer's recommended operating and maintenance instructions.
7. Vendor's name and address for each item.

1.16 RECORD DRAWINGS

A. Maintain at the job site, on a daily basis, a complete set of "Record Drawings", reflecting an accurate dimensional record of all buried or concealed work. Mark "Record Drawings" to show the precise location of concealed work and equipment, including concealed or embedded conduit and junction boxes and all changes and deviations in the work from that shown on the Contract Documents. This requirement shall not be construed as authorization for the Contractor to make changes in the layout or work without definite authorization for such changes. The "Record Drawings" for daily recording shall consist of a set of blue line prints of the Contract Drawings.

B. Record dimensions clearly and accurately, delineating the work as installed; identify locations by at least two dimensions to permanent reference points.

C. Certify the "Record Drawings" for correctness by placing and signing the following certifications on the first sheet:
"CERTIFIED CORRECT (3/8" high letters)

By _____ Date _____
(Name of General Contractor)

By _____ Date _____
(Name of Electrical Contractor)

D. GUARANTEE: Ensure that electrical system installed under this contract is in proper working order and in compliance with drawings, specifications and/or authorized changes. Without additional charge, replace any work or materials which develop defects, except from ordinary wear and tear, within one year from the date of substantial completion. Exception: Incandescent and fluorescent lamps shall be guaranteed for a period of two months from the date of substantial completion.

1.17 CLEAN-UP

A. Clean up all equipment, conduit, fittings, packing cartons and other debris that is a direct result of the installation of the work of this Division.

B. Clean luminaires, interiors and exteriors of all equipment, and raceways. Replace all filters in electrical equipment upon request for Substantial Completion.

1.18 POWER OUTAGE

A. All power outages required for execution of this work shall occur during non-standard working hours and/or at the convenience of the Owner. Include all costs or overtime work in the base bid.

B. Submit written request at least 7 days in advance of scheduled outage and proceed with outage only after receiving authorization from the Owner's Representative.

C. Keep all outages to an absolute minimum.

1.19 STORAGE AND PROTECTION OF MATERIALS

A. Provide storage space for storage of materials and apparatus and assume complete responsibility for all losses due to any cause whatsoever. In no case shall storage interfere with traffic conditions in any public thoroughfare or constitute a hazard to persons in the vicinity. Protect completed work, work under way, and apparatus against loss or damage.

1.20 ELECTRICAL-MECHANICAL COORDINATION

A. General - All disconnect means, motor controllers, electrical controls, signal devices, etc., for mechanical equipment as noted in Division 23 & 24 of the specifications shall be furnished, installed, wired, and connected under Division 26. All pressure switches, thermostats, solenoid valves, damper motors, smoke duct detectors, etc. shall be supplied and installed under the Mechanical Division for electrical connection under this Division. Connection diagrams will be supplied as hereafter explained.

B. If the substitution of equipment in Division 23 results in a change to the contract documents and/or changes to the installation requirements (not covered by the contract change orders), then the Division 23 contractor shall reimburse the Division 26 contractor for additional work required.

C. If the substitution of equipment in Division 26 results in a change to the contract documents and/or changes to the installation requirements (not covered by the contract change orders), the complete responsibility for costs shall be assigned to the section of these specifications under which the equipment is furnished.

D. Controls Contractor shall provide and install all control conduit for mechanical system.

1.21 EQUIPMENT CONNECTION DIAGRAM

A. Submittal data for each individual electrically operated or electrically controlled item of equipment or device furnished under Division 23 & 24 and/or 26 of the contract documents shall include complete electrical wiring diagrams and elementary control diagrams (ladder form) showing all internal and external wiring connections and services. The submittal data shall itemize all electrical characteristics that are of a special nature or critical to the electrical installation or control system. Such equipment and devices will not be considered for approval until these requirements are met.

PART 2 - PRODUCTS

2.1 GENERAL

A. PRODUCTS are specified by Manufacturer name, description, and/or catalog number and shall be supplied as such.

B. DISCREPANCIES between equipment specified and the intended function of equipment shall be brought to the attention of the Engineer in writing prior to bidding. Failure to report any conflict, including catalog numbers, discontinued products, etc., does not relieve the Contractor from meeting the intent of the contract documents, nor shall it change the contract cost. If the Contractor is unable to interpret any part of the plans and/or specifications, or should he find discrepancies therein, he shall bring this to the attention of the Engineer, who will issue interpretation and/or additional instructions to Bidders before the project is bid.

C. MANUFACTURERS AND SUBSTITUTE ITEMS: Provide products of manufacturers specified. Manufacturer's catalog numbers and descriptions establish the quality of product required.

D. Provide only equipment specified in the contract documents or approved by addendum.

2.2 LISTED EQUIPMENT

A. Provide and install materials, devices, appliances, equipment, etc. that conforms to applicable standards or is indicated to be acceptable by the established standards of the Underwriter’s laboratories, Inc., or other electrical product testing laboratories which are accredited by the department.

B. The statement in Item “A” above is being interpreted by the State Electrical Inspector as follows: It is understood that many specialty items such as power panels, light fixtures, devices and other building components are not available with a UL label covering the entire piece of equipment. The State will impose no requirement that an item of equipment be UL labeled unless it is available as a UL labeled item from at least two manufacturers. Electrical components of unlabeled equipment, such as motors, shall be labeled if they are available from at least two manufacturers.

C. If any building component is available with a UL label from at least two manufacturers, an identical or similar unlabeled component shall not be acceptable for installation. Should any such component be installed, it shall be replaced with a UL labeled component, before the building will be accepted by the Electrical Engineer.

D. Consequently, it shall be the sole responsibility of the Contractor (through project suppliers and equipment manufactures) to purchase and install only equipment bearing the UL label whenever the equipment so labeled is available. The Contractor (should any equipment be installed without the proper UL label) shall bear the entire cost of correction to the satisfaction of the authority having jurisdiction.

2.3 SUBSTITUTIONS AND SUBSTITUTE EQUIPMENT

A. Substitute equipment is encouraged if it is truly an equal to the specified items.

1. The designer has taken time and effort to analyze, evaluate and prove to himself that the specified unit will perform the function needed, wherein it is placed. This means the responsibility for the function of the specified equipment rests with the designer, who knows and understands what is to be accomplished.
2. If a supplier and/or the contractor desire to substitute equipment in place of specified item, he may do so, but he takes upon himself or herself the full responsibility that the substituted equipment will equal all of the performing characteristics, functions, etc., and/or exceed the performance of the specified item. The substitute equipment shall be of such a physical size and weight that it will mount in the designated location without alterations to the building and the structure will carry the load. If for any reason the substituted equipment requires alterations or modification, in any form to the building and/or the structure, the costs shall be paid by the contractor and/or those requesting the substitutions.
3. Those interested in requesting a substitution shall state the Manufacturer's catalog numbers and descriptions establish the quality of product required. Substitutions will be considered if a written application is at the office of the Engineer eight (8) working days prior to day of bidding. The application shall include the following: 1) A statement certifying that the equipment proposed is equal to that specified; that it has the same electrical and physical characteristics, compatible dimensions, and meets the functional intent of the contract documents;
   2) The specified and submittal catalog numbers of the equipment under consideration; 3) A pictorial and specification brochure.
4. Because of the short bidding period, (from issuance of drawing to bid date), between the substitution request and the bid date, the designer does not have adequate time to make a full evaluation of substitute equipment. Therefore, those requesting the substitution must accept full responsibility for the items being submitted for substitution (operating characteristics, physical size, weight, output, not increase the load, etc.). If at any time during the course of construction, even up into the final completion, if the designer finds the equipment does not meet the design criteria, comply with the performance, etc., those requesting the substitution and the contractor have the responsibility to remove the substituted equipment and install the specified item at their expense. There shall be no cost assessed to the owner and/or the designer and the replacement will not delay the completion of the project.

B. Discrepancies between equipment specified and the intended function of equipment shall be brought to the attention of the Engineer in writing prior to bidding. Failure to report any conflict, including catalog numbers, discontinued products, etc., does not relieve the Contractor from meeting the intent of the contract documents, nor shall it change the contract cost. If the Contractor is unable to interpret any part of the plans and/or specification, or should he find discrepancies therein, he shall bring this to the attention of the Engineer, who will issue interpretation and/or additional instruction to Bidders before the project is bid.

C. Any conflict arising from the use of substituted equipment shall be the responsibility of the contractor, who shall bear all costs required to make the equipment comply with the intent of the contract documents.

D. Samples may be required for non-standard or substituted items before installation during construction. Provide all samples as required.

E. No materials or apparatus may be substituted after the bid opening, except where the equipment specified has been discontinued. This substitution may be made by a change order.

F. Approved equipment shall be so noted, in writing in a formally issued Project Addendum.

2.4 INCENTIVE BIDS AND UNIT PRICES

A. Suppliers of materials, equipment, and systems are encouraged to submit incentive bids by grouping several products under one bid. However, at the request of the Architect and/or Engineer, the supplier shall submit a unit price to add or delete a particular unit, (panel, luminaire, fire alarm panel, etc.) from his quotation so that other components might be considered in the bid.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Layout electrical work in advance of construction to eliminate unnecessary cutting, drilling, channeling, etc. Where such cutting, drilling, or channeling becomes necessary for proper installation; perform with care. Use skilled mechanics of the trades involved. Repair damage to building and equipment at no additional cost to the contract. Cutting work of other Contractors shall be done only with the consent of that Contractor. Cutting structural members shall not be permitted.

B. Since the drawings of floor, wall, and ceiling installation are made at small scale, outlets, devices, equipment, etc., are indicated only in their approximate location unless dimensioned. Locate outlets and apparatus symmetrically on floors, walls and ceilings where not dimensioned, and coordinate such locations with work of other trades to prevent interferences. Verify all dimensions on the job. Do not scale the electrical drawings, but refer to the architectural and mechanical shop drawings and project drawings for dimensions as applicable.

C. Perform for other trades, the electrical wiring and connection for all devices, equipment or apparatus. Consult Architectural, Mechanical, and other applicable drawings, and all applicable shop drawings to avoid switches, outlets, and other equipment from being hidden behind doors, cabinets, counters, heating equipment, etc. Relocate buried electrical devices and/or connections as directed at no additional cost.

D. All electrical networks, power, etc., systems shall be installed in conduit; see Section 260533.

E. Where conduit, outlets or apparatus are to be embedded in concrete, they shall be located and secured at the defined point. Check locations of the electrical items before and after concrete and/or masonry installation and relocate displaced items.

F. Provide block-outs, sleeves, demolition work, excavation, etc., required for installation of work specified in this Division. Opening shall be core drilled and/or saw cut and shall be no longer than required. Seal around conduit and on equipment inside and out with a silicone compound.

G. Patching and Repair

1. The Contractor is responsible for all block-outs, demolition, patching and repair of all finished interior and exterior surfaces pertaining to the installation of this particular phase of work. All surfaces shall be finished (textured, painted, etc.) to match the adjacent materials.
2. Hard Surfaces: Whenever demolition or excavation is required for the installation of the electrical system, it should be the responsibility of the Contractor to make repairs and/or replacements of hard finish surfaces such as concrete, asphalt, etc.
3. The method of patching and repair should follow good construction practices. All surfaces shall match materials and finish wherein the demolition occurred when construction is complete.

H. All electrical powered equipment specified on this project, whether specified in the architectural, mechanical, or electrical specification, shall be electrically connected and made operational. Confirm voltage, amperage, and phases.

3.2 COMPLETION OF WORK AND TESTING

A. Before energizing any circuits, make megger ground tests on conductors, bus duct and fused disconnects with the distribution breakers open. These readings shall be recorded by circuit number identification and submitted in triplicate to the Owner's Representative before the system is energized.

B. Before final inspection, but after the electrical installation is complete, the Electrical Contractor shall remove neutral grounding connection from main distribution panel and demonstrate to authority having jurisdiction and Owner's Representative, with an ohmmeter, that the electrical system neutral is grounded through main panel location only. Neutral shall be reconnected after the test is complete.

C. Test Equipotential grounding system throughout the building and report the results.

3.3 FINAL REVIEW

A. At the time of final review, the project foreman shall accompany the reviewing party, and remove coverplates, panel covers, and other access panels as requested, to allow review of the entire electrical system.

3.4 PROJECT FINALIZATION AND START-UP

A. Upon completion of equipment and system installation, notify equipment Factory Representative and Subcontractors for system start-up.

B. Each Factory Representative and Subcontractor shall assist in start-up to examine their respective system and remain at the site until the total system operation is accepted by the Owner's Representative.

END OF SECTION 260501

SECTION 260508 - BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 MATERIALS AND METHODS

A. Materials and methods common to this project are listed below and shall be followed as closely as practicable using acceptable construction practices and specified products. This section indicates conditions and practices that should become a part of this project.

1. Materials: The materials installed on this project shall be new, noted in this specification and shall be installed in the course of construction, except, they be changed in writing over the signature of the designer.
2. Method: The method of installation shall follow current acceptable electrical practices under the direction of a licensed journeyman electrician. This will be further explained in the body of the specification.
3. Notes: The notes on the plans are a part of the contract documents; a conflict between the specification and the drawings, the specifications rule.

1.2 EQUIPMENT CONNECTIONS

A. The Contractor shall install an electric service to the subject project as shown on the plans and described herein.

B. Extent of electrical connection for equipment includes final electrical connection of all equipment (supplied under this or any other division or by the owner) having electrical requirements. Make final connections for all owner furnished equipment. See other applicable Divisions of specification for building requirements, namely, mechanical, plumbing, temperature control wiring requirements, kitchen equipment, etc.

C. Refer to Division-23 sections for motor starters and controls furnished integrally with equipment.

D. Refer to Division-23 section for control system wiring; not work of this section, except as noted on the electrical plans.

E. Refer to sections of other Divisions for specific individual equipment power requirements.

1.3 QUALITY ASSURANCE

A. CODE COMPLIANCE: Comply with applicable portions of NEC, state, and local codes as to type products used and installation of electrical power connections.

B. UL LABELS: Provide electrical connection products and materials which have been UL-listed and labeled.

PART 2 - PRODUCTS

2.1 GENERAL

A. For each electrical connection indicated, provide complete assembly of materials, including but not necessarily limited to; raceways, conductors, cords, cord caps, wiring devices, pressure connectors, terminals (lugs), electrical insulating tape, heat-shrinkable insulating tubing, cable ties, solderless wire nuts, and other items and accessories as needed to complete splices, terminations, and connections as required. See Section 26 0533, Conduit Raceways; Section 26 2726, Wiring Devices; and Section 26 0519 Conductors and Cables for additional requirements. Provide final connections for equipment consistent with the following:

1. Permanently installed fixed equipment - flexible seal-tight conduit from branch circuit terminal equipment, or raceway; to equipment, control cabinet, terminal junction box or wiring terminals. Totally enclose all wiring in raceway.
2. Movable and/or portable equipment - wiring device, cord cap, and multi-conductor cord suitable for the equipment and in accordance with NEC requirements (Article 400).
3. Other methods as required by National Electrical Code and/or as required by special equipment of field conditions.

END OF SECTION 260508

SECTION 260510 - EXISTING FACILITIES AND EQUIPMENT

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. The bidder shall consider the existing unit a part of this project. All electrical equipment, panels, apparatus, luminaires, conduit/conductors, boxes, devices, etc., are to be removed, reworked, added to, extended, etc., as noted on the contract documents to make a complete and operable facility. The contractor shall also include in his bid an allowance to cover items that may be concealed in wall, ceiling, or floor, that must be rerouted, relocated, etc., to maintain or extend existing systems to keep them operable.

B. When the project is completed all systems, apparatus, etc., shall be made operable and left in normal operating order.

1.2 EXISTING EQUIPMENT

A. General: The electrical conditions in the existing facility are part of this project, and all costs, changes, extensions, additions, etc., pertaining thereto shall be included in the base bid.

B. Disconnect all equipment that obstructs and/or is to be relocated. Reconnect when reset.

C. The new electrical equipment and apparatus shall be coordinated and connected into the existing system as required. Auxiliary systems shall comply unless otherwise specified.

D. Conduit and wire installed in existing structures shall be concealed. Exceptions shall be an approval of Architect. (See demolition and patching sections).

E. When conduit is to be installed below concrete, etc., the surface shall be cut, not ripped up, with a backhoe or other equipment, but shall be mechanically cut then removed.

F. All electrical equipment and apparatus in the building not remodeled shall be connected as per specifications and left in working conditions.

G. Existing raceways shall be used where possible, except as noted.

H. New conductors shall be installed throughout the project. This includes main and branch feeders and all branch circuit wiring in remodeled areas where changes and/or additions are being made.

I. All vacated or unused power, communication, signal, control wiring or cabling, etc., shall have wire pulled out of conduit back to branch panel or the first active outlet. The conductors/cabling become the property of the contractor and shall be removed from the site.

J. Any and all equipment having electrical systems (power, auxiliary, etc.) that require disconnecting and reconnection, at the same or another location throughout the course of construction, shall be included as part of this contract.

END OF SECTION 260510

SECTION 260519 - CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. Extent of electrical conductor and electrical cable work is indicated by drawings and schedules.

B. Types of conductors and cables in this section include the following:

1. Copper Conductors (600V)

C. Applications for conductors and cables required for project include:

1. Branch Circuits

1.2 QUALITY ASSURANCE

A. Comply with NEC as applicable to construction and installation of electrical conductors and cable. Comply with UL standards and provide electrical conductors and cables which have been UL-listed and labeled.

B. Comply with applicable portions of NEMA/Insulated Cable Engineers Association standards pertaining to materials, construction and testing of conductors and cable.

C. Comply with applicable portions of ANSI/ASTM and IEEE standards pertaining to construction of conductors and cable.

D. Non-approved materials.

1. AFC Cabling
2. Non-metallic sheathed cable.
3. Service entrance cable.

1.3 SUBMITTALS

A. FIELD TEST DATA: Submit test data in accordance with IEEE Standard 400-1980 showing ambient conditions, voltage levels, level durations, and conduction current for each step. Include effective insulation resistance in submittal.

PART 2 - PRODUCTS

2.1 COPPER CONDUCTORS (600V)

A. All conductors shall be copper with 90% conductivity.

B. Provide factory-fabricated conductors of sizes, ratings, materials, and types indicated for each service. Where not indicated provide.

C. Proper selection to comply with project's installation requirements and NEC standards. Provide conductors in accordance with the following:

1. Distribution and Panelboard Feeders; and other conductors, #2 AWG and larger shall be Copper; see drawings for size.
2. Conductors: All conductors shall be jacketed with THHN or XHHW insulation. Size all conductors in accordance with NEC; minimum size to be #12 AWG. Provide stranded conductors for #10 AWG and larger. Provide THHN insulated conductors (in dry areas) from outlets to luminaire, and in luminaire channels.
3. Conductor ampacity shall comply when local codes have a derating factor because of ambient temperature.
4. Provide color and coding of conductors as follows:
   a. Conductors
      1) All conductors shall be stranded copper wire, #12 AWG & #14 AWG may be solid copper. Color code all 208 volt wiring using black for phase A, red for phase B, blue for phase C, white for neutral and green for equipment ground.
   b. Motor Control

1)	Motor Feeders	Black
2)	Hot or Stop Lead	Red
3)	Start Lead	Blue
4)	Common	White
5)	Indicating Light	Orange
6)	Interlock or Shunt	Brown
7)	Ground	Green

2.2 CONNECTING BLOCKS (Also see Section 260520)

A. Taps made to conductors in wireways, switchgear, J-Boxes, etc. larger than #10 shall be made with an insulated connector. The connector block shall be an alloy that is completely compatible with copper, aluminum alloy 6061-T6 conductive plating for low contact resistance, excellent anti-pull out ability and set-screw for suring in place. The block shall be insulated with a molded high dielectric plastisol that will not support combustion, abrasive and chemical resistant. All connections shall comply with rated for 600 volt 90º C and comply with NEC 100. Torque each lug to the recommendations of the manufacturer.

B. The unit shall be NSI Series NSZ (in and out same side), other types are: Series IPL (double row), Series IT (in and out), Series IPLD (pass through), etc. The contractor shall decide which type of connection is best suited for installation.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Conductor size noted in panels is for the home-run. The conductor may be changed to code size after the first apparatus.
B. "G" in the Conduit symbol, denotes a #10 (or larger) green ground, which shall be installed in the conduit with other conductors. It shall connect to the ground bar in the panel.

C. GENERAL: Install electrical conductors and cables as indicated, in compliance with manufacturer`s written instructions, applicable requirements of NEC and NECA's "Standards of Installation", and in accordance with recognized industry practices.

D. Coordinate installation work with electrical raceway and equipment installation work, as necessary for proper interface.

E. Use pulling compound or lubricant, where necessary; compounds must not deteriorate conductor or insulation.

F. Keep conductor splices to minimum in a J-box.

G. Install splices and taps which have mechanical strength and insulation rating equivalent-or-better than conductor.

H. Use splice and tap connectors which are compatible with conductor material.

I. The conductor ends shall be stripped at the ends to comply with the following chart:

1. Strip Length Chart

CONNECTOR SIZE	LENGTH (inches)
500	2
350	1.75
250	1.625
3/0	1.437
1/0	1.25
#4	0.875

2. All conductor connections on lugs, breakers, connection blocks, etc. of the set-screw type shall be set with a torque wrench in strict accordance with industry standards as recommended for each conductor size.

3. Lug Torque Chart

CONN SIZE	500	350	250	3/0	1/0	#4

AWG/MCM WIRE SIZE	TIGHTENING TORQUE, INCH POUNDS					
500	375					
400	325					
350	325	325				
250	325	325	325			
4/0	325	325	325			
3/0	250	250	250	250		
2/0	180	180	180	180		
1/0	180	180	180	180	180	
3-2-1	150	150	150	150	150	
#4 - #6	110	110	110	110	110	45
#8	75	75	75	75	75	40
#10 - #16	75	75	75	75	75	35

J. Vertical Support: Conductors rising vertically shall be supported with conduit kellems grips or equal, in accordance with NEC section 300-19.

Cable Vertical Support Spacing	
Conductor Size	Minimum Distance - Feet
12 - 1/0	100
2/0 - 4/0	80
4/0 - 350 KCM	50
500 KCM	40

3.2 FIELD QUALITY CONTROL

A. Prior to energization, test cable and wire for continuity of circuitry, and also for short circuits. Correct malfunctions when detected.

B. Check and prove the proper phase rotation of all rotating equipment powered by this network.

C. Subsequent to wire and cable connections, energize circuitry and demonstrate functioning in accordance with requirements. (SEE SECTION ON COMPLETION AND TESTING)

END OF SECTION 260519

SECTION 260520 - ELECTRICAL WIRING CONNECTIONS

PART 1 - GENERAL

The contractor shall make all electrical connections relating to the power, lighting and auxiliary systems for this project. Each connection shall be made in such a manner that it will not generate heat and destroy the connecting and/or the insulation on the conductor. All connections shall be made in a skilled craftsman like manner.

1.1 DESCRIPTION OF WORK (STANDARD CONNECTIONS)

A. All connections shall be in compliance with the 75° NEC ratings.

B. The conductors being connected shall be cut of sufficient length to conveniently make a splice - minimum 6".

C. Conductors No. 8 and smaller can be connected with a spring wire connector after the conductors have been mechanically twisted two (2) turns.

D. Conductors No. 6 and larger shall be connected with pressure type terminal lugs of a type hereafter noted.

E. All connections made shall be set in compliance with the lug torque chart in Section 260519.

F. All conductor connections No. 8 and smaller made below a point 24" above grade outside the building shall be made with a non-hardening sealant connector.

G. All conductor connections No. 6 and larger shall be made with water tight connectors.

1.2 PRODUCT DATA

A. Conductors No. 8 and Smaller: Free spring wire connectors made from flame retardant thermo plastic rated at 105°C (221°F), UL Standard 486, CSA LR6541. Cu/Cy, 600V Intgr. TSB, NSI.

B. Conductors No. 8 and smaller outside building (ground j-box, pole base, etc.) water tight steel spring connectors with water-proof non-hardening sealant, same rating as "A".

C. Conductors No. 8 and Larger (dry locations): Insulated copper rated connectors with Allen wrench set-screw, such as NSI "IT" Series (size to conductors).

D. Multiple conductor connections No. 8 and Larger (dry locations: NSI Series IPL, IPLD, etc.

E. Insulated terminal strips up to 30 Amp, 600V shall be a double terminal block such as NSI Series "TB", with appropriate mounting hardware.

F. Terminal blocks (size to conductors) such as Square "D" No. CBA363106.

PART 2 - EXECUTION:

2.1 GENERAL

A. All connectors shall be secure in place making a tight electrical connection.

2.2 FIXED EQUIPMENT

A. Terminal strips, terminal blocks shall be firmly secured in place.

END OF SECTION 260520

SECTION 260526 - GROUNDING AND BONDING

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. Provide grounding as specified by NEC, as noted herein, and as indicated on drawings. Types of grounding in this section include the following:

1. Enclosures
2. Systems
3. Equipment
4. Other items indicated on drawings

B. "G" in the conduit symbol denotes a green ground (to match indicated conductor sizes) which shall be installed in the conduit with other conductors. It shall connect to an insulated ground bar in the panel. (Exception: Main Panel terminations made on ground bar bonded to enclosure).

C. A green ground conductor shall be installed in all non-metallic conduit runs.

D. Requirements of this section apply to electrical grounding work specified elsewhere in these specifications.

1.2 QUALITY ASSURANCE

A. Comply with NEC as applicable to electrical grounding and ground fault protection systems. Comply with applicable ANSI and IEEE requirements. Provide products which have been UL listed and labeled.

1.3 SUBMITTALS

A. None required.

PART 2 - PRODUCTS

2.1 MATERIALS AND COMPONENTS

A. GENERAL: Except as otherwise indicated, provide each electrical grounding system as specified herein, and as shown on drawings, including but not necessarily limited to, cables/wires, connectors, terminals (solderless lugs), grounding rods/electrodes and plate electrodes, bonding jumper braid, and other items and accessories needed for complete installation.

B. Where materials or components are not otherwise indicated, comply with NEC, NEMA and established industry standards for applications indicated.

C. Install an insulated ground bar in branch panels.

2.2 ELECTRICAL GROUNDING CONDUCTORS

A. Unless otherwise indicated, provide electrical grounding conductors for grounding connections matching power supply wiring materials and sized according to NEC.

B. When conductor sizes are increased due to voltage drop (i.e., distance) the ground size shall be increased proportionately in size per NEC.

PART 3 - EXECUTION

3.1 INSTALLATION OF GROUNDING SYSTEMS

A. Install electrical grounding systems in accordance with manufacturer's written instructions and with recognized industry practices to ensure grounding devices comply with requirements.

B. Install clamp-on connectors only. Thoroughly clean metallic contact surfaces, to ensure electrical conductivity and circuit integrity.

C. Provide grounding for the entire raceway, enclosure, equipment and device system in accordance with NEC. All non-metallic raceways shall include copper grounding conductor sized in accordance with NEC.

D. See drawings for additional grounding requirements.

END OF SECTION 260526

SECTION 260533 - RACEWAYS FOR ELECTRICAL SYSTEM

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. Extent of raceways in indicated by drawings and schedules.

B. Types of raceways in this section include the following:

1. Electrical metallic tubing.
2. Flexible metal conduit.
3. Intermediate metal conduit.
4. Liquid-Tight flexible metal conduit.
5. Rigid metal conduit.
6. Rigid non-metallic conduit. (below grade only w/RMC elbows)

C. Prohibited Raceway Materials:

1. Aluminum conduit.
2. Electrical Nonmetallic Tubing (ENT) conduit.
3. Armored cable type AC (BX) cable.
4. Metal-clad cable type MC cable.

D. Prohibited Fitting Materials:

1. Crimp-on, tap-on, indenter type fittings.
2. Cast set-screw fittings for EMT.
3. Spray (aerosol) PVC cement.

1.2 QUALITY ASSURANCE

A. Manufacturers: Firms regularly engaged in the manufacture of raceway systems of types and sizes required, whose products have been in satisfactory use in similar service for not less than three (3) years.

B. Standards: Comply with applicable portions of NEMA standards pertaining to raceways. Comply with applicable portions of UL safety standards pertaining to electrical raceway systems; and provide products and components which have been UL-listed and labeled. Comply with NEC requirements as applicable to construction and installation of raceway systems.

C. Minimums: As a minimum, conduit sizes shall be as per NEC Tables 3A, 3B, and 3C or as shown on plans. Minimum conduit size shall be 3/4". Minimum home run size shall be 3/4". Electrical contractor shall not modify the wiring arrangement without prior approval from Engineer.

1.3 SUBMITTALS

A. Not required.

PART 2 - PRODUCTS

2.1 METAL CONDUIT AND TUBING

A. General: Provide metal conduit, tubing and fittings or types, grades, sizes and weights (wall thicknesses) as indicated; with minimum trade size of 3/4".

B. Auxiliary system conduit shall be installed as shown with 3/4" being the minimum size.

C. Rigid Metal Conduit (RMC): FS WW-C-0581 and ANSI C80.1.

D. Intermediate Steel Conduit (IMC): RS 22-C-581.

E. PVC Externally Coated Rigid Steel Conduit: ANSI C08.1 and NEMA Std. Pub. No. RN1.

F. Rigid and Intermediate Steel Conduit Fittings: Provide fully threaded malleable steel couplings; raintight and concrete tight where required by application. Provide double locknuts and metal bushings at conduit terminations, us OZ Type B bushing on conduits 1-1/4" and larger.

G. Electrical Metallic Tubing (EMT): FS WW-C-563 and ANSI C80.3.

H. EMT Fittings: Provide install set-screw type malleable steel fittings: connectors shall be insulated throat type, concrete tight where required by application. Install OZ Type B bushings on conduits 1-1/4" and larger.

I. Flexible Metal Conduit: FS WW-C-566, of the following type:

1. Zinc-coated steel.

I. Flexible Metal Conduit Fittings: FS W-F-406, Type 1 Class 1, and Style A.

J. Liquid-Tight Flexible Metal Conduit: Provide liquid-tight, flexible metal conduit; constructed of single strip, flexible, continuous interlocked, and double-wrapped steel; galvanized inside and outside; coated with liquid-tight jacket of flexible polyvinyl chloride (PVC). Type UA and/or NMLT-B non-metallic.

K. Liquid-Tight Flexible Metal Conduit Fittings: FS W-F-406, Type 1, Class 3, Style G and/or fittings to match the specified non-metallic conduit noted above.

L. Expansion Fitting: OZ Type AX, or equivalent of suit application.

2.2 NON-METALLIC CONDUIT AND DUCTS (Below grade only, shroud with concrete where indicated.

A. General: Provide non-metallic conduit, ducts, and fittings of types, sizes and weights (wall thicknesses) as indicated shall not be installed inside the building, except it be encased in concrete and there it shall surface through a RMC elbow; with minimum trade size of 3/4". (In this specification, it is not permitted above grade for any reason.)

B. Underground PVC Plastic Utilities Duct: ANSI/NEMA TC 6, Type 1 for encased burial in concrete, Type II for direct burial.

1. PVC and ABS Plastic Utilities Duct Fittings: ANSI/NEMA TC9, match to duct type and material.

2. Conduit, Tubing, and Duct Accessories: Provide conduit, tubing and duct accessories of types, sizes, and materials, complying with manufacturer's published product information, which mate and match conduit and tubing.

C. Sealing Bushings: Provide OZ Type FSK, or FSKA.

D. Special Ground: To maintain the building ground continuity, a NEC size ground shall be installed in each non-metallic conduit run, where the system voltage is greater than 48-volts.

PART 3 - EXECUTION

3.1 INSTALLATION OF ELECTRICAL RACEWAYS

A. Install electrical raceways where indicated; in accordance with manufacturer's written instructions, applicable requirements of NEC and NECA "Standard of Installation", and in accordance with the following.

B. Branch Circuits, Signal and Control Circuits, and Individual Equipment Circuits Rated Less Than 100 Amps: Install in electric metallic tubing (EMT); except in poured walls, floor slabs, below concrete slab-on-grade, or in earth fill, install in non-metallic plastic duct. Encase non-metallic plastic duct 1-1/4" and larger in concrete.

C. Coordinate with other work, including metal and concrete deck work, as necessary to interface installation of electrical raceways and components.

D. When non-metallic conduit is used it shall come to the surface in a RMC elbow or box.

E. Coordinate the campus ground equipment installation with existing structures, trees, lawn sprinkler systems, etc.

F. Install raceway in accordance with the following:

1. Provide a minimum of 12" clearance from flues, steam and hot water piping, etc.

2. Conceal raceways in finished walls, ceilings and floors (other than slab-on-grade). Where conduit is exposed in mechanical spaces, etc., install parallel with or at right angles to building or room structural lines.
3. Where cutting raceway is necessary, remove all inside and outside burrs; make cuts smooth and square with raceway.
4. Flexible raceways shall not be concealed in construction and where installed the run shall be limited to 10' in length.
5. Comply with NEC for requirements for installation of pull boxes in long runs.
6. All raceways shall terminate in a connection and/or bushing.

G. Secure conduit per NEC

H. Install conduit in truss space per NEC

3.2 NORMAL INSTALLATIONS

A. Cap open ends of conduits and protect other raceways as required against accumulation of dirt and debris. Pull a mandril and swab through all conduit before installing conductors. Install a 200 lb. nylon pull cord in each empty conduit run.

B. Replace all crushed, wrinkled or deformed raceway before installing conductors.

C. Provide rigid metal conduit (RMC) for all bends in buried conduit greater than 30º. Provide a protective coating for RMC bend as specified herein.

D. Where raceways penetrate building or vault walls and floors below grade, install rigid metal conduit (RMC) for a minimum distance of 10' on the exterior side of the floor or wall. Provide OZ, Type FSK or WSK sealing bushings (with external membrane clamps as applicable) for all conduit penetrations entering building or vaults below grade.

E. Install liquid-tight flexible conduit for connection of motors, transformers, and other electrical equipment where subject to movement and vibration.

F. Provide OZ expansion fittings on all conduits crossing building expansion joints, both in slab and suspended.

G. Complete installation of electrical raceways before starting installation of cables/conductors within raceways.

3.3 GROUNDING

A. All metal conduit terminations shall be equipped with a grounding bushing.

B. To maintain the continuity of the building ground network, install a code size ground conductor in all non-metallic conduit.

3.4 FIRE PENETRATION SEALS

A. All penetrations through fire rated floors and walls shall be sealed to prevent the spread of smoke, fire, toxic gas or water through the penetration either before, during or after the fire. The fire rating of the penetration seal shall be at least that of the floor or wall into which it is installed so that the original fire rating of the floor or wall is maintained as required by Article 300-21 of the National Electrical Code. The sealant shall remain soft and pliable to allow for the removal and/or addition of cables without the necessity of drilling holes. It shall adhere to itself to allow any and all repairs to be made with the same material. It shall permit the vibration, expansion and/or contraction of raceways and/or cables going through the penetration without the seal cracking or crumbling.

B. When damming materials are to be left in place after the seal is complete, all such materials shall be non-flammable.

C. When sealant is injected into a penetration, the foam shall expand to surround all items within the penetration and maintain pressure against the walls of the penetration. The foam shall cure within five minutes and be fire resistant at that time. No heat shall be required to further expand the foam to block the passage of fire and smoke or water.

D. All wall or floor penetration opening shall be as small as possible.

E. The foam sealant shall meet all of the fire test and hose stream test requirements of ASTM E119-73 and shall be UL Classified as a Wall Opening Protective Device. The sealant shall be CHASE-FOAM CTC PR-585 Fire Resistant Foam Sealant from Chase Technology Corporation, Huntington Station, New York, 11746, or equals of 3-M and T &B.

F. Escutcheon plates - when a conduit passes through a ceiling, wall and/or floor into a finished space, an escutcheon plate shall be installed on the conduit to cover the unfinished hole and sealant.

3.5 PROHIBITED PROCEDURES

A. Use of wooden plugs inserted in concrete or masonry units for mounting raceway, supports, boxes, cabinets, or other equipment.

B. Installation of raceway which has been crushed or deformed.

C. Use of torches for bending PVC.

D. Spray applied PVC cement.

E. Boring holes in truss members.

F. Notching of structural members.

G. Supporting raceway from ceiling system support wires.

H. Nail drive straps for supporting raceway.

END OF SECTION 260533

SECTION 260534 - BOXES, PULL BOXES, CONDUIT BODIES AND FITTINGS

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. Extent of electrical box and electrical fitting work is indicated by drawings and schedules.

B. Types of electrical boxes, fittings, etc. in this section, or noted on the plans shall include the following:

1. Outlet boxes
2. Junction boxes
3. Conduit bodies
4. Bushings
5. Locknuts
6. Knockout closures
7. Miscellaneous boxes and fittings

1.2 QUALITY ASSURANCE

A. Comply with NEC as applicable to construction and installation of electrical boxes and fittings. Comply with ANSI C 134.1 (NEMA Standards Pub. No. OS 1) as applicable to sheet-steel outlet boxes, device boxes, covers and box supports. Provide electrical boxes and fittings which have been UL-listed and labeled.

1.3 SUBMITTALS

A. None required.

PART 2 - PRODUCTS

2.1 FABRICATED MATERIALS

A. Interior Outlet Boxes: Provide one piece, galvanized flat rolled sheet steel interior outlet wiring boxes, of types, shapes and sizes, including box depths, to suit each respective location and installation; construct with stamped knockouts in back and sides, and with threaded screw holes with corrosion-resistant screws for securing box covers and wiring devices; standard box shall be 4" square x 2-1/8" deep, (Raco 231) with 3/4" knock outs and tile or masonry/type box extensions (Raco 843).

B. If the structure will not allow a 4 square box use a 3" deep single gang unit (Raco 695).

C. In spaces with restricted width, like between a door frame and window jam, use partition boxes (Raco 426).

D. Interior Outlet Box Accessories: Provide outlet box accessories as required for each installation, including mounting brackets, hangers, masonry extension rings, fixture studs, cable clamps and metal straps for supporting outlet boxes, which are compatible with outlet boxes being used and fulfilling requirements of individual wiring applications. See the details on the plans.

E. Junction and Pull Boxes: Provide code-gage sheet steel junction and pull boxes, with screw-on covers; of types, shapes and sizes to suit each respective location and installation; with welded seams and equipped with stainless steel nuts, bolts, screws and washers. J-box larger than 8 x 8 x 6 shall have a hinged cover.

F. Condulet Bodies (Fittings): Provide galvanized cast-metal conduit bodies, of types, shapes and sizes to suit respective locations and installation, construct with threaded-conduit- entrance ends, removable covers, and corrosion-resistant screws.

G. Bushings, Knockout Closures And Locknuts: Provide corrosion-resistant punched-steel box knockout closures, conduit locknuts and malleable iron conduit bushings and offset connectors, or types and sizes to suit respective uses and installation.

2.3 FITTINGS

A. The contractor shall provide all sheet metallic connectors, coupling, etc, a needed on this project.

B. When installing non-metallic sheathed cable, all connections to boxes, cabinets, etc., shall be made with screw steel fittings with a locknut connection to the box.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Interface with other work.

B. Coordinate location of outlets adjacent to or in millwork with Division 06 before rough-in. Refer conflicts to Architect and locate outlet under his direction.

C. Coordinate with Division 23 for installation of exposed raceway in mechanical equipment areas. Exact separation of responsibility is shown on Drawings.

D. Boxes shall be accessible and installed with approved cover.

E. Do not locate device boxes which are on opposite sides of framed walls in the same stud space. In other types of wall construction, do not install boxes back to back.

F. Locate boxes so outlets are not obstructed by pipes, ducts, or other items.

G. Install outlets flush with finished surface and level and plumb.

H. Boxes for switches shall generally be located within 6” of door jamb.

I. Properly center single outlets in each room. Where two or more outlets occur, space them uniformly and in straight lines with each other.

J. HVAC Instrumentation and Control System: Boxes installed by mechanical contractor.

K. Install electrical boxes and fittings where indicated, complying with manufacturer's written instructions, applicable requirements of NEC and NECA's "Standard of Installation", and in compliance with recognized industry practices to ensure that products fulfill requirements.

L. Minimum height of wall receptacles shall be 18". With the box arranged for vertical mounting of the receptacles (neutral slot at the left).

M. Coordinate installation of electrical boxes and fittings with wire/cable and raceway installation work.

N. Provide coverplates for all boxes. See Section 260534, Wiring Devices.

O. Provide weatherproof outlets for interior and exterior locations exposed to weather or moisture.

P. Provide knockout closures or cap unused knockout holes where blanks have been removed.

Q. Install boxes and conduit bodies to ensure ready accessibility of electrical wiring. Install recessed boxes with face of box or ring flush with adjacent surface so the device mounting flange sets on the box mounting plate. This will cause the device and coverplate surfaces to match.

R. Fasten boxes rigidly to substrates or structural surfaces to which attached, or solidly embed electrical boxes in concrete or masonry. Use bar hangers for stud construction. Use of nails for securing boxes is prohibited. Set boxes on opposite sides of common wall with minimum 10" of conduit between them.

S. Provide electrical connections for installed boxes.

END OF SECTION 260534

SECTION 260548 - ELECTRICAL SUPPORTS AND SEISMIC RESTRAINTS

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. All electrical equipment, distribution panels, motor control centers, conduit, device boxes, apparatus, etc., shall be securely anchored and/or supported in place as specified herein and/or in accordance with state, local, and seismic codes.

1. Work of this section includes supports, anchors, sleeves, and seals required for a complete raceway support system, including but not limited to: clevis hangers, riser clamps, C-clamps, beam clamps, one and two hold conduit straps, offset conduit clamps, expansion anchors, toggle bolts, threaded rods, U-channel strut systems, and all associated accessories.
2. Quality Assurance: Comply with NEC and local codes as applicable to construction and installation of electrical supporting devices. Comply with applicable requirements of ANSI/NEMA Std. Pub. No. FB 1, “Fittings and Supports for Conduit and Cable Assemblies”. Provide electrical components which are UL-listed and labeled.
3. Manufactured Supporting Devices and Raceways: Provide manufactured mounting brackets (such as Caddy #SDG or SDB - D - 16); complying with manufacturer’s standard materials, design and construction in accordance with published product information, and as required for a complete installation; and as herein specified. See drawing details for additional requirements.
4. Tie-wire is not acceptable.
5. Supporting of equipment may be noted in other sections of the specifications.

B. Wall supported equipment shall be mounted on an angle support bracket with anchors into or through the wall as perimeter (the latter mounting is preferred, but must be approved by the architect), with two 1/2" rods up to the structure from the outer most corners of the mounting frame tied-off to the building structure. This would be likened unto a transformer. Wall mounted electrical panels shall be mounted directly to the wall.

C. For hanging of conduit, see Section 260533.

D. Installation of Supporting Devices for all types of Raceways: Install hangers, anchors, sleeves, and seals as required, in accordance with manufacturer's written instructions and with recognized industry practices to ensure supporting devices comply with requirements. Comply with requirements of NECA, NEC and ANSI/NEMA for installation of supporting devices.

1. Coordinate with other electrical work, including raceway and wiring work, as necessary to interface installation of supporting devices with other work.
2. Install hangers, supports, clamps and attachments to support piping properly from building structures. Arrange for grouping of parallel runs of horizontal conduits to be supported together on trapeze type hangers where possible.

3. Raceways (All Types): Support raceways which are rigidly attached to structure at intervals not to exceed 8’ on center and within 12" of each junction box, outlet or fitting. Support raceway (as it is installed) in accordance with the following:

NUMBER OF RUNS	MIN. 3/4" TO 1-1/2"	1-1/2" & LARGER
1	Full straps, clamps or hangers.	Hanger
2	Full straps, clamps or hangers.	Mounting Channel
3	Mounting Channel	Mounting Channel

4. Support suspended raceways on trapeze hanger system, or individually by means of threaded rod and straps, clamps, or hangers suitable for the application. Do not use "tie wire" as a portion of any raceway support system; do not support raceway from ceiling support wires.
5. Install electrical raceways where indicated; in accordance with manufacturer’s written instructions, applicable requirements of NEC and NECA “Standard of Installation”, and in accordance with the following
6. Coordinate with other work, including metal and concrete deck work, as necessary to interface installation of electrical raceways and components.
7. Coordinate the campus ground equipment installation with existing structures, trees, lawn sprinkler systems, etc.
8. Install raceway in accordance with the following:
   a. Provide a minimum of 12" clearance from flues, steam and hot water piping, etc.

E. Buried Conduit: Conduit installed in the earth shall be laid on undisturbed soil and/or compacted fill. The first 6” of cover shall be sand. See Excavation and Backfill - see Section 260533-3.6.

F. Concrete slabs, bases, curbs, etc., for electrical apparatus shall be provided and installed under this contract. The concrete shall be 5-bag mix, except as noted.

1. The contractor shall provide and install an 8 x 8 x 4 concrete base for the transformer (confirm size and depth with the service utility) at the indicated location.
2. Unless otherwise noted, provide a 4" high concrete base for all main panels, motor control centers, transformers, engine generators, etc. Extend base 4" beyond equipment or mounting rails on all sides or as shown on the drawings. Coordinate the pad dimension with the equipment to be located thereon.
3. Concrete pole bases (detailed on the plans) shall be provided under Division 26. Coordinate size and location of all bases and furnish all required anchor bolts, sleeves and templates as required to obtain a proper installation.
4. All concrete used on this project shall be 5-bag mix and/or as specified in the concrete section of the Architectural Section.

PART 2 - SEISMIC BRACING

2.1 GENERAL

A. The General Conditions, Supplementary General Conditions, Alternates and Addenda, Applicable Drawings and the Technical Specifications shall apply to all work under this division.

B. This seismic bracing section shall conform to the conditions governing the area within the structure being built under local and/or state UBC Seismic Requirements.

2.2 SCOPE OF WORK

A. The materials covered by these specifications consist of furnishing all labor, material and equipment necessary to complete the seismic bracing for all work provided under section 260000.

B. The work shall include all electrical isolated and non-isolated equipment, luminaires, raceways, etc.

2.3 CODES - REGULATIONS

A. In the installation of this work, comply in every way with the requirements of the laws, ordinances and rules of the system design and installation shall be based on seismic zone III of the Uniform Building Code, current edition and other standards listed below.

B. Reference Standards:

1. Uniform Building Code current edition, especially Sec. 2336
2. NFPA bulletin 90A, current edition
3. UL Standard 181
4. Tri-services manual, fagel etal 1978

C. If a conflict occurs between these rules and this specification, the rules are to govern. Accept this condition upon submitting bid, and no extra charge will be allowed after the contract is awarded. This shall not be construed as relieving the contractor from complying with any requirements on the plans or specifications which may be in excess of requirements of the hereinbefore mentioned rules and not contrary to same. Contractor shall bear all costs arising from the installation of any materials or equipment which is in conflict with the above-mentioned codes or ordinances.

D. Obtain approvals, inspections, etc., required by code. All fees shall be included in the contract price. The contractor shall furnish a certificate of approval to the Owner's Representative from the inspection authority at completion of the work.

2.4 MATERIALS AND WORKMANSHIP

A. All materials and equipment furnished and installed shall be first quality, new and meet the standards of NEMA, IPCEA, LS, UL, NFPA, UBC, UOSH, NEC, and shall bear their label wherever standards have been established and label service is available. Where materials and equipment are specified by manufacturer's name, and type and quality required is thereby denoted. The Owner's Representative shall be afforded every facility, deemed necessary to inspect and examine the materials and apparatus being installed to provide their quality, skill and competency of workmanship.

B. Workmanship shall be the best quality of its kind for the respective industries, trades, crafts and practices and shall be acceptable in every respect to the Owner's Representative. Nothing contained herein shall relieve the contractor from making good and perfect work in all details of construction.

C. The contractor shall work in harmony with the Owner's Representative and with other contractors, companies or individuals working in connection with this project. Imperfections or errors by other contractors shall not relieve responsibility of this contractor. Store materials orderly and clean up without interference.

2.5 QUALITY ASSURANCE

The contractor shall be held responsible for purchasing and installing vibrator isolators, flexible connections, rigid steel frames, concrete inertia bases, anchors, inserts, hangers, and attachments, seismic bracing and snubbers as required for seismic control and prevention of the transmission of vibration for both isolated and non-isolated systems.

A. Manufacturers and suppliers approved for use by the contractors Mason Industries, Inc., Korfund, and Amber/Booth Company.

B. The approved manufacturer or supplier shall be totally responsible for the fabrication and operation of the seismic bracing components specified herein for all isolated equipment, non-isolated equipment, luminaires, raceways, etc.

2.6 GUARANTEE

A. The entire electrical system installed under this contract shall be left in proper working order and be in compliance with the drawings, specifications and/or authorized changes to the satisfaction of the Owner's Representative. Without additional charge, replace any work or materials which develop defects, except from ordinary wear, within one year from the date of substantial completion. A written guarantee covering the above provisions shall be signed and delivered to the architect after the project has final acceptance by the inspecting authority.

PART 3 - PRODUCTS

3.1 ISOLATED EQUIPMENT

A. All vibration isolated equipment shall be mounted on rigid steel frames or concrete bases. Each spring mounted base shall have a minimum of four all directional seismic snubbers that are double acting and located as close to the vibration isolators as possible to facilitate attachment both to the base and the structure. The snubbers shall consist of interlocking steel members restrained by shock absorbent rubber materials compounded to bridge bearing specifications.

B. Elastomeric, 50 durometer, materials shall be replaceable and a minimum of 3/4" thick. Snubbers shall be manufactured with an air gap between hard and resilient materials of not less than 1/8" nor more than 1/4". Snubbers shall be installed with factory set clearances.

C. The capacity of the seismic snubbers at 3/8" deflection shall be 3 to 4 times the load assigned to the mount grouping in its immediate area.

3.2 NON-ISOLATED EQUIPMENT, RACEWAYS, ETC.

A. All non-isolated equipment shall be installed according to current Uniform Building Code Sec. 2312 (g): Cp Factor Table 23J, I Factor Table 23K. In addition the vertical forces, restraint requirements shall be computed as .5g the value of the lateral forces.

B. All non-isolated raceway shall be protected against seismic disturbances except as noted below:

1. All electrical conduit less than 2" inside diameter.

PART 4 - EXECUTION

4.1 SEISMIC REQUIREMENTS

A. All electrical work shall be braced, snubbed or supported to withstand seismic disturbances and remain operational. Furnish all labor, materials and equipment to provide protection against seismic disturbances and remain in place.

4.2 SHOP DRAWING SUBMITTAL AND REVIEW

A. Submit complete, bound submittal in a loose-leaf binder large enough for all items (8 copies) to architect after award of contract. All such submittals shall include, but are not necessarily limited to, the following:

1. Complete engineering calculations and shop drawings, prepared and stamped by a licensed engineer (UBC 302-6) for all seismic requirements for all equipment that is to restrain raceways, etc.
2. The type, size and deflection of each isolator proposed for items in this specification and on the drawings.

3. Details for all the isolators and seismic bracing with snubber proposed for items in this specification and on the drawings.
4. Details for steel frames and concrete inertia bases to be used in conjunction with the isolation of the items in this specification and drawings.
5. Clearly outlined procedures for installing and adjusting the isolators, seismic bracing and snubbers.
6. The size, loading and location of raceway supports with either a plan or complete description of the system.

B. All items must be submitted at the same time. Partial submittals will not be accepted. Binders and indexes will remain in possession of engineer, architect, contractor and sub-contractor.

C. Review is for assistance and interpreting the design concept. Changes in requirements will not be made in the review process. Review action does not exempt requirements to meet the intent of the contract documents. Any changes will be made by change order. Items not included in the submittal or incorrectly selected shall be in accordance with the contract requirements.

END OF SECTION 260548

SECTION 260553 - ELECTRICAL IDENTIFICATION

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. The Electrical Contractor is responsible for the labeling of all electrical equipment for this project. The labels shall be made on 1/8” laminated micarta and an engraving machine as stated below.

B. Labeling and Engraving: Any and all electrical control equipment shall be labeled with an engraved black Micarta with white core labels, 1/16" thick, shall be bolted on the interior and the exterior of branch panels (panel name and voltage) and the exterior of disconnect switches, motor controls, major J-boxes (power and auxiliary), push buttons, thermal switches, time switches and similar equipment. The labels shall have 1/4" high engraved letters, such as 1-1/2 HP FAN, PANEL - A. All main panel circuits shall be identified with Micarta labels.

C. Conduit shall be installed as diagramed on the plan. Any deviation shall be authorized in writing prior to rough-in.

D. Write with a felt tip pen that contains permanent ink, on the inside of each device box and on the back of every plate, the circuit to which the device is connected. Example: Circuit “A-1".

E. Engraving device plates - see Wiring Devices.

END OF SECTION 260553

SECTION 262726 - WIRING DEVICES

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. The extent of wiring device work is indicated by drawings and schedules. Wiring devices are defined as a unit of an electrical system that carries or controls electric energy as its principal function.

B. Types of electrical wiring devices in this section include the following:

1. Receptacles
2. Cord caps and connectors
3. Wiring device accessories

1.2 QUALITY ASSURANCE

A. Comply with NEC and NEMA standards as applicable for construction and installation of electrical wiring devices. Provide electrical wiring devices which have been UL listed and labeled.

1.3 SUBMITTALS

A. Product Data: Submit manufacturer's data on electrical wiring devices.

PART 2 - PRODUCTS

2.1 FABRICATED WIRING DEVICES

A. GENERAL: Provide factory-fabricated wiring devices, in types, and electrical ratings for applications indicated and complying with NEMA Stds. Pub. No. WD 1. The devices shall be white with white coverplates.

B. Provide wiring devices (of proper voltage rating) as follows:

RECEPTACLES (20A Continuous Rating)					
MFGR.	C.O.'s	GFI (Weather-Resistant)	Controlled	Hospital (Green Dot)	IG (Orange)
Hubbell	SNAP5362WA/SNAP2RA	GFR5362SGW	SNAP5362CIWA	HBL2182WA	IG 2162
P&S	5362-AW/Plugtail	2097TRWRAW	5362CHW	26362HGW	IG 26362
Eaton	AH5362W	TWRSGF20W	5362CHW	8362W	IG8362RN

C. Special devices as indicated on the plans, complete with matching coverplates shall be provided and installed where indicated.

D. All weatherproof covers on receptacles (GFI) and/or switches shall be mounted on a recessed box. Cover shall be made of cast aluminum such as Arlington Industries #DSHBIBRC. Equals of T&B and TayMac are acceptable. GFI receptacle shall be weather resistant as indicated in schedule above.

E. Provide devices in colors selected by Architect.

F. Contractor shall provide and install tamper resistant receptacles where required by NEC 406. If P & S/Eaton do not have tamper resistant version of specified device, provide Hubbell tamper resistant version where required.

2.2 CORDS CAPS AND CONNECTORS

A. Provide 3-wire grounding, cap plugs, and connectors of ampere and voltage rating required, for final equipment connection, and as indicated otherwise on drawings. Provide products of one of the following manufactures:

1. Arrow Hart
2. General Electric
3. Hubbell
4. Leviton
5. Pass and Seymour
6. Bryant

2.3 WIRING DEVICE ACCESSORIES

A. WALL PLATES: Provide and install high impact, smooth, white nylon coverplates for all wiring devices. Provide galvanized steel plates in unfinished or kitchen areas. Engrave all receptacle plates other than those serving 120 volt, single phase devices. State voltage and amperage characteristics. Example: "208V, 30A".

B. All switch banks shall have each switch identified as to its function with 1/8" thick laminated micarta engraved adhesive plate.

C. Weatherproof coverplates shall be Arlington Industries #DSHBIBRC. Equals of T & B and TayMac are acceptable.

D. Emergency power coverplate shall be "RED", engrave "Emergency Power" on coverplate.

PART 3 - EXECUTION

3.1 GENERAL

A. Install wiring devices as indicated, in compliance with manufacturer's written instructions, applicable requirements of NEC, NECA's "Standard of Installation", and in accordance with recognized industry practices to fulfill project requirements.

B. Coordinate with other trades (including painting), the installation of electrical boxes and wiring. Install devices in boxes such that front of device is flush and square with coverplate. Drawings are small scale and, unless dimensioned, indicate approximate locations only of outlets, devices, equipment, etc. Locate outlets and apparatus symmetrically on floors, walls and ceilings where not dimensioned and coordinated with other work. Verify all dimensioned items on job site. Consult architectural cabinet, millwork, and equipment shop drawings prior to rough-in of electrical work.

C. Receptacles: The receptacles shall be mounted vertically with the neutral terminal or slot at the left side.

D. Install devices only in electrical boxes which are clean; free from excess building materials, dirt, and debris. Mark each box and the back of each device plate, with felt tip marker, indicating the circuit or port to which the device is connected. Example: "CKT A-1".

E. Install blank plates on all boxes without devices.

F. Delay installation of wiring devices until wiring work is completed. Delay installation of wall plates until after painting work is completed.

G. Do not Edison or share neutral conductors between phases.

3.2 PROTECTION OF WALL PLATES AND RECEPTACLES

A. At time of substantial completion, replace those items which have been damaged, including those stained, burned and scored.

3.3 GROUNDING

A. Provide electrical continuous, tight grounding connections for wiring devices, unless otherwise indicated.

3.4 TESTING

A. Prior to energizing circuitry, test with a hand test device that proves electrical connections: continuity, proper polarity, grounding, neutral connection, etc. Any irregularities shall be corrected.

END OF SECTION 262726

SECTION 262910 - OVERCURRENT PROTECTIVE DEVICES

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. Extent of overcurrent protective device work is indicted by drawings and schedules. Overcurrent protective devices specified herein are for installation as individual components in separate enclosures, and for installation as integral components of switchboards and panelboards. See Section 262413, Switchgear and Switchboards, and Section 262416, Panelboards.

B. Types of overcurrent protective devices in this section include the following for operation at 600 volts and above:

1. Molded case circuit breakers
2. Power circuit breakers
3. Molded case systems breakers

C. Refer to other Division-26 sections for cable/wire and connector work required in conjunction with overcurrent protective devices.

1.2 QUALITY ASSURANCE

A. Comply with NEC requirements and NEMA and ANSI standards as applicable to construction and installation of overcurrent protective devices.

1.3 SUBMITTALS

A. Product Data: Submit manufacturer's data on overcurrent protective devices, including catalog cuts, time-current trip characteristic curves, and mounting requirements.

B. Shop Drawings: Submit layout drawings of overcurrent protective devices, with layout of circuit breakers, including special relationships to proximate equipment.

C. Maintenance Stock, Fuses: For types and ratings required, furnish additional fuses, amounting to one unit for every 5 installed units, but not less than two units of each size and type.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURER’S (LOW VOLTAGE)

A. Subject to compliance with requirements, provide products of one of the following (main and branch manufacturer must be same as panelboard and/or switchboard manufacturer):

1. Circuit Breakers and Fusible Switches
   a. Siemons

2.2 MOLDED CASE CIRCUIT BREAKERS

A. Provided factory-assembled, molded case circuit breakers for power distribution panelboards and switchboards; and for individual mounting, as indicated. Provide breakers and amperage, voltage and RMS interrupting rating shown, with permanent thermal trip and adjustable instantaneous magnetic trip in each pole. Construct breakers for mounting and operating in any physical position and in an ambient temperature of 40º C. Provide with mechanical screw type removable connector lugs, AL/CU rated.

B. All breakers in the main distribution panel shall have sufficient interrupting capacity to safely interrupt the available short circuit current from the transformer bank.

PART 3 - EXECUTION

3.1 INSTALLATION OF OVERCURRENT PROTECTIVE DEVICES

A. Install overcurrent protective devices as indicated, in accordance with the manufacturer's written instructions and with recognized industry practices to ensure that protective devices comply with requirements. Comply with NEC and NEMA standards for installation of overcurrent protective devices.

B. Coordinate with other work as necessary to interface installation of overcurrent protective devices with other work.

C. Provide a breaker coordination study. Set field-adjustable circuit breakers for trip settings recommended in study, subsequent to installation of devices.

D. Install fuses in overcurrent protective devices.

E. Field test all ground fault protective devices for proper operation; test to be performed by representative of the manufacturer. Include verification of complete time current trip characteristics.

F. Provide selective coordination of all breakers per NEC 700.27 and 701.27 Using the definition in Article 100 (NEC2014).

3.2 FIELD QUALITY CONTROL

A. Prior to energization of overcurrent protective devices, test devices for continuity of circuitry and for short-circuits. Correct malfunctioning units, and then demonstrate compliance with requirements.

END OF SECTION 262910