

SPECIFICATIONS
FOR:
HAGERMAN HIGH SCHOOL
HVAC EQUIPMENT
REPLACEMENT

HAGERMAN, IDAHO

Laughlin Ricks Architecture

architecture/planning

134 3rd Avenue East * Twin Falls, Idaho 83301

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INVITATION TO BID

Sealed proposals will be received at the office of, Hagerman Joint School District #233, 324 N 2nd Ave, Hagerman, Idaho 83332 for a HVAC equipment replacement for Hagerman High School, in Hagerman, Idaho until 3:00 p.m. Thursday, January 11, 2024, prevailing local time.

Proposals will be opened publicly at 3:15 p.m. Thursday, January 11, 2024, prevailing local time. Following review, a bid tabulation report will be sent to each contractor.

Bid security in the amount of 5% of the bidders maximum bid price shall be made payable to the Owner. Security shall be in the form of a certified check or bid bond issued by a Surety. No bidder may withdraw his bid within 30 days after the bid date. A current public works contractor's license for the State of Idaho shall be required in order to submit a bid on this project.

Plans and specifications shall be made available by electronic PDF file. Each General Contractor shall be responsible for making available information to their bidding sub-contractors as necessary for bidding purposes. All questions or RFI requests by bidding contractors shall be directed through each General Contractor to the Architect. Answers/clarifications shall be given to each pre-qualified General Contractor by Addendum.

Retainage will be 5% for work completed and material suitably stored.

Performance, Labor, and Material Bonds. The successful bidder or bidders shall be required to file with the State of Idaho, at the time of execution of the Contract, Performance and Labor and Material Bonds in the full amount of the contract price. Said bonds if required shall be in force for one (1) year after the date of final payment for the work to cover all guarantees against defective workmanship and materials.

Pre-bid conference will be held on Thursday, December 14th at 3:30 p.m. at the Hagerman High School. All interested parties are recommended to attend.

END OF INVITATION

BID PROPOSAL

To: Hagerman High School HVAC Equipment Replacement:

Proposal of, _____.
(hereafter called the "Bidder"), organized and existing under the
laws of the State of Idaho, doing business as a _____.
(Insert corporation, Partnership, or Individual.)

The Bidder, in compliance with the invitation to bid for the HVAC equipment replacement for Hagerman High School, Hagerman, Idaho, and having examined the plans and specifications, with related documents of the proposed work, and being familiar with all of the conditions surrounding the constructions 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 at 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 a part.

Bidder hereby agrees to commence work under this contract as notified by "Notice to Proceed". Substantial completion for the work will be set forth after issuance of Notice to Proceed. Bidder further agrees to pay liquidated damages, the sum of \$ 500.00 (Five Hundred Dollars) for each consecutive calendar day thereafter.

Bidder acknowledges receipt of addendum(s):
No. _____.

BASE BID PROPOSAL: Bidder agrees to perform all of the work described in the contract document of _____ Dollars
\$ _____. (Amount shall be shown
in both words and figures. In case of discrepancy, the amount shown in words will govern.)

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 45 calendar days after the scheduled closing time for receiving bids. Upon receipt of written notice of the acceptance of this bid, Bidder will execute to formal contract attached within 10 days and deliver a Surety Bond or Bonds.

ALTERNATE BIDS

The following Alternates may be selected by the Owner and considered with the Total Base Bid in accordance with the provisions of the Bidding Documents.

Alternate Bid No. 1: Add to provide Refrigerant Pipe Cover
\$ _____

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

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 set forth, all liquidated damages for the delay and additional expense to the owner caused thereby.

State of Idaho Public Works License _____

Pursuant to Section 67-2310, IDAHO CODE commonly known as the naming law, the names and addresses of the entities that will perform the plumbing, heating and air conditioning, and electrical work, subject to approval of the Owner and Architect, if Undersigned is awarded the Contract, are as follows:

Plumbing (name) _____

Address _____

Idaho Plumbing Contractor's License No. _____

Electrical (name) _____

Address _____

Idaho Electrical Contractor's License No. _____

Heating, Air Conditioning (name) _____

Address _____

Idaho H.V.A.C Contractor's License No. _____

Dated at _____ this _____ day of _____, 2024.

Respectfully Submitted,

By: _____
(Company)

(Address)

(Signature)

Seal if Corporation

(Title)

THE AMERICAN INSTITUTE OF ARCHITECTS



AIA Document A310

Bid Bond

KNOW ALL MEN BY THESE PRESENTS, that we

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

as Principal, hereinafter called the Principal, and

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

a corporation duly organized under the laws of the State of

as Surety, hereinafter called the Surety, are held and firmly bound unto

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

as Obligee, hereinafter called the Obligee, in the sum of

Dollars (\$),

for the payment of which sum well and truly to be made, the said Principal and the said Surety, bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has submitted a bid for

(Here insert full name, address and description of project)

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

Signed and sealed this

day of

19

_____	{	_____	(Seal)
(Witness)		(Principal)	
		_____	(Title)
_____	{	_____	(Seal)
(Witness)		(Surety)	
		_____	(Title)



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PERFORMANCE BOND

THE AMERICAN INSTITUTE OF ARCHITECTS



Performance Bond

AIA Document A311

KNOW ALL MEN BY THESE PRESENTS: that

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

as Principal, hereinafter called Contractor, and,

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

as Surety, hereinafter called Surety, are held and firmly bound unto

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

as Oblige, hereinafter called Owner, in the amount of

Dollars (\$),

for the payment whereof Contractor and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS,

Contractor has by written agreement dated

19 , entered into a contract with Owner for

(Here insert full name, address and description of project)

in accordance with Drawings and Specifications prepared by

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

which contract is by reference made a part hereof, and is hereinafter referred to as the Contract.

PERFORMANCE BOND

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION is such that, if Contractor shall promptly and faithfully perform said Contract, then this obligation shall be null and void; otherwise it shall remain in full force and effect.

The Surety hereby waives notice of any alteration or extension of time made by the Owner.

Whenever Contractor shall be, and declared by Owner to be in default under the Contract, the Owner having performed Owner's obligations thereunder, the Surety may promptly remedy the default, or shall promptly

1) Complete the Contract in accordance with its terms and conditions, or

2) Obtain a bid or bids for completing the Contract in accordance with its terms and conditions, and upon determination by Surety of the lowest responsible bidder, or, if the Owner elects, upon determination by the Owner and the Surety jointly of the lowest responsible bidder, arrange for a contract between such bidder and Owner, and make available as Work progresses (even though there should be a default or a succession of

defaults under the contract or contracts of completion arranged under this paragraph) sufficient funds to pay the cost of completion less the balance of the contract price; but not exceeding, including other costs and damages for which the Surety may be liable hereunder, the amount set forth in the first paragraph hereof. The term "balance of the contract price," as used in this paragraph, shall mean the total amount payable by Owner to Contractor under the Contract and any amendments thereto, less the amount properly paid by Owner to Contractor.

Any suit under this bond must be instituted before the expiration of two (2) years from the date on which final payment under the Contract falls due.

No right of action shall accrue on this bond to or for the use of any person or corporation other than the Owner named herein or the heirs, executors, administrators or successors of the Owner.

KNOW ALL MEN BY THESE PRESENTS: that

as Principal, hereinafter called Principal, and,

Signed and sealed this

day of

19

as Obligor, hereinafter called Owner, for the use and benefit of claimants as hereinafter defined, in the

amount of

(Witness)

(Principal)

(Seal)

(Title)

WHEREAS,

Principal has by written agreement dated

19

entered into a contract with Owner for

(Witness)

(Surety)

(Seal)

(Title)



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LABOR AND MATERIAL PAYMENT BOND

THE AMERICAN INSTITUTE OF ARCHITECTS



AIA Document A311

Labor and Material Payment Bond

THIS BOND IS ISSUED SIMULTANEOUSLY WITH PERFORMANCE BOND IN FAVOR OF THE OWNER CONDITIONED ON THE FULL AND FAITHFUL PERFORMANCE OF THE CONTRACT

KNOW ALL MEN BY THESE PRESENTS: that

as Principal, hereinafter called Principal, and,

as Surety, hereinafter called Surety, are held and firmly bound unto

as Oblige, hereinafter called Owner, for the use and benefit of claimants as hereinbelow defined, in the

amount of

(Here insert a sum equal to at least one-half of the contract price)

Dollars (\$),

for the payment whereof Principal and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS,

Principal has by written agreement dated

(Here insert full name, address and description of project)

19 , entered into a contract with Owner for

in accordance with Drawings and Specifications prepared by

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

which contract is by reference made a part hereof, and is hereinafter referred to as the Contract.

LABOR AND MATERIAL PAYMENT BOND

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION is such that, if Principal shall promptly make payment to all claimants as hereinafter defined, for all labor and material used or reasonably required for use in the performance of the Contract, then this obligation shall be void; otherwise it shall remain in full force and effect, subject, however, to the following conditions:

1. A claimant is defined as one having a direct contract with the Principal or with a Subcontractor of the Principal for labor, material, or both, used or reasonably required for use in the performance of the Contract, labor and material being construed to include that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental of equipment directly applicable to the Contract.

2. The above named Principal and Surety hereby jointly and severally agree with the Owner that every claimant as herein defined, who has not been paid in full before the expiration of a period of ninety (90) days after the date on which the last of such claimant's work or labor was done or performed, or materials were furnished by such claimant, may sue on this bond for the use of such claimant, prosecute the suit to final judgment for such sum or sums as may be justly due claimant, and have execution thereon. The Owner shall not be liable for the payment of any costs or expenses of any such suit.

3. No suit or action shall be commenced hereunder by any claimant:

a) Unless claimant, other than one having a direct contract with the Principal, shall have given written notice to any two of the following: the Principal, the Owner, or the Surety above named, within ninety (90) days after such claimant did or performed the last of the work or labor, or furnished the last of the materials for which said claim is made, stating with substantial

accuracy the amount claimed and the name of the party to whom the materials were furnished, or for whom the work or labor was done or performed. Such notice shall be served by mailing the same by registered mail or certified mail, postage prepaid, in an envelope addressed to the Principal, Owner or Surety, at any place where an office is regularly maintained for the transaction of business, or served in any manner in which legal process may be served in the state in which the aforesaid project is located, save that such service need not be made by a public officer.

b) After the expiration of one (1) year following the date on which Principal ceased Work on said Contract, it being understood, however, that if any limitation embodied in this bond is prohibited by any law controlling the construction hereof such limitation shall be deemed to be amended so as to be equal to the minimum period of limitation permitted by such law.

c) Other than in a state court of competent jurisdiction in and for the county or other political subdivision of the state in which the Project, or any part thereof, is situated, or in the United States District Court for the district in which the Project, or any part thereof, is situated, and not elsewhere.

4. The amount of this bond shall be reduced by and to the extent of any payment or payments made in good faith hereunder, inclusive of the payment by Surety of mechanics' liens which may be filed of record against said improvement, whether or not claim for the amount of such lien be presented under and against this bond.

Signed and sealed this _____ day of _____

19

for the payment whereof Contractor and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

(Witness)

(Principal)

(Seal)

(Title)

WHEREAS,

Contractor has by written agreement dated _____ entered into a contract with Owner for _____

(Witness)

(Surety)

(Seal)

(Title)



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OC1-2020 – Owner/Contractor Agreement

(Lump Sum Fee)

CAUTION: THIS DOCUMENT HAS LEGAL CONSEQUENCES. ALA recommends that the parties seek the advice of their attorney(s) prior to executing or modifying this Agreement. By executing this Agreement, the parties assume sole and complete responsibility for the content contained hereinafter.

1.0 AGREEMENT: This Agreement is made and entered into this ___ day of _____, 20 __, by and between:

The **OWNER** is: _____

Attention: _____

Phone Number: _____ Cell Number: _____

Email: _____

The **Owner's** Designated Representative is: _____

The **CONTRACTOR** is: _____

Attention: _____

Phone Number: _____ Cell Number: _____

Email: _____

The **Contractor's** Designated Representative is: _____

The **ARCHITECT** is: _____

Attention: _____

Phone Number: _____ Cell Number: _____

Email: _____

The **Architect's** Designated Representative is: _____

The **PROJECT** is located at: _____

The **PROJECT** consists of the construction of: *[Insert description of Project]*.____

(Include the Legal Description, Property Index Number (PIN), and the name of the legal owner(s) of the property on which the Project is being constructed in the description following. The Owner shall provide a survey which shall not be more than six months old prior to the submission of the Project for a building permit.)

(Refer to Exhibit A, plat(s) of survey attached hereinafter.)

2.0 TERMS AND CONDITIONS: The Owner and Contractor each agree to be bound by the terms and conditions contained in the Agreement.

3.0 ARTICLE 3 – CONTRACT DOCUMENTS

3.1 General Conditions: The General Conditions of the Contract for Construction Where the Basis of Compensation is a Lump Sum Fee, ALA Document GC1, 2020 Edition, forms a part of this Agreement and is incorporated herein as if set for in full.



- 3.2 List of Drawings:** The complete construction of the Project (the Work) is based on the following drawings, all dated *[Insert date here]* __, unless specifically noted otherwise.

Sheet No:	Description	Date
a.	_____	_____
b.	_____	_____

Or

Refer to **Exhibit** *[Insert Exhibit alpha.]* __ for list of drawings, attached hereinafter.

- 3.3 Specifications:** The Specifications for the Project (the Work) are as indicated on the Drawings or contained in the Project Manual dated *[Insert date here]* __, unless specifically noted otherwise, and are as follows:

Specification Section No.	Title	Page Nos.	Date
a.	_____	_____	_____
b.	_____	_____	_____

Or

Refer to **Exhibit** *[Insert Exhibit alpha.]* __ for list of specification sections, attached hereinafter.

- 3.4 Owner and/or Tenant Standards:** The Contractor shall conform to the following referenced Owner and/or Tenant Standards, if any: *[Insert standards here.]* __

Or

Refer to **Exhibit** *[Insert Exhibit alpha.]* __ for Tenant Standards to be complied with, attached hereinafter.

4.0 ARTICLE 4 – CONTRACT TIMES

- 4.1 Date of Commencement of Work:** The Contractor shall commence work on the Project upon receipt of the Owner's Notice to Commence Work. Prior to commencement of any work on the project, the Contractor shall submit to Owner all required insurance certificates and bonds. Failure to do so shall be considered a material breach, and the Owner may, at his sole discretion, terminate this Agreement.

- 4.2 Substantial Completion:** The Contractor shall construct the Project to a state of Substantial Completion within *[insert number of days in alpha form.]* __ *[insert number of days in numerical form]* (__) calendar days after issuance of all required building permits. Substantial Completion is hereby defined as the date upon which the Owner can occupy the Project and utilize it for the Owner's intended purposes.

- 4.3 Final Completion:** The Contractor's Work on the Project shall be considered finally complete when:

4.3.1 All punch list items have been corrected, or the Owner elects to accept specific defective work and receives a credit from the Contractor;

4.3.2 The Owner receives the Final Sworn Statement from Contractor and all subcontractors in conformity with the requirements of law, Final Waivers of Lien from the Contractor and all



subcontractors and materials suppliers for any and all labor performed, or materials supplied, for the Project;

- 4.3.3 The Owner receives from the Contractor all manufacturers' Warranties and/or Guarantees required by the Drawings or Specifications;
- 4.3.4 The Owner receives from the Contractor operating manuals for all equipment and systems incorporated in the work;
- 4.3.5 The Owner receives a Certificate of Occupancy from the appropriate authority having jurisdiction over the Project;
- 4.3.6 Consent of surety for Final Payment is received (if applicable); and
- 4.3.7 When the Contractor submits his Final Application for Payment.

5.0 ARTICLE 5 - COMPENSATION

5.1 Contractor's Lump Sum Fee: The Contractor hereby agrees to fully construct the Project in accordance with the Contract Documents for the **LUMP SUM FEE** of *[insert amount in alpha form]* _____ Dollars *[insert amount in numerical form]* (\$ _____).

5.2 Alternate Price(s): The Cost of the Work indicated as the Contractor's Lump Sum Fee in Paragraph 5.1 above shall be increased or decreased upon Owner's acceptance of any of the following alternates: (State description and cost of Alternate(s) and the increase or decrease in the Cost of the Work, if any.) *[Insert descriptions and change in cost for each alternate below.]*

5.2.1 Alternate #1 – Description

5.2.1.1 Cost - Add **OR** Deduct _____ Dollars
(\$ _____)

5.2.2 Alternate #2 – Description

5.2.2.1 Cost - Add **OR** Deduct _____
Dollars (\$ _____)

5.2.3 Alternate #3 – Description

5.2.3.1 Cost - Add **OR** Deduct _____
Dollars (\$ _____)

5.3 Unit Prices: Unit prices are to be based upon the number of units indicated in the Contract Document. Unit prices, if any, shall adjust the Contractor's Lump Sum Fee indicated in Paragraph 5.1 as stated hereinafter: (Attach separate listings of Unit Prices if necessary.) *[Insert unit cost descriptions and cost per unit below.]*

5.3.1 Description

5.3.1.1 Unit Price for Each Additional Unit - _____ Dollars
(\$ _____)



5.3.2 Description

5.3.2.1 Unit Price for Each Additional Unit - _____ Dollars
(\$ ____)

- 5.4 Allowances:** The Contractor shall include in the Lump Sum Fee stated in Paragraph 5.1 the following dollar amounts to be held in reserve to pay for the anticipated costs of the following Allowance Items. Once the exact cost of an Allowance Item is determined, that exact cost shall replace the allowance amount, and the Contractor's Lump Sum Fee shall be adjusted accordingly via a written Change Order. The Allowance Items requested are as follows: (Attach separate listings of Unit Prices if necessary.).
[Insert allowance item descriptions and amounts below.]

	Allowance For: _____	Cost to be Included Allowance Amount _____
5.4.1	_____	\$ _____
5.4.2	_____	\$ _____

6.0 ARTICLE 6 – PROGRESS PAYMENTS

- 6.1 Contractor's Application for Payment:** The Contractor shall submit an Application for Payment on the *[Insert day of the month here]* _____ day of the month for all labor performed and materials supplied during the previous month. The Contractor's Application for Payment shall include a request for payment for any and all Change Order work performed during the previous month. Requests for payment for extra or additional work shall be disallowed without a properly executed Change Order by the Owner authorizing the Contractor to perform the additional work. No extra work may be done or requested without a change order. Additionally, requests for Change Order work not submitted in a timely manner for work performed during the previous month will be disallowed. The intent of this paragraph is to address all Change Order work in a timely and organized manner. Owner maintains the right to reasonably withhold and deduct the cost to correct any portion(s) of non-conforming or defective work.
- 6.2 Retainage:** Retainage in the amount of *[Insert percentage here]* _____ % of the requested amount on the Contractor's Application for Payment will be withheld from each monthly payout to the Contractor until the Project reaches a state of Substantial Completion. Retainage amounts will be released on the date of Substantial Completion, less any amounts reasonably withheld to cover the cost of correction of outstanding punch list items, including the cost to correct defective and non-conforming work. Owner may reduce or eliminate retainage amounts to be withheld from future payments to the Contractor, once the project exceeds 50% completion.
- 6.3 Final Payment:** Owner shall make the Final Payment to Contractor when all of the requirements of Article 4.3 are met to the reasonable satisfaction of the Owner and Architect.
- 6.4 Interest Charges for Late Payments:** Payments are due and payable to the Contractor within thirty (30) days of receipt by Owner of Contractor's Application for Payment. Payments shall be considered late thirty (30) days after the date of the receipt by the Owner of the Contractor's Application for Payment. Late payments shall accrue interest at the rate of *[Insert percentage here]* _____ % per month.
- 6.5 Liquidated Damages:** Liquidated Damages shall apply to this Agreement. The Contractor shall construct the project to a state of Substantial Completion on or before the date stated in Paragraph 4.2 above. Should the Contractor fail to reach Substantial Completion by the stated time, the Contractor hereby agrees and acknowledges that the Owner will incur daily damages in the amount of *[Insert dollar*



amount in alpha form here] ___ Dollars per calendar day, which amount the Owner shall deduct from any amount(s) due the Contractor. Should said amount for Liquidated Damages exceed the amount still due the Contractor, the Contractor agrees that the Owner shall have no responsibility to continue paying the Contractor. The Contractor further hereby agrees to pay the Owner any excess amount of unpaid Liquidated Damages. The stated Liquidated Damages amount represents the Owner's good faith effort at determining the actual damages the Owner will incur on a daily basis if the Project is not finished on time. This Liquidated Damages provision is not a penalty clause.

OR *[Note: Delete either the subparagraph 6.5 Liquidated Damages above or subparagraph 6.5 Penalty and Bonus Clause below. If neither applies, delete both subparagraphs.]*

6.5 Penalty and Bonus Clause: The Contractor agrees to pay the Owner, as a penalty, the sum of *[Insert dollar amount here]* \$ ___ for each calendar day the Contractor fails to construct the project to a state of Substantial Completion after the time stated in Paragraph 4.2 above. The Owner similarly agrees to pay the Contractor, as a bonus, the same stated amount for each day the project is constructed to a state of Substantial Completion before the time stated in Paragraph 4.2.

7.0 ARTICLE 7 – INTEGRATION CLAUSE

7.1 This Agreement represents the entire and integrated agreement (the contract) between the Owner and Contractor. Together with the Contract Documents, it supersedes any prior negotiations, representations and or promises made to the parties hereto, whether written or oral. The Contract may be amended or modified only by a written modification.

8.0 ARTICLE 8 – MISCELLANEOUS PROVISIONS - *(Insert any other terms and conditions below.)*

8.1 _____

8.2 _____

8.3 _____

9.0 AGREED TO AND ACCEPTED BY *(The Designated Representative having the legal authority to bind.)*

OWNER:

CONTRACTOR:

Co Name _____

Co Name _____

By: _____

By: _____

Print Name: _____

Print Name: _____

Title: _____

Title: _____



GC1 – 2020 General Conditions

Lump Sum Fee

CAUTION: THIS DOCUMENT HAS LEGAL CONSEQUENCES. The Association of Licensed Architects recommends that the parties seek the advice of their attorney(s) prior to executing or modifying this Agreement. By executing this Agreement, the parties assume sole and complete responsibility for the content contained hereinafter.

1.0 ARTICLE 1 – DEFINITIONS

1.1 THE CONTRACT DOCUMENTS:

The Contract Documents consist of the Agreement between the Owner and Contractor, drawings, specifications, addenda issued prior to execution of the Agreement, these General Conditions, as modified, and other attachments to the Agreement, if any. The Contract Documents, including these General Conditions, represent the entire and integrated agreement between the Owner and the Contractor. The Contract Documents supersede any prior negotiations, representations and or promises made to the parties hereto whether written or oral. The Contract may be amended or modified only by a written modification.

1.2 THE WORK:

The Contractor shall furnish all management, labor, materials, services, permits, and transportation to perform and timely complete the construction for its intended use according to the Contract Documents.

1.3 INTENT:

The intent of Contract Documents is to include all items and services necessary for the proper execution and completion of the Work by the Contractor for its intended use and benefits to the Owner. The Contract Documents are complimentary, and what is required by one shall be binding as if required by all. Proper execution and completion of the Work shall be within applicable industry standards. Work not in conformance with applicable industry standards shall be considered defective.

1.4 COST OF THE WORK (LUMP SUM FEE):

Cost of the Work includes the total cost at current market rates of all labor, including fringe benefits, materials, value of equipment rental, taxes, insurance, bonds, overhead and profit necessary to construct the project in a complete and workmanlike manner.

1.5 CHANGE ORDER:

A change order is an authorization to change the scope of work for a stated fee and to adjust contract amounts accordingly.

1.6 CONSTRUCTION CHANGE DIRECTIVE:

An Owner may order the Contractor to proceed with a change in the scope of work without prior written agreement regarding the adjustment, if any, in the contract amount or time. The Contractor and the Owner shall determine in advance the method by which the cost of the Construction Change Directive shall be determined. Once the cost is determined, a Change Order shall be issued adjusting the contract sum or time, if required.

2.0 ARTICLE 2 – OWNER’S OBLIGATIONS AND RIGHTS

2.1 The Owner will furnish and pay for survey and any pertaining information about land or existing building conditions.



- 2.2 The Owner shall secure and pay for necessary surveys, investigations, approvals, easements, or any charges required for the construction, use or occupancy. The Owner shall obtain and supply the Architect with a survey of the property upon which the Work is to be constructed. Said survey shall be no more than six (6) months old prior to the date of submission of the project for a building permit.
- 2.3 Neither the Owner nor the Architect shall have control or charge over construction means, methods, techniques, sequence, procedures, or safety precautions, since these are solely the responsibility of the Contractor.
- 2.4 The Owner shall have the authority to reject nonconforming work installed by the Contractor.
- 2.5 The Owner shall have the right to suspend the Work of the Contractor for any reason whatsoever. The Owner shall give seven (7) days written notice to the Contractor of Owner's intent to suspend the Work. The Owner may carry out the Work seven (7) days after such written notice. The Owner agrees to reimburse the Contractor for any and all actual costs incurred as a direct result of the Owner's suspension of the Work, including any costs incurred in recommencing the Work.
- 2.6 The Owner shall have the right to stop the Work if the Contractor persistently fails to correct construction defects or delays caused through no fault of Owner. The Owner shall give seven (7) days written notice to the Contractor of Owner's intent to stop the Work. The Owner may carry out the Work seven (7) days after such written notice.
- 2.7 If the Contractor fails to take corrective measures and perform under the terms of the Contract following receipt of a seven (7) day notice, the Owner may give a Notice of Termination to the Contractor immediately terminating the Contract. The Owner may deduct from the Contractor's charges, the cost of the succeeding contractor's charges for correcting any deficiencies and delays, as well as the cost of any additional Architect's services and expenses incurred as a direct result of correcting any such terminated Contractor's deficiencies or delays. The Owner shall not be obligated to make any further payments to the terminated Contractor until the Project is complete.
 - 2.7.1 If the succeeding contractor's charges to complete the remainder of the Work are less than the unpaid amount of the terminated Contractor's fee, the Owner shall pay the terminated Contractor such difference.
 - 2.7.2 If the succeeding contractor's charges to complete the remainder of the Work exceed the unpaid amount of the terminated Contractor's fee, the terminated Contractor shall pay the Owner the difference.

3.0 ARTICLE 3 – CONTRACTORS OBLIGATIONS AND RIGHTS

- 3.1 By entering into the Contract, the Contractor acknowledges visiting the site to become familiar with local conditions and that the Contractor has studied the Contract Documents and resource information, including but not limited to surveys, geotechnical reports, environmental reports, local municipal requirements, etc.
- 3.2 The Contractor shall supervise and direct the Work and be responsible for co-ordination of all portions of the Work.
- 3.3 The Contractor shall take control of and be solely responsible for construction means, methods, techniques, sequence, procedures, safety procedures and precautions.



- 3.4 Prior to commencement of any actual construction work on the Project, the Contractor shall submit a Construction Schedule to the Owner for review and approval. The Construction Schedule shall indicate all critical milestone dates for the Work and shall further indicate the Work of the various trades on the Project. The Contractor agrees to adhere to the approved Construction Schedule, and to adjust same from time to time, to comply with the dates of Substantial and Final Completion of the Project, and as further reasonably revised and approved by the Owner. The Contractor hereby agrees to bring any scheduling problems to the immediate written attention of the Owner.
- 3.5 The Contractor shall provide the Architect and Owner a Schedule of Shop Drawing submissions for the review and approval of the Architect and Owner. Contractor shall adjust such schedule, from time to time, when reasonably requested by the Architect and/or the Owner. Contractor agrees to stagger Shop Drawing submissions as reasonably necessary to allow both the Architect and Owner sufficient time to review same.
- 3.6 The Contractor shall be solely responsible for the content and accuracy of its subcontractors' and material suppliers' Shop Drawing submissions. The Contractor shall review and approve all Shop Drawings prior to submission to the Architect for review. All Shop Drawings without the approval stamp of the Contractor shall be immediately returned to Contractor for his review and approval before the Architect reviews same.
- 3.7 The Contractor shall have the right to suspend or terminate Work on the Project, after providing the Owner seven (7) days written notice, should the Owner fail to pay for all Work properly performed exceed thirty (30) calendar days from date of submission of Contractor's Request for Payment.
- 3.8 If the Work is suspended more than thirty (30) consecutive days, through no fault of the Contractor, the Contractor, upon seven (7) days Notice of Intent to Terminate, may terminate the Agreement. Should the Owner desire the Work to continue during the seven (7) day notice period, the Contractor shall immediately recommence Work.
- 4.0 ARTICLE 4 – ARCHITECT'S ADMINISTRATION OF CONSTRUCTION CONTRACT**
- 4.1 Neither the Architect nor the Owner shall have control or charge over construction activities, means, methods, techniques, sequence, procedures, or safety precautions. These are solely the responsibility of the Contractor.
- 4.2 The Architect shall not have the authority nor the responsibility to stop the work.
- 4.3 The Architect shall evaluate the quality and quantity of Work performed, and certify, to the best of his knowledge, information and belief, the amounts due under the Contractor's Request for Payment.
- 4.4 The Architect has the right to reject portions of the Work known not to confirm to the Contract Documents.
- 4.5 The Architect will review Shop Drawings for conformance to the overall design intent. The Architect will not be responsible for checking dimensions, gages of materials, sizes, or quantities, since these are the sole responsibility of the Contractor. The Architect shall not review Shop Drawings which are not first reviewed and approved by the Contractor.
- 4.6 Time spent by the Architect responding to unnecessary Requests for Information (RFI's), where the information is reasonably inferable from the Contract Documents, shall be billed by the Architect as an Additional Service and back charged to the Contractor.
- 5.0 ARTICLE 5 – CONSTRUCTION BY OWNER**
- 5.1 The Owner has the right to perform work on portions of the Project using separate contractors or the Owner's own work force.



- 5.2 The Contractor shall provide reasonable cooperation and coordinate the Contractor's activities with the activities of the Owner's separate contractors or work force.
- 5.3 The Owner's separate contractor or Owner's work forces shall not affect the Contractor's schedule.
- 5.4 If the Owner's separate contractor or own work forces affect the Contractor's schedule, then the Contractor shall be entitled to a Change Order reflecting an equitable adjustment in the Contractor's fee, the contract time, or both.

6.0 ARTICLE 6 – CHANGES IN THE SCOPE OF WORK

- 6.1 The Owner has the right to make changes, additions, deletions or modifications to the Work without invalidating the Contract.
- 6.2 The Contractor's Fee and or Contract Time shall be adjusted by mutual agreement through the use of a written Change Order.

7.0 ARTICLE 7 – CORRECTION OF WORK AND CONTRACTOR'S CORRECTION PERIOD

- 7.1 During construction, the Contractor shall immediately correct defective and non-conforming work to the reasonable satisfaction of the Owner.
- 7.2 For a period of one year following the date of Substantial Completion, the Contractor shall correct all defective and non-conforming Work.

8.0 ARTICLE 8 – PROJECT CLOSE OUT

- 8.1 The Contractor shall submit a request for final payment after the Contractor completes all punch list items to the Owner's reasonable satisfaction. In addition to completion of the punch list items, the Contractor shall submit all final waivers of lien, manufacturer's warranties, extended warranties, if any, equipment manuals, and any other required submissions specified in the Contract Documents.

9.0 ARTICLE 9 – INSURANCE

- 9.1 Contractor shall provide the following types and limits of insurance coverage, all on an occurrence made basis:

9.1.1 Worker's Compensation:

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

- 9.1.2 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 exposure exists. This coverage may be provided by the subcontractor if the State and prime contractor are named as additional insured.
 - (d) For personal injury liability, limits of not less than \$1,000,000 per occurrence.
 - (e) For medical expenses (any one person) a limit of not less than \$10,000.
 - (f) A general aggregate policy limit (per project) of not less than \$2,000,000.
 - (g) A product and completed operations aggregate policy limit (per project) of not less than \$2,000,000.
 - (h) For fire legal liability (any one fire) a limit of not less than \$100,000.
- 9.1.3** Business auto liability (including owned, non-owned and hired vehicles) in an amount not less than \$1,000,000 combined single limit.
- 9.1.4** Umbrella Excess Liability:
The contractor shall be required to have an Umbrella Policy with a minimum coverage of \$1,000,000.
- 9.2** All of the above policies shall include a Waiver of Subrogation in favor of the Owner, Architect and Architect's Consultants.
- 9.3** In case of any work sublet, the Contractor shall require that the lower tier Subcontractors similarly provide such insurance.
- 9.4** Certificates of Insurance for the above coverage's shall be submitted for approval to the Owner and the Architect prior to the start of construction. The certificates and the insurance policies required above shall contain a provision that the coverage's afforded under the policies will not be cancelled until at least thirty (30) days' prior written notice has been given to the Owner and Architect, except for 10 days' notice for cancellation due to nonpayment of premium. Information concerning reduction of coverage shall be furnished by the Contractor with reasonable promptness in accordance with the Contractor's information and belief.
- 9.5** In the event that the Contractor fails to maintain the insurance required above, the Owner shall have the right to purchase such insurance on behalf of the Contractor and the Contractor shall reimburse the Owner for such costs on demand.
- 9.6** The Owner shall purchase and maintain property insurance written on a builder's risk form in an amount sufficient to cover the Cost of the Work and the Contractor's Fee on a replacement cost basis. Such property insurance shall be maintained by the Owner until substantial completion of the project has been achieved by the Contractor.
- 9.7** All of the above policies shall include a Waiver of Subrogation in favor of the Owner, Architect and Architect's Consultants.



- 9.8 In case of any work sublet, the Contractor shall require that the lower tier Subcontractors similarly provide such insurance.
- 9.9 Certificates of Insurance for the above coverages shall be submitted for approval to the Owner and the Architect prior to the start of construction. The certificates and the insurance policies required above shall contain a provision that the coverage's afforded under the policies will not be cancelled until at least thirty (30) days' prior written notice has been given to the Owner and Architect, except for 10 days notice for cancellation due to nonpayment of premium. Information concerning reduction of coverage shall be furnished by the Contractor with reasonable promptness.
- 9.10 In the event that the Contractor fails to maintain the insurance required above, the Owner shall have the right to purchase such insurance on behalf of the Contractor and the Contractor shall reimburse the Owner for such costs on demand.
- 9.11 The Owner shall purchase and maintain property insurance written on a builder's risk form in an amount sufficient to cover the Cost of the Work and the Contractor's Fee on a replacement cost basis. Such property insurance shall be maintained by the Owner until substantial completion of the project has been achieved by the Contractor.

10.0 ARTICLE 10 – INDEMNIFICATION

- 10.1 To the fullest extent permitted by law, the Contractor shall defend and hold harmless the Owner, the Architect and the Architect's Consultants, their respective sub consultants, officers, directors, members, employees and agents from and against any and all damages, liabilities or costs, including reasonable attorney's fees and defense costs, to the extent arising out of the negligent performance of the Work by the Contractor, the Contractor's subcontractors, or anyone for whom the Contractor is legally liable. The indemnification obligation under this Paragraph shall not be limited by a limitation on the amount or type of damages, compensation or benefits payable by or for the Contractor or a Subcontractor under workers' or workmen's compensation acts, disability benefit acts or other employee benefit acts. The Contractor shall not be required to indemnify any party for that party's own negligence.

11.0 ARTICLE 11 – DISPUTE RESOLUTION

- 11.1 All disputes or claims arising out of or relating to the Contract shall be submitted to mediation as a condition precedent to the institution of legal or equitable proceedings by either party. Mediation shall be administered by the American Arbitration Association in accordance with the applicable rules in effect as of the date of this Agreement. The cost of the mediator and any mediation expenses shall be shared equally by the parties. Nothing contained herein shall be construed to prevent any party from filing a mechanic's lien or other civil action to preserve their rights under applicable statutes of limitations or repose.
- 11.2 The Owner and the Contractor further agree to include a similar mediation provision in all agreements with independent contractors and consultants retained for the Project and to require all independent contractors and consultants also to include a similar mediation provision in all agreements with their subcontractors, sub-consultants, suppliers and the parties to all those agreements.
- 11.3 Any dispute that was not resolved by mediation shall be resolved by arbitration. Arbitrations shall be subject to the Federal Arbitration Act. An arbitration shall address any claim, dispute or other matter in question arising out of or related to this Agreement that was not resolved by mediation, and shall be administered by the American Arbitration Association pursuant to rules in effect as of the date of this Agreement. A demand for arbitration shall be made in writing and delivered to the other party and to the American Arbitration Association prior to the expiration of the applicable statute of limitations. Both parties hereto consent to joinder, at the request of either party, with any other arbitration involving this Project and common questions of law or fact.



12.0 ARTICLE 12 – MISCELLANEOUS PROVISIONS

- 12.1** The laws of the state in which the project is located shall govern this agreement. The venue for any litigation is the county in which the project is located.
- 12.2** Neither party to this agreement shall transfer, sublet or assign this agreement to any other party, without the written consent of the other, which consent shall not be unreasonably withheld.
- 12.3** Any term or provision of this agreement found to be invalid under any applicable statute or rule of law shall be deemed omitted and the remainder of this agreement shall remain in full force and effect.
- 12.4** Notwithstanding completion or termination of this agreement for any reason, all rights, duties and obligations of the parties to this agreement shall survive such completion or termination and remain in full force and effect until fulfilled.
- 12.5** The paragraph titles used in this agreement are for general reference only and are not part of the agreement
- 12.6** Nothing contained within this Contract shall establish any third-party beneficiary relationship with any other party.



SECTION 010010 - BASIC REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Summary of Work: Contract, work by owner, contractor use of premises, future work.
- B. Contract Considerations: Cash allowances, contingency allowance, inspection and testing allowances, schedule of values, applications for payment, change procedures, alternates.
- C. Coordination and Meetings: Coordination, field engineering, cutting and patching, meetings, progress meetings, equipment electrical characteristics and components, examination, preparation, cutting and patching.
- D. Submittals: Submittal procedures, construction progress schedules, proposed products list, shop drawings, product data, samples, manufacturers' installation instructions, manufacturers' certificates.
- E. Quality Control: Quality assurance - control of installation, tolerances, references, mock-ups, inspection and testing laboratory services, manufacturers' field services and reports.
- F. Construction Facilities and Temporary Controls: Temporary electricity, temporary lighting for construction purposes, temporary heat, temporary ventilation, telephone service, temporary water service, temporary sanitary facilities, barriers and fencing, water control, exterior enclosures, interior enclosures, protection of installed work, security, access roads, parking, progress cleaning and waste removal, project identification, field offices and sheds, removal of utilities, facilities, and controls.
- G. Material and Equipment: Products, transportation, handling, storage, and protection, products options, substitutions.
- H. Starting of Systems: Starting systems, demonstration and instructions, testing, adjusting and balancing.
- I. Contract Closeout: Contract closeout procedures, final cleaning, adjusting, project record documents, operation and maintenance data, spare parts and maintenance materials, warranties.

1.2 CASH ALLOWANCES

- A. None

1.3 SCHEDULE OF VALUES

- A. Submit schedule on AIA Form G703, or as approved by Architect.

- B. Submit Schedule of Values in duplicate within fifteen (15) days after date of Owner-Contractor Agreement.

1.4 APPLICATIONS FOR PAYMENT

- A. Submit three copies of each application on AIA Form G702 and G703 or as approved by Architect.
- B. Content and Format: Utilize Schedule of Values for listing items in Application for Payment.
- C. Payment Period: Monthly. Pay request to be submitted by the 25th day of the month and payment to be made within 30 days of approval of the pay request.

1.5 CHANGE PROCEDURES

- A. Stipulated Sum/Price Change Order: Based on Proposal Request and Contractor's fixed price quotation or Contractor's request for a Change Order as approved by Architect.
- B. Change Order Forms: AIA G701, or as approved by Architect.

1.6 COORDINATION

- A. Coordinate scheduling, submittals, and Work of the various sections of specifications to ensure efficient and orderly sequence of installation of interdependent construction elements.
- B. Verify utility requirement characteristics of operating equipment are compatible with building utilities.
- C. Coordinate space requirements and installation of mechanical and electrical work which are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable.
- D. In finished areas, conceal pipes, ducts, and wiring within the construction.

1.7 FIELD ENGINEERING

- A. Establish elevations, lines, and levels and certify that elevations and locations of the Work conform with the Contract Documents.
- B. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

1.8 CUTTING AND PATCHING

- A. Employ a skilled and experienced installer to perform cutting and patching new Work; restore Work with new Products.

- B. Submit written request in advance of cutting or altering structural or building enclosure elements.
- C. Execute cutting, fitting, and patching [including excavation and fill,] to complete Work, and to:
 - 1. Fit the several parts together, to integrate with other Work.
 - 2. Uncover Work to install or correct ill-timed Work.
 - 3. Remove and replace defective and non-conforming Work.
 - 4. Provide openings in elements of Work for penetrations of mechanical and electrical Work.
- D. Cut masonry and concrete materials using masonry saw or core drill. Restore Work with new Products in accordance with requirements of Contract Documents.
- E. Fit Work tight to adjacent elements. Maintain integrity of wall, ceiling, or floor construction; completely seal voids. Provide all required protection including, but not necessarily limited to shoring, bracing, and support to maintain structural integrity of the Work. Provide proper dust abatement materials and/or procedures to protect persons and property.
- F. Fit Work tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- G. Refinish surfaces to match adjacent finishes.
- H. Remove and properly replace defective or damaged Work in place.
- I. Restoration of existing and/or newly installed surfaces, assemblies, systems, etc.
- J. Thoroughly clean and restore areas, finishes and spaces where work is performed or used to access the Work.

1.9 SUBMITTAL PROCEDURES

- A. Submittal form to identify Project, Contractor, Subcontractor or supplier; and pertinent Contract Document references.
- B. The General Contractor shall review all submittals prior to submitting to Owner. The responsibility to properly review and coordinate the submittals is solely the Contractor's and is the means by which the Contractor can confirm that the products, materials, systems, etc., by his Subcontractors will be constructed in accordance with the Contract Documents. Review of each submittal by the Architect and the Engineer shall not be construed as a complete or comprehensive check. The Architect/Engineer review shall not relieve the Contractor from responsibility for errors which may exist in the submittal.

- C. Apply Contractor's stamp, signed or initialed, certifying that review, verification of Products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with the requirements of the Work and Contract Documents.
- D. Identify variations from Contract Documents and Product or system limitations which may be detrimental to successful performance of the completed Work.
- E. Revise and resubmit submittals as required; identify all changes made since previous submittal.
- F. No extension of time will be authorized because of the Contractor's failure to transmit submittals which have not been adequately checked or properly coordinated by the Contractor.

1.10 CONSTRUCTION PROGRESS SCHEDULES

- A. Submit initial progress schedule in duplicate within fifteen (15) days after date of Owner-Contractor Agreement for Architect review.
- B. Submit revised schedules with each Application for Payment, identifying changes since previous version. Indicate estimated percentage of completion for each item of Work at each submission.
- C. Submit a horizontal bar chart with separate line for each major section of Work or operation, or section of Work, identifying first work day of each week.

1.11 PROPOSED PRODUCTS LIST

- A. Within fifteen (15) days after date of Owner-Contractor Agreement, submit list of major Products proposed for use, with name of manufacturer, trade name, and model number of each product.

1.12 PRODUCT DATA

- A. Product Data for Review:
 - 1. Submitted to Owner for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.
 - 2. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article above and for record documents.
- B. Product Data for Information:
 - 1. Submitted for the Architect's benefit as contract administrator or for the Owner.

- C. Product Data for Project Close-out:
 - 1. Submitted for the Owner's benefit during and after project completion.
- D. Submit the number of copies which the Contractor requires, plus two copies which will be retained by the Architect.
- E. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information unique to this project.

1.13 SHOP DRAWINGS

- A. Shop Drawings for Review:
 - 1. Submitted to Owner for review for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.
 - 2. After review, produce copies and distribute in accordance with the SUBMITTAL PROCEDURES article above and for record documents.
- B. Shop Drawings for Information:
 - 1. Submitted for the Architect's benefit as contract administrator or for the Owner.
- C. Submit the number of opaque reproductions which Contractor requires, plus two copies which will be retained by Owner.

1.14 SAMPLES

- A. Samples for Review:
 - 1. Submitted to Architect for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.
 - 2. After review, produce duplicates and distribute in accordance with SUBMITTAL PROCEDURES article above and for record documents.
- B. Samples for Selection:
 - 1. Submitted to Owner for aesthetic, color, or finish selection.
- C. Submit samples to illustrate functional and aesthetic characteristics of the Product.
- D. Submit samples of finishes from the full range of manufacturers' standard colors, textures, and patterns for Architect's selection.

1.15 MANUFACTURER INSTALLATION INSTRUCTIONS

- A. When specified in individual specification sections, submit manufacturer printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, in quantities specified for Product Data.

1.16 MANUFACTURER CERTIFICATES

- A. When specified in individual specification sections, submit certifications by manufacturer to Architect, in quantities specified for Product Data.
- B. Indicate material or Product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

1.17 QUALITY ASSURANCE - CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, Products, services, site conditions, and workmanship, to produce Work of specified quality.
- B. Comply with manufacturers' instructions.
- C. Comply with specified standards as minimum quality for the Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- D. Defective work deemed to be unsatisfactory due to quality workmanship or installation shall be removed from project at the contractor's expense.

1.18 EXAMINATION

- A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.
- B. Verify that utility services are available, of the correct characteristics, and in the correct location.

1.19 PREPARATION

- A. Clean substrate surfaces prior to applying next material or substance.
- B. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying new material or substance in contact or bond.

1.20 TOLERANCES

- A. Monitor fabrication and installation tolerance control of installed Products over suppliers, manufacturers, Products, site conditions, and workmanship, to produce acceptable Work. Do not permit tolerances to accumulate.
- B. Comply fully with manufacturers' tolerances.

1.21 REFERENCES

- A. Conform to reference standards by date of issue current as of date of Contract Documents or date for receiving bids.
- B. Should specified reference standard conflict with Contract Documents, request clarification from Architect before proceeding.

1.22 INSPECTION AND TESTING LABORATORY SERVICES

- A. Owner will appoint, employ, and pay for specified services of an independent firm to perform inspection and testing.
- B. Cooperate with independent firm; furnish samples as requested.
- C. Re-testing required because of non-conformance to specified requirements will be charged to the contractor.
- D. Contractor shall employ and pay for services of an independent testing agency to perform other specified testing and inspection.

1.23 TEMPORARY ELECTRICITY

- A. Cost: Contractor to provide and pay for power service required from source.
- B. Provide power outlets for construction operations, branch wiring, distribution boxes, and flexible power cords as required.

1.24 TEMPORARY LIGHTING FOR CONSTRUCTION PURPOSES

- A. Provide and maintain temporary lighting for construction operations. Contractor may use owner's lighting as available.
- B. Provide branch wiring from power source to distribution boxes with lighting conductors, pigtails, and lamps as required.
- C. Permanent building lighting may be utilized during construction

1.25 TEMPORARY HEAT

- A. Provide temporary heat required by construction activities for curing or drying of complete installations or for protection of installed construction from adverse effects of low

temperatures or high humidity. Select safe equipment that will not have a harmful effect of completed installations or elements being installed. Coordinate ventilation requirements to produce the ambient condition required and minimize consumption of energy.

1. Do not use heating equipment that will introduce moisture within enclosed or finished spaces.
- B. The Contractor shall pay for temporary heating equipment and fuel, necessary accessories and to protect the operating equipment of the building.
- C. The Contractor shall be responsible for utility expenses of heating and/or air conditioning, including operating of heating system. Contractor shall be responsible for expenses related to maintenance and operation during construction.

1.26 TEMPORARY VENTILATION

- A. Contractor shall provide ventilation of enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases for the health and safety of the facility residents.

1.27 TELEPHONE SERVICE

- A. Contractor shall provide, maintain and pay for telephone and telephone facsimile service to field office at time of project mobilization.

1.28 TEMPORARY WATER SERVICE

- A. Contractor shall provide, maintain and pay for suitable quality water service required.
- B. At the telephone, post a list of important telephone numbers, including the following:
 1. Local police and fire department
 2. Doctor/emergency room.
 3. Ambulance service.
 4. Contractor's office.
 5. Architects office.
 6. Engineers' offices.
 7. Owner's office.
 8. Principal sub-contractor's offices.

1.29 TEMPORARY SANITARY FACILITIES

- A. Contractor shall provide and maintain restroom facilities for contractor use.
- B. Contractor shall maintain in clean and sanitary condition.

1.30 WATER CONTROL

- A. Contractor shall provide water to control dust.

1.31 INTERIOR ENCLOSURES

- A. Provide temporary closures or barriers as required to limit debris, dust and noise control for acceptable conditions and protection of the areas of work.
- B. Temporary Enclosures: At the earliest practical time provide temporary enclosure of materials, equipment, work in progress and completed parts of the work for compliance with OSHA safety regulations. Provide for safe access, exiting and circulation for occupants to, from, and between the various occupied areas of the facility as required for safety and as approved by authorities. Construction aids and miscellaneous general services and facilities include, but are not limited to the following:
 - 1. Guardrails, barriers, fencing, etc.
 - 2. Scaffolding.
 - 3. Temporary access and exit and enclosures.

1.32 PROTECTION OF INSTALLED WORK

- A. Protect installed Work and provide special protection where specified in individual specification sections.
- B. Prohibit traffic or storage upon waterproofed or roofed surfaces.

1.33 SECURITY

- A. Contractor shall coordinate to maintain building from unauthorized entry due to contractors accessing work areas.
- B. Contractor shall establish work schedules and work hours that comply with local jurisdiction.
- C. Contractor shall provide an emergency contact number, with a local contact available 24 hours a day, 7 days a week, for Police/Fire/Owner contact. An answering service must have access to the Contractor at ALL times.
- D. General: Provide a reasonably neat and uniform appearance in security and protection facilities acceptable to the Owner.
- E. Fire Protection: Provide fire protection equipment. Comply with the applicable recommendations of NFPA Standard 10 "Standard for Portable Fire Extinguishers". Locate fire extinguishers where they are most convenient and effective for their intended purpose. Store combustible materials in containers in recognized fire-safe locations.

1. Develop and supervise an overall fire prevention and first-aid fire protection program for personnel at the project site. Review needs with the local fire department officials and establish procedures to be followed. Instruct personnel in methods and procedures to be followed. Post warnings and information and enforce strict discipline. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire protection facilities, and access routes for fighting fires. Prohibit smoking. Provide supervision of welding operations, combustible type temporary heating units, and similar sources of ignition for possible fires.

1.34 PROGRESS CLEANING AND WASTE REMOVAL

- A. Collect and maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition. All waste material shall be disposed of in strict accordance with all current federal, state, and local requirements and regulations.

1.35 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

- A. Remove temporary utilities, equipment, facilities, materials, prior to Substantial Completion review.
- B. Remove underground installations to a minimum depth of 2 feet.
- C. Clean and repair damage caused by installation or use of temporary work.
- D. Restore existing facilities used during construction to original condition. Restore permanent facilities used during construction to specified condition.

1.36 PRODUCTS

- A. Products: Means new material, machinery, components, equipment, fixtures, and systems forming the Work, but does not include machinery and equipment used for preparation, fabrication, conveying and erection of the Work.
- B. Owner or Tenant Supplied Products. – referred to as Owner hereafter
 1. Owner shall arrange for and deliver Owner reviewed shop drawings, product data, and samples, to Contractor.
 2. Arrange and pay for product delivery to site.
 3. Submit claims for transportation damage and replace damaged, defective, or deficient items.
 4. Arrange for manufacturers' warranties, inspections, and service.
- C. Contractor's Responsibilities.

1. Review Owner reviewed shop drawings, product data, and samples.
2. Receive and unload products at site; inspect for completeness or damage and report damaged, defective, or deficient items to Owner.
3. Handle and store finished products. Install finished products as indicated in Contract Documents.
4. Repair or replace items damaged after receipt.

1.37 TRANSPORTATION, HANDLING, STORAGE AND PROTECTION

- A. Transport, handle, store, and protect Products in accordance with manufacturer's instructions.

1.38 PRODUCT OPTIONS

- A. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

1.39 SUBSTITUTIONS

- A. Owner will consider requests for Substitutions only within fifteen (15) days after date of Owner-Contractor Agreement.
- B. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.
- C. In making request for Substitution, the Bidder/Contractor represents:
 1. They have personally investigated proposed product and determined that it is equal or superior in all respects to that specified.
 2. They will provide the same guarantee for the substitute as for the product specified.
 3. They will coordinate installation of the accepted substitution into work, making such changes as may be required for work to be complete in all respect.
 4. They waive all claims for additional costs related to substitution(s) which consequently becomes apparent.
 5. Cost data is complete and includes all related costs under this Contract.
 6. Project Schedule will not be altered.

1.40 STARTING SYSTEMS

- A. Provide seven days notification prior to start-up of each item.
- B. Ensure that each piece of equipment or system is ready for operation.
- C. Execute start-up under supervision of responsible persons in accordance with manufacturers' instructions.

1.41 DEMONSTRATION AND INSTRUCTIONS

- A. Demonstrate operation and maintenance of Products to Owner's personnel two weeks prior to date of Substantial Completion.
- B. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.
- C. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at agreed-upon times, at designated location.

1.42 TESTING, ADJUSTING, AND BALANCING

- A. General Contractor shall employ and pay for services of an independent engineering firm to perform testing, adjusting, and balancing and certification of such for the building HVAC to the owner and the mechanical inspector.

1.43 OPERATIONS, TERMINATION AND REMOVAL:

- A. Supervision: Do not allow hazardous, dangerous or unsanitary conditions to develop or persist on the project site.
- B. Maintenance: Operate and maintain temporary services and facilities in good operating condition throughout the time of use and until removal. Protect from damage by freezing temperatures and similar elements.
- C. Termination and Removal: Remove each temporary service and facility promptly when the need for it has ended. Complete and restore permanent and existing work which may have been damaged because of the temporary service or facility.
 - 1. Materials and facilities that constitute temporary services and facilities are and remain the property of the Contractor.
 - 2. Prior to Substantial Completion, Clean and renovate or restore permanent services, facilities and assemblies that have been used to provide temporary services and

facilities during the construction period to original condition. Replace "construction" filters in the mechanical system.

1.44 CONTRACT CLOSEOUT PROCEDURES

- A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Architect's inspection.
- B. In order to achieve Substantial Completion:
 - 1. Contractor shall prepare a comprehensive list of items to be completed or corrected. Proceed with the completion and correction of the listed items.
 - 2. Provide approvals from the Building and the Fire Authority allowing for occupancy of the building.
 - 3. Provide the following:
 - a. Operation and maintenance manuals for the Owner's use.
 - b. Complete startup testing procedures and provide documentation.
 - c. Complete instruction for proper use, maintenance, and operation of all systems in the building for the Owner's designated personnel.
 - d. Submit brief written documentation for type of training undertaken and sign-in sheet showing personnel in attendance for instruction.
 - 1) Complete final cleanup requirements including finishing of flooring.
- C. Architect's Review Procedures
 - 1. Following completion of the provisions listed above, Contractor shall submit a written request for the Architect's inspection. Further, Contractor shall include documentation with the written request for inspection that each of the provisions listed above have been complied with and have been completed. After the above information is received, the Architect will proceed with the requested inspection within a reasonable time or will advise Contractor in writing of unfulfilled requirements.
 - 2. If the Work or designated portion of the Work is Substantially Complete in the opinion of the Architect, the Architect will prepare the Certificate of Substantial Completion which shall establish the date of Substantial Completion and other information. If the Work or designated portion of the Work is not complete in the opinion of the Architect, the Architect shall notify Contractor in writing. Contractor shall then complete the work and shall again request, in writing, a second inspection by the Architect.

- a. The number of inspections the Architect will make to determine Substantial Completion before costs will be incurred by Contractor is specified.
- 3. The Architect shall attach any listing of punch list items to be corrected by the Contractor to the Certificate of Substantial Completion, which shall indicate the time period in which Final Completion shall be achieved. The punch list shall be completed, with documentation by Contractor showing the date of correction, the party making the correction, and certification by Contractor that all items on the punch list have been completed prior to the request for final inspection.
- 4. Following the completion of the punch list and on receipt of the above information and Contractor's certification that the punch list items have been completed, Contractor shall request, in writing, the Architect's final inspection.
- D. Submit final Application for Payment identifying total adjusted Contract Sum/Price, previous payments, and amount remaining due.

1.45 FINAL CLEANING

- A. Execute final cleaning prior to final inspection.
- B. Clean interior and exterior surfaces exposed to view. Vacuum carpeted and soft surfaces.
- C. Clean debris from site, roofs, gutters, downspouts, and drainage systems.
- D. Replace filters of operating equipment.
- E. Remove waste and surplus materials, rubbish, and construction facilities from the site.
- F. Glass: Clean all glass inside and outside.
- G. For all resilient flooring finishes, just prior to Architect's inspection for Substantial Completion, Contractor shall thoroughly clean all flooring materials and apply commercial floor polish, per the manufacturer's directions and will apply proper type of materials and buffing procedures in strict compliance with the manufacture's instructions for each type of flooring. Coordinate with Owner for product used and include instructions for flooring maintenance in Operations and Maintenance Manual.

1.46 ADJUSTING

- A. Adjust operating Products and equipment to ensure smooth and unhindered operation.

1.47 PROJECT RECORD DOCUMENTS

- A. Maintain on site one set of Contract Documents to be utilized for record documents. Indicate all utility location and/or changes to original construction documents.

- B. Record actual revisions to the Work. Record information concurrent with construction progress.
- C. Making Entries of Record Documents: Using and erasable colored pencil (not ink or indelible pencil), clearly describe the change by note and by graphic line, as required. Date all entries. Call attention to the entry by a "cloud" around the area or areas affected. In the event of overlapping changes, different colors may be used for each of the changes. Make entries in the pertinent Documents as approved by the Architect.
 - 1. Documents with unclear or unintelligible markings will be rejected and will be required to be resubmitted.
- D. Tape addenda, revisions, and changes on drawings and/or in specifications and schedules.

1.48 OPERATION AND MAINTENANCE DATA

- A. Submit two sets prior to final inspection, bound in 8-1/2 x 11-inch text pages, three D side ring or capacity expansion binders with durable plastic or cloth covers.
- B. Prepare binder cover with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS" and title of project.
- C. Internally subdivide the binder contents with permanent page dividers, logically organized, with tab titles clearly printed under reinforced laminated plastic tabs.
- D. Contents: Include at least the following:
 - 1. Neatly typewritten index near the front of the Manual, giving immediate information as to location within the Manual of all emergency data regarding the installation.
 - 2. Copy of all guarantees and warranties issued.
 - 3. Complete instructions regarding operation and maintenance of all equipment involved, including lubrication, disassembly, and reassembly.
 - a. For each product, provide the following in list or "spread sheet" format (organized in order by Division and Section):
 - 1) Division and Section name/number.
 - 2) Subcontractor name; address, telephone number; fax number; contact person.
 - 3) Name of product(s); model number(s); part number(s); etc.
 - 4) Name of manufacturer(s); address; telephone number; fax number.
 - 5) Supplier name; address; telephone number; fax number; contact person.

4. Complete nomenclature of all parts of all equipment.
5. Manufacturers' bulletins, cuts, and descriptive data, where pertinent, clearly indicating the precise items included in this installation and deleting, or otherwise clearly indicating, all manufacturers' data with which this installation is not concerned.

1.49 WARRANTIES

- A. Provide duplicate notarized copies.
- B. Execute and assemble transferable warranty documents from Subcontractors, suppliers, and manufacturers.
- C. Submit prior to final Application for Payment.
- D. The starting date of each and every warranty begins at the date of Substantial Completion, Whether or not the warranty is dated otherwise.
- E. Provide certification that all materials and products used in the construction are asbestos (ACM) free.

1.50 NOISE, LANGUAGE, TOBACCO AND FIREARMS

- A. Proper conduct on project shall be maintained at all times. No loud sound systems, no loud music, no loud shouting, no loud language, no smoking or other disruptive noise shall be allowed or generated at any place on the project site. Contractor shall be responsible to maintain a quality work environment that is not disruptive to workers, employees, and others associated with the Work.
- B. Loud or abusive language will not be tolerated by any person on the project site. In the event that any person generates such language and fails to conduct themselves in a proper manner or practices loud and/or abusive language, they shall be informed by the Contractor of these provisions and if repeated, shall be dismissed from the site by the Contractor. Contractor shall have the responsibility to see that such behavior is not tolerated or allowed on site and be responsible for removal of those not in compliance with the above requirements.
- C. Uphold Owner's Policy of no firearms allowed, in any form, on the property.

2 PART 2 - PRODUCTS
Not Used.

3 PART 3 - EXECUTION
Not Used.

END OF SECTION

Section 013500 – PROJECT ALTERATION PROCEDURES

PART 1 - GENERAL

1.1 DESCRIPTION OF REQUIREMENTS

- A. General: Procedural requirements and established standards for coordination and provision of interfaces between existing construction to remain and new Work, include, but are not limited to:
 - 1. Restoration of existing Work, areas, surfaces, conditions, systems, etc., as applicable.
 - 2. Restoration and/or correction of existing Work removed or damaged as a result of Work on this Contract or Work that has been rejected, as applicable.
- B. Requirements for demolition of existing Work in preparation of new Work are specified in other Divisions of this specification.
- C. Refer to Technical Specification sections and drawings and schedules for other requirements.

1.2 QUALITY ASSURANCE

- A. Comply with applicable referenced codes, rules, regulations and required approvals by local authorities for each occurrence and condition of Work described in this section.

1.3 SUBMITTALS

- A. Submit notifications of unusual conditions, requests for interpretations, proposals for alternate methods and other communications and requests regarding alteration procedures in writing to the Architect.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Compatibility: Provide new materials which are compatible with existing materials and/or substrates to which they are to be applied or attached.
 - 1. Full restoration of site and site Work and full replacement and restoration of rejected Work is the obligation and responsibility of the Contractor.

2.2 PRODUCTS FOR PATCHING WORK

- A. Match existing products and Work for patching where indicated.
 - 1. Match existing products for areas of non-conforming Work that will be removed and replaced that have been rejected or as a result of a correction notice issued by the Owner or Architect.

PART 3 - EXECUTIONS

3.1 PREPARATION

- A. Cut, move or remove all items and existing Work for restoration Work; replace and fully restore all aspects of area(s) to prime condition at completion.
- B. Remove and properly dispose of all debris and abandoned items from area and from concealed spaces.
- C. Prepare surfaces and remove surface finishes to provide for proper installation of new Work and new finishes.

3.2 INSTALLATION

- A. Coordinate Work to expedite completion sequentially and to accommodate Owner occupancy. Sequence and schedule Work to minimize construction traffic in Owner occupied spaces.
- B. Remove, cut, and patch Work in a manner to minimize damage and to provide means of restoring products, finishes, surfaces, systems, etc. to match original conditions as acceptable to Owner and Architect.
 - 1. Do not overload or apply excessive forces to existing structures and assemblies.
 - 2. Restore all systems to working condition acceptable to Owner.
- C. Provide products and materials as indicated to result in finished appearance and function acceptable to Owner and Architect.
 - 1. Verify and coordinate exact existing conditions and with details if drawn.
 - 2. If no detail is drawn for a specific condition, verify a similar detail with Architect. Adjust to fit the condition at no extra cost to the contract.

3.3 REPAIR OF DAMAGED SURFACES

- A. Patch or replace portions of existing surfaces which are damaged, lifted, discolored, or showing other imperfections which are the result of work of the contract.

1. Patching procedure must result in a surface or finish that exactly matches existing work. Non-matching work will be the basis for rejection.

3.4 FINISHES

- A. Finish patchings to produce uniform finish and texture over entire area. When textures or colors cannot be matched, retexture or repaint entire surface to nearest intersection(s).

3.5 CLEANING

- A. In addition to cleaning specified in other Division 1 sections and for specific Work specified in Divisions 2 through 33, expertly clean Owner-occupied areas of construction debris daily.

END OF SECTION

SECTION 017000 - SELECTIVE DEMOLITION

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. This Section includes but is not limited to:
 - 1. Demolition and removal of all portions of the building in preparation for the provision of new work; Typical above and below grade elements.
 - 2. Patching and repairs

1.2 DEFINITIONS

- A. Remove: Remove and legally dispose of items except those to be reinstalled, salvaged, or to remain the Owner's property. Removal of existing work shall be in preparation for the provision of new work. The Owner will turn the buildings over to the Contractor and anything left behind is Contractor's option to salvage, save or dispose.
- B. Remove and Salvage: Items to be removed and salvaged remain the Owner's property prior to turning building over to Contractor. Remove, clean, and pack or crate items to protect against damage that are indicated. Otherwise, it is the responsibility of the Owner. Identify contents of containers and deliver to Owner's designated storage area.
- C. Remove and Reinstall: Remove and reinstall items indicated; clean, service, and otherwise prepare them for reuse; store and protect against damage/ Reinstall items in the same locations or in locations indicated.
- D. Existing to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by the Architect, items may be removed to a suitable, protected storage location during selective demolition and then cleaned and reinstalled in their original locations.

1.3 MATERIALS OWNERSHIP

- A. All items remain the ownership of the Owner until building is turned over to the Contractor. Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain the Owner's property and shall be removed from the site with further disposition at the Contractor's option.

END OF SECTION

DIVISION 23: HEATING, VENTILATING, AND AIR-CONDITIONING

23 0000 HEATING, VENTILATING, AND AIR-CONDITIONING

23 0501 COMMON HVAC REQUIREMENTS
23 0502 DEMOLITION AND REPAIR
23 0553 IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT
23 0593 TESTING, ADJUSTING, AND BALANCING
23 0720 REFRIGERANT PIPING INSULATION

23 1000 FACILITY FUEL SYSTEMS

23 1123 NATURAL GAS SYSTEMS

23 2000 HVAC PIPING AND PUMPS

23 2300 REFRIGERANT PIPING SYSTEMS
23 2310 REFRIGERANT SPECIALTIES
23 2311 REFRIGERANT PIPE COVER
23 2600 CONDENSATE DRAIN PIPING

23 3000 HVAC AIR DISTRIBUTION

23 3114 LOW-PRESSURE STEEL DUCTWORK
23 3318 SMOKE DETECTORS
23 3346 FLEX DUCT
23 4145 FURNACE AIR PIPING

23 5000 CENTRAL HEATING EQUIPMENT

23 5417 HIGH EFFICIENCY NATURAL GAS FURNACE

23 6000 CENTRAL COOLING EQUIPMENT

23 6213 AIR-COOLED CONDENSING UNITS

END TABLE OF CONTENTS

SECTION 23 0501 – COMMON HVAC REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Furnish labor, materials, and equipment necessary for completion of work as described in Contract Documents.
- B. It is the intent of these specifications that the systems specified herein are to be complete and operational before being turned over to the owner. During the bidding process, the contractor is to ask questions or call to the engineer's attention any items that are not shown or may be required to make the system complete and operational. Once the project is bid and the contractor has accepted the contract, it is his responsibility to furnish and install all equipment and parts necessary to provide a complete and operational system without additional cost to the owner.
- C. Furnish and install fire stopping materials to seal penetrations through fire rated structures and draft stops.
- D. Includes But Not Limited To:
 - 1. General procedures and requirements for HVAC.
- E. Related Sections:
 - 1. Section 23 0593: Testing, Adjusting, and Balancing for HVAC.

1.3 SUBMITTALS

- A. Substitutions: By specific designation and description, standards are established for specialties and equipment. Other makes of specialties and equipment of equal quality will be considered provided such proposed substitutions are submitted to the Architect for his approval, complete with specification data showing how it meets the specifications, at least 5 working days prior to bid opening. A list of approved substitutions will be published as an addendum.
 - 1. Submit a single copy of Manufacturer's catalog data including Manufacturer's complete specification for each proposed substitution.
 - 2. The Architect or Engineer is to be the sole judge as to the quality of any material offered as an equal.
- B. Product Data, Shop Drawings: Within 30 days after award of contract, submit Manufacturer's catalog data for each manufactured item.
 - 1. Literature shall include enough information to show complete compliance with Contract Document requirements.
 - 2. Mark literature to indicate specific item with applicable data underlined.
 - 3. Information shall include but not be limited to capacities, ratings, type of material used, guarantee, and such dimensions as are necessary to check space requirements.
 - 4. When accepted, submittal shall be an addition to Contract Documents and shall be in equal force. No variation shall be permitted.
 - 5. Even though the submittals have been accepted by the Engineer, it does not relieve the contractor from meeting all of the requirements of the plans and specifications and providing a complete and operational system.
- C. Drawings of Record: One complete sets of blue line mechanical drawings shall be provided for the purpose of showing a complete picture of the work as actually installed.
 - 1. These drawings shall serve as work progress report sheets. Contractor shall make notations neat and legible therein daily as the work proceeds.
 - 2. The drawings shall be kept at the job at a location designated by the Mechanical Engineer.
 - 3. At completion of the project these "as-built" drawings shall be signed by the Contractor, dated, and returned to the Architect.
- D. Operating Instructions and Service Manual: The Mechanical Contractor shall prepare 2 copies of an Operation and Maintenance Manual for all mechanical systems and equipment used in this project. Manuals shall be bound in hard-backed binders and the front cover and spine of each binder shall indicate the name and location of the project. Use plastic tab indexes for all sections. Provide a section for each different type of equipment item. The following items shall be included in the manual, together with any other pertinent data. This list is not complete and is to be used as a

guide.

1. Provide a master index at the beginning of the manual showing all items included.
2. The first section of the manual shall contain:
 - a. Names, addresses, and telephone numbers of Architect, Mechanical Engineer, Electrical Engineer, General Contractor, Plumbing Contractor, Sheet Metal Contractor, and Temperature Control Contractor.
 - b. List of Suppliers which shall include a complete list of each piece of equipment used with the name, address, and telephone number of vendor.
 - c. General Description of Systems including –
 - 1) Location of all major equipment
 - 2) Description of the various mechanical systems
 - 3) Description of operation and control of the mechanical systems
 - 4) Suggested maintenance schedule
 - d. Copy of contractor's written warranty
3. Provide a copy of approved submittal literature for each piece of equipment.
4. Provide maintenance and operation literature published by the manufacturer for each piece of equipment which includes: oiling, lubrication and greasing data; belt sizes, types and lengths; wiring diagrams; step-by-step procedure to follow in putting each piece of mechanical equipment in operation.
5. Include parts numbers of all replaceable items.
6. Provide control diagram and operation sequence, along with labeling of control piping and instruments to match diagram.
7. Include a valve chart indicating valve locations.

E. Include air balance report.

1.4 SUBMITTALS FOR COMMON HVAC REQUIREMENTS

- A. Samples: Sealer and gauze proposed for sealing ductwork.
- B. Quality Assurance / Control:
 1. Manufacturer's installation manuals providing detailed instructions on assembly, joint sealing, and system pressure testing for leaks.
 2. Specification data on sealer and gauze proposed for sealing ductwork.
- C. Quality Assurance
 1. Requirements: Construction details not specifically called out in Contract Documents shall conform to applicable requirements of SMACNA HVAC Duct Construction Standards.
 2. Pre-Installation Conference: Schedule conference immediately before installation of ductwork.

1.5 QUALITY ASSURANCE

- A. Requirements of Regulatory Agencies:
 1. Perform work in accordance with applicable provisions of local and state Plumbing Code, Gas Ordinances, and adoptions thereof. Provide materials and labor necessary to comply with rules, regulations, and ordinances.
 2. In case of differences between building codes, state laws, local ordinances, utility company regulations, and Contract Documents, the most stringent shall govern. Promptly notify Architect in writing of such differences.
- B. Applicable Specifications: Referenced specifications, standards, and publications shall be of the issues in effect on date of Advertisement for Bid.
 1. "Heating, Ventilating and Air Conditioning Guide" published by the American Society of Heating and Air Conditioning Engineers.
 2. "Engineering Standards" published by the Heating, Piping, and Air Conditioning Contractors National Association.
 3. "2018 International Building Code", "2018 International Mechanical Code", "2018 International Plumbing Code" and "2018 International Fire Code" as published by the International Conference of Building Officials.
 4. "National Electrical Code" as published by the National Fire Protection Association.
 5. "2018 International Energy Conservation Code".
- C. Identification: Motor and equipment name plates as well as applicable UL and AGA labels shall be in place when Project is turned over to Owner.

1.6 INSPECTIONS AND PERMITS

- A. Pay for permits, fees, or charges for inspection or other services. Local and state codes and ordinances must be

properly executed without expense to Owner and are considered as minimum requirements. Local and state codes and ordinances do not relieve the Contractor from work shown that exceeds minimum requirements.

1.7 ADDITIONAL WORK:

- A. Design is based on equipment as described in the drawing equipment schedule. Any change in foundation bases, electrical wiring, conduit connections, piping, controls and openings required by alternate equipment submitted and approved shall be paid for by this division. All work shall be in accordance with the requirements of the applicable sections.

PART 2 - NOT USED

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Site Inspection:
 - 1. Examine premises and understand the conditions which may affect performance of work of this Division before submitting proposals for this work.
 - 2. No subsequent allowance for time or money will be considered for any consequence related to failure to examine site conditions.
- B. Drawings:
 - 1. Mechanical drawings show general arrangement of piping, ductwork, equipment, etc, and do not attempt to show complete details of building construction which affect installation. This Contractor shall refer to architectural, structural, and electrical drawings for additional building detail which affect installation of his work.
 - a. Follow mechanical drawings as closely as actual building construction and work of other trades will permit.
 - b. No extra payments will be allowed where piping and/or ductwork must be offset to avoid other work or where minor changes are necessary to facilitate installation.
 - c. Everything shown on the mechanical drawings shall be the responsibility of Mechanical Contractor unless specifically noted otherwise.
 - 2. Consider architectural and structural drawings part of this work insofar as these drawings furnish information relating to design and construction of building. These drawings take precedence over mechanical drawings.
 - 3. Because of small scale of mechanical drawings, it is not possible to indicate all offsets, fittings, and accessories which may be required. Investigate structural and finish conditions affecting this work and arrange work accordingly, providing such fittings, valves, and accessories required to meet conditions. Do not scale drawings for locations of equipment or piping. Refer to large scale dimensioned drawings for exact locations.
- C. Insure that items to be furnished fit space available. Make necessary field measurements to ascertain space requirements including those for connections and furnish and install equipment of size and shape so final installation shall suit true intent and meaning of Contract Documents.
 - 1. If approval is received to use other than specified items, responsibility for specified capacities and insuring that items to be furnished will fit space available lies with this Division.
 - 2. If non-specified equipment is used and it will not fit job site conditions, this Contractor assumes responsibility for replacement with items named in Contract Documents.

3.2 PREPARATION

- A. Cut carefully to minimize necessity for repairs to existing work. Do not cut beams, columns, or trusses.
 - 1. Patch and repair walls, floors, ceilings, and roofs with materials of same quality and appearance as adjacent surfaces unless otherwise shown. Surface finishes shall exactly match existing finishes of same materials.
 - 2. Each Section of this Division shall bear expense of cutting, patching, repairing, and replacing of work of other Sections required because of its fault, error, tardiness, or because of damage done by it.
 - 3. Cutting, patching, repairing, and replacing pavements, sidewalks, roads, and curbs to permit installation of work of this Division is responsibility of Section installing work.

3.3 INSTALLATION

- A. Arrange pipes, ducts, and equipment to permit ready access to valves, unions, traps, starters, motors, control components, and to clear openings of doors and access panels.

3.4 STORAGE AND PROTECTION OF MATERIALS:

- A. Provide storage space for storage of materials and assume complete responsibility for losses due to any cause whatsoever. Storage shall not interfere with traffic conditions in any public thoroughfare.
- B. Protect completed work, work underway, and materials against loss or damage.
- C. Close pipe openings with caps or plugs during installation. Cover fixtures and equipment and protect against dirt, or injury caused by water, chemical, or mechanical accident.

3.5 COOPERATION

- A. Cooperate with other crafts in coordination of work. Promptly respond when notified that construction is ready for installation of work under Division 23000. Contractor will be held responsible for any delays which might be caused by his negligence or failure to cooperate with the other Contractors or crafts.

3.6 SUPERVISION

- A. Provide a competent superintendent in charge of the work at all times. Anyone found incompetent shall be removed at once and replaced by someone satisfactory, when requested by the Architect.

3.7 INSTALLATION CHECK:

- A. An experienced, competent, and authorized representative of the manufacturer or supplier of each item of equipment indicated in the equipment schedule shall visit the project to inspect, check, adjust if necessary, and approve the equipment installation. In each case, the equipment supplier's representative shall be present when the equipment is placed in operation. The equipment supplier's representative shall revisit the project as often as necessary until all trouble is corrected and the equipment installation and operation is satisfactory to the Engineer.
- B. Each equipment supplier's representative shall furnish to the Owner, through the Engineer, a written report certifying the following:
 - 1. Equipment has been properly installed and lubricated.
 - 2. Equipment is in accurate alignment.
 - 3. Equipment is free from any undue stress imposed by connecting piping or anchor bolts.
 - 4. Equipment has been operated under full load conditions.
 - 5. Equipment operated satisfactorily.
- C. All costs for this installation check shall be included in the prices quoted by equipment suppliers.

3.8 CLEANING EQUIPMENT AND PREMISES

- A. Properly lubricate equipment before Owner's acceptance.
- B. Clean exposed piping, ductwork, equipment, and fixtures. Repair damaged finishes and leave everything in working order.
- C. Remove stickers from fixtures and adjust flush valves.
- D. At date of Substantial Completion, air filters shall be new, clean, and approved by Owner's representative.
- E. Trap elements shall be removed during cleaning and flushing period. Replace trap elements and adjust after cleaning and flushing period.

3.9 TESTS

- A. No piping work, fixtures, or equipment shall be concealed or covered until they have been inspected and approved by the inspector. Notify inspector when the work is ready for inspection.
- B. All work shall be completely installed, tested as required by Contract Documents and the city and county ordinances and shall be leak-tight before the inspection is requested.
- C. Tests shall be repeated to the satisfaction of those making the inspections.
- D. Water piping shall be flushed out, tested at 100 psi and left under pressure of supply main or a minimum of 40 psi for

the balance of the construction period.

3.10 WARRANTY

- A. Contractor shall guarantee work under Division 23 to be free from inherent defects for a period of one year from acceptance.
 - 1. Contractor shall repair, revise or replace any and all such leaks, failure or inoperativeness due to defective work, materials, or parts free of charge for a period of one year from final acceptance, provided such defect is not due to carelessness in operation or maintenance.
 - 2. In addition, the Contractor shall furnish all refrigeration emergency repairs, emergency service and all refrigerant required due to defective workmanship, materials, or parts for a period of one year from final acceptance at no cost to the Owner, provided such repairs, service and refrigerant are not caused by lack of proper operation and maintenance.
- B. In addition to warranty specified in General Conditions, heating, cooling, and plumbing systems are to be free from noise in operation that may develop from failure to construct system in accordance with Contract Documents.

3.11 SYSTEM START-UP, OWNER'S INSTRUCTIONS

- A. Off-Season Start-up
 - 1. If Substantial Completion inspection occurs during heating season, schedule spring start-up of cooling systems. If inspection occurs during cooling season, schedule autumn start-up for heating systems.
 - 2. Notify Owner 7 days minimum before scheduled start-up.
 - 3. Time will be allowed to completely service, test, check, and off-season start systems. During allowed time, train Owner's representatives in operation and maintenance of system.
 - 4. At end of off-season start-up, furnish Owner with letter confirming that above work has been satisfactorily completed.
- B. Owner's Instructions
 - 1. Instruct building maintenance personnel and Owner Representative in operation and maintenance of mechanical systems utilizing Operation & Maintenance Manual when so doing.
 - 2. Minimum instruction periods shall be as follows –
 - a. Mechanical - Four hours.
 - b. Temperature Control - Four hours.
 - c. Refrigeration - Two hours.
 - 3. Instruction periods shall occur after Substantial Completion inspection when systems are properly working and before final payment is made.
 - 4. None of these instructional periods shall overlap another.

3.12 PROTECTION

- A. Do not run heat pump, air handling units, fan coil units, or other pieces of equipment used for moving supply air without proper air filters installed properly in system.
- B. The mechanical systems are not designed to be used for temporary construction heat. If any equipment is to be started prior to testing and substantial completion, such equipment will be returned to new condition with full one year warranties, from date of substantial completion after any construction use. This includes, but is not necessarily limited to: Equipment, filters, ductwork, fixtures, etc.

3.13 COMMON HVAC REQUIREMENTS:

- A. INSTALLATION
 - 1. During installation, protect open ends of ducts by covering with plastic sheet tied in place to prevent entrance of debris and dirt.
 - 2. Make necessary allowances and provisions in installation of sheet metal ducts for structural conditions of building. Revisions in layout and configuration may be allowed, with prior written approval of Architect. Maintain required airflows in suggesting revisions.
 - 3. Hangers And Supports:
 - a. Install pair of hangers close to each transverse joint and elsewhere as required by spacing indicated in table on Drawings.
 - b. Install upper ends of hanger securely to floor or roof construction above by method shown on Drawings.
 - c. Attach strap hangers to ducts with cadmium-plated screws. Use of pop rivets or other means will not be accepted.
 - d. Where hangers are secured to forms before concrete slabs are poured, cut off flush all nails, strap ends, and other projections after forms are removed.

- e. Secure vertical ducts passing through floors by extending bracing angles to rest firmly on floors without loose blocking or shimming. Support vertical ducts, which do not pass through floors, by using bands bolted to walls, columns, etc. Size, spacing, and method of attachment to vertical ducts shall be same as specified for hanger bands on horizontal ducts.

B. CLEANING

- 1. Clean interior of duct systems before final completion.

END OF SECTION 23 0501

SECTION 23 0502 - DEMOLITION AND REPAIR

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, General Provisions of Contract, including General and Supplementary Conditions and Section 23 0501 apply to this Section.

1.2 SUMMARY

- A. Under this section remove obsolete piping and mechanical equipment and relocate, reconnect or replace existing piping affected by demolition or new construction. Remove concealed piping abandoned due to demolition or new construction, or cap piping flush with existing surfaces.

1.3 DRAWINGS AND EXISTING CONDITIONS

- A. All relocations, reconnections and removals are not necessarily indicated on the drawings. As such, the Contractor shall make adequate allowance in his proposal for this work as no extra charges will be allowed for these items.

PART 2 - NOT USED

PART 3 - EXECUTION

3.1 TEMPORARY CONNECTIONS

- A. Where existing piping must remain in service to supply occupied areas during construction, provide temporary piping, connections, and equipment to maintain service to such areas. All shall be performed in a neat and safe manner to prevent injury to the building or its occupants.

3.2 EXISTING TO BE ABANDONED

- A. All required drilling, cutting, block-outs and demolition work required for the removal and/or installation of the mechanical system is the responsibility of this Contractor.
- B. No joists, beams, girders, trusses or columns shall be cut by any Contractor without written permission from the Architect.
- C. The patching, repair, and finishing to existing or new surfaces is the responsibility of this Contractor, unless specifically called for under sections of specifications covering these materials.
- D. Disconnect all equipment that is to be removed or relocated. Relocate any existing equipment that obstructs new construction.

3.3 EXISTING TO REMAIN IN USE

- A. Where affected by demolition or new construction, relocate, replace, extend, or repair piping and equipment to allow continued use of same. Use methods and materials as specified for new construction.

3.4 MATERIALS AND EQUIPMENT REMOVED

- A. All obsolete materials, piping, and equipment shall become the property of the Contractor and be removed from the site promptly.

END OF SECTION 23 0502

SECTION 23 0553 - IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, General Provisions of Contract, including General and Supplementary Conditions and Section 23 0501 apply to this Section.

1.2 SUMMARY

- A. Furnish and install identification of equipment and piping as described in Contract Documents.
- B. Mechanical Contractor shall touch-up equipment where factory paint has been damaged. Repaint entire item where more than 20 percent of the surface is involved.

PART 2 - PRODUCTS

- A. Labels:
 - 1. Equipment Identification:
 - a. Black formica, with white reveal when engraved.
 - b. Lettering to be 3/16 inch (5 mm) high minimum.

PART 3 - EXECUTION

3.1 APPLICATION

- A. Engraved Plates:
 - 1. Identify furnaces and condensing units with following data engraved and fastened to equipment with screws.
 - a. Equipment mark noted on Drawings (i.e., F-1)

END OF SECTION 23 0553

SECTION 23 0593 - TESTING, ADJUSTING, AND BALANCING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Division 23 0501 - Common HVAC Requirements and Basic Mechanical Materials and Methods Sections apply to work of this section.

1.2 SUMMARY SCOPE

- A. This Section includes TAB to produce design objectives for the following:
 - 1. Air Systems.
 - a. Furnaces.

1.3 SUBMITTALS

- A. Agency Data:
 - 1. Submit proof that the proposed testing, adjusting, and balancing agency meets the qualifications specified below. The firm or individuals performing the work herein specified may not be the installing firm.
- B. Engineer and Technicians Data:
 - 1. Submit proof that the Test and Balance Engineer assigned to supervise the procedures, and the technicians proposed to perform the procedures meet the qualifications specified below.
- C. Procedures and Agenda: Submit a synopsis of the testing, adjusting, and balancing procedures and agenda proposed to be used for this project.
- D. Sample Forms: Submit sample forms, if other than those standard forms prepared by the AABC or NEBB are proposed.
- E. Certified Reports: Submit testing, adjusting, and balancing reports bearing the seal and signature of the Test and Balance Engineer. The reports shall be certified proof that the systems have been tested, adjusted, and balanced in accordance with the referenced standards; are an accurate representation of how the systems have been installed; are a true representation of how the systems are operating at the completion of the testing, adjusting, and balancing procedures; and are an accurate record of all final quantities measured, to establish normal operating values of the systems. Follow the procedures and format specified below.
 - 1. Draft Reports: Upon completion of testing, adjusting, and balancing procedures, prepare draft reports on the approved forms. Draft reports may be hand written, but must be complete, factual, accurate, and legible. Organize and format draft reports in the same manner specified for the final reports. Submit 2 complete sets of draft reports. Only 1 complete set of draft reports will be returned.
 - 2. Final Report: Upon verification and approval of draft reports, prepare final reports, type written, and organized and formatted as specified below. Submit 4 complete sets of final reports.
 - 3. Report Format: Report forms shall be those standard forms prepared by the referenced standard for each respective item and system to be tested, adjusted, and balanced. Bind report forms complete with schematic systems diagrams and other data. Divide the contents of the binder into the below listed divisions, separated by divider tabs:
 - a. General Information and Summary
 - b. Air Systems
 - c. Temperature Control System Verification.
- F. Report Contents: Provide the following minimum information, forms, and data:
 - 1. General information and Summary: Inside cover sheet to identify testing, adjusting, balancing agency, Contractor, Owner, Engineer, and Project. Include addresses and contact names and telephone numbers. Also include a certification sheet containing the seal and name, address, telephone number, and signature of the Certified Test and Balance Engineer. Include in this division a listing of the instrumentation used for the procedures along with the instrument calibration sheet.
 - 2. The remainder of the report shall contain the appropriate forms containing as a minimum, the information indicated on the standard report forms prepared by the AABC or NEBB, for each respective item and system. Prepare a schematic diagram for each item of equipment and system to accompany each respective report form. The report shall contain the following information, and all other data resulting from the testing, adjusting, and balancing work:
 - a. All nameplate and specification data for all air handling equipment and motors.

- b. Actual metered running amperage for each phase of each motor on all pumps and air handling equipment.
 - c. Actual metered voltage at air handling equipment (phase-to-phase for all phases).
 - d. Fan RPM for each piece of air handling equipment.
 - e. Total actual CFM being handled by each piece of air handling equipment.
 - f. Actual CFM of systems by rooms.
 - 3. Certify that all smoke and fire dampers operate properly and can be reset under actual system operating conditions.
- G. Calibration Reports:
- 1. Submit proof that all required instrumentation has been calibrated to tolerances specified in the referenced standards, within a period of six months prior to starting the project.

1.4 CERTIFICATION

- A. Agency Qualifications:
- 1. Employ the services of a certified testing, adjusting, and balancing agency meeting the qualifications specified below, to be the single source of responsibility to test, adjust, and balance the building mechanical systems identified above, to produce the design objectives. Services shall include checking installations for conformity to design, measurement, and establishment of the fluid quantities of the mechanical systems as required to meet design specifications, recording and reporting the results, and operation of all systems to demonstrate satisfactory performance to the owner.
 - 2. The testing, adjusting, and balancing agency certified by National Environmental Balancing Bureau (NEBB) or Associated Air Balance Council (AABC) in those testing and balancing disciplines required for this project, and having at least one person certified by NEBB or AABC as a Test and Balance supervisor, and a registered professional mechanical engineer, licensed in the state where the work will be performed.
- B. Codes and Standard:
- 1. NEBB: "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems."
 - 2. AABC: "National Standards for Total System Balance."
 - 3. ASHRAE: ASHRAE Handbook, 1984 Systems Volume, Chapter 37, Testing, Adjusting, and Balancing.

1.5 PROJECT CONDITIONS

- A. Systems Operation: Systems shall be fully operation and clean prior to beginning procedures.

1.6 SEQUENCING AND SCHEDULING

- A. The report shall be approved by the Engineer. Test and balance shall be performed prior to substantial completion.

PART 2 - NOT USED

PART 3 - EXECUTION

3.1 PRELIMINARY PROCEDURES FOR AIR SYSTEM BALANCING

- A. Before operating the system, perform these steps.
- 1. Obtain design drawings and specifications and become thoroughly acquainted with the design intent.
 - 2. Obtain copies of approved shop drawings of all air handling equipment, outlets (supply, return, and exhaust) and temperature control diagrams.
 - 3. Compare design to installed equipment and field installations.
 - 4. Walk the system from the system air handling equipment to terminal units to determine variations of installation from design.
 - 5. Check filters for cleanliness and to determine if they are the type specified.
 - 6. Check dampers (both volume and fire) for correct and locked position. Check automatic operating and safety controls and devices to determine that they are properly connected, functioning, and at proper operating setpoint.
 - 7. Prepare report test sheets for both fans and outlets. Obtain manufacturer's outlet factors and recommended procedures for testing. Prepare a summation of required outlet volumes to permit a cross-check with required fan volumes.
 - 8. Determine best locations in main and branch ductwork for most accurate duct traverses.
 - 9. Place outlet dampers in the full open position.
 - 10. Prepare schematic diagrams of system "As-Built" ductwork and piping layouts to facilitate reporting.
 - 11. Lubricate all motors and bearings.
 - 12. Check fan belt tension.
 - 13. Check fan rotation.

3.2 MEASUREMENTS

- A. Provide all required instrumentation to obtain proper measurements, calibrated to the tolerances specified in the referenced standards. Instruments shall be properly maintained and protected against damage.
- B. Provide instruments meeting the specifications of the referenced standards.
- C. Use only those instruments which have the maximum field measuring accuracy and are best suited to the function being measured.
- D. Apply instrument as recommended by the manufacturer.
- E. Use instruments with minimum scale and maximum subdivisions and with scale ranges proper for the value being measured.
- F. When averaging values, take a sufficient quantity of readings which will result in a repeatability error of less than 5%. When measuring a single point, repeat readings until 2 consecutive identical values are obtained.
- G. Take all readings with the eye at the level of the indicated value to prevent parallax.
- H. Use pulsation dampeners where necessary to eliminate error involved in estimating average of rapidly fluctuation readings.
- I. Take measurements in the system where best suited to the task.

3.3 PERFORMING TESTING, ADJUSTING, AND BALANCING

- A. Perform testing and balancing procedures on each system identified, in accordance with the detailed procedures outlined in the referenced standards. Balancing of the air systems and hydronic systems shall be achieved by adjusting the automatic controls, balancing valves, dampers, air terminal devices, and the fan/motor drives within each system.
- B. Cut insulation, ductwork, and piping for installation of test probes to the minimum extent necessary to allow adequate performance of procedures.
- C. Patch insulation, ductwork, and housings, using materials identical to those removed.
- D. Seal ducts and piping, and test for and repair leaks.
- E. Seal insulation to re-establish integrity of the vapor barrier.
- F. Adjust timing relays of environmental equipment motor reduced voltage starters to the optimum time period for the motor to come up to the maximum reduced voltage speed and then transition to the full voltage speed to prevent damage to motor, and to limit starting current spike to the lowest possible and practical.
- G. Mark equipment settings, including damper control positions, valve indicators, fan speed control levers, and similar controls and devices, to show final settings. Mark with paint or other suitable, permanent identification materials.
- H. Retest, adjust, and balance systems subsequent to significant system modifications, and resubmit test results.

3.4 RECORD AND REPORT DATA

- A. Record all data obtained during testing, adjusting, and balancing in accordance with, and on the forms recommended by the referenced standards, and as approved on the sample report forms.
- B. Prepare report of recommendations for correcting unsatisfactory mechanical performances when system cannot be successfully balanced.
- C. Report shall be certified and stamped by a registered professional mechanical engineer employed by the agency and licensed in the state where the work will be performed.
- D. Engineer is to provide a floor plan and test and balance contractor to include the plan in test and balance report and identify actual cfm on drawing or number the diffusers to match report.

3.5 DEMONSTRATION

- A. If requested, testing, adjusting, and balancing agency shall conduct any or all of the field tests in the presence of the engineer.
- B. Agency shall include a maximum of one (1) call back to the project within the one year warranty period to make additional adjustments if requested by the engineer.

END OF SECTION 23 0593

SECTION 23 0720 - REFRIGERANT PIPING INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, General Provisions of Contract, including General and Supplementary Conditions and Section 23 0501 apply to this Section.

1.2 SUMMARY

- A. Furnish and install insulation on above ground refrigerant suction piping and fittings, including thermal bulb, from thermal expansion valve where insulation is missing.

1.3 QUALITY ASSURANCE

- A. Insulation shall have flame-spread rating of 25 or less and a smoke density rating of 50 or less as tested by ASTM E-84 method.
- B. Ratings:
 - 1. Upper rating of =210 deg. F.
 - 2. Lower rating of -110 deg. F.
 - 3. UV stabilized for ten year life.
 - 4. Thermal conductivity of 0.24.
 - 5. Water vapor transmission of .03 perms per inch.
 - 6. Material to be polyolefin food grade.

PART 2 - PRODUCTS

2.1 FLEXIBLE FOAMED PIPE INSULATION

- A. Thickness:
 - 1. 1/2 inch for one inch outside diameter and smaller pipe.
 - 2. 3/4 inch for 1-1/8 through 2 inch outside diameter pipe.
 - 3. One inch for 2-1/8 inches outside diameter and larger pipe (two layers of 1/2 inch).
 - 4. One inch sheet for fittings as recommended by Manufacturer.
- B. Approved Manufacturers:
 - 1. Armaflex
 - 2. Halstead "Insul-tube"
 - 3. Rubatex
 - 4. Therma-Cel

2.2 JOINT SEALER

- A. Approved Manufacturers:
 - 1. Armaflex 520
 - 2. BFG Construction Adhesive #105
 - 3. Therma-Cel 950.

2.3 MANUFACTURED UNITS

- A. Nominal 3/4" wall thickness
- B. Approved Manufacturers:
 - 1. ImcoLock Pipe Insulation
 - 2. or approved equal

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install insulation in snug contact with pipe and in accordance with Manufacturer's recommendations.

- B. Insulation shall be slipped onto pipe prior to connection or applied after pipe is installed, at contractor's option.
- C. Close butt joints and miter joints.
 - 1. Approved Manufacturers:
 - a. IMCOA's Fuse-Seal joining system
 - b. or factory approved contact adhesive
- D. Insulation shall be installed according to manufacturer's recommended procedures.
- E. Exterior insulation shall be finished with two coats of factory approved finish. Color shall be selected by the Owner's representative.
- F. Stagger joints on layered insulation.
- G. Slip insulation on tubing before tubing sections and fittings are assembled keeping slitting of insulation to a minimum.
- H. Seal joints in insulation.
- I. Insulate flexible pipe connectors.
- J. Insulate thermal expansion valves with insulating tape.
- K. Insulation exposed outside building shall have "slit" joint seams placed on bottom of pipe.
- L. Insulate fittings with sheet insulation and as recommended by Manufacturer.

END OF SECTION 23 0720

SECTION 23 1123 – NATURAL GAS SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, General Provisions of Contract, including General and Supplementary Conditions and Section 23 0501 apply to this Section.

1.2 SUMMARY

- A. Furnish and install gas piping and fittings within building including connection to meter.

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 PIPE

- 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 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

2.4 PRESSURE REDUCING REGULATORS

- A. Corrosion Resistant Brass Body.
- B. 1/2" to 4" Threaded NPT
- C. 2" and Above Flanged.
- D. Max Inlet Pressure 10 psi.
- E. Max Outlet Pressure 0.5 psi.
- F. Temperature Capabilities - ~20 to 180° F.

- G. Approved Manufactures and Models.
 - 1. Emerson Process Management.
 - 2. Maxitrol 3UP33
 - 3. Or approved equal.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Pipe installed underground, through air plenums, in walls, and pipes 2-1/2 inches and larger shall have welded fittings and joints. Other pipe may have screwed or welded fittings.
- B. Wrap and lay underground pipe in accordance with local gas utility company regulations and specifications.
- C. 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.
- D. Do not use flexible pipe connections to boilers, furnaces, duct heaters, or hot water heaters.
- E. Install dirt leg with pipe cap, 6 inches long minimum, on each vertical gas drop to heating equipment.
- F. Use fittings for changes of direction in pipe and for branch runouts.
- G. Paint exterior exposed gas piping with grey paint to match gas meter.

END OF SECTION 23 1123

SECTION 23 2300 - REFRIGERANT PIPING SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, General Provisions of Contract, including General and Supplementary Conditions and Section 23 0100 apply to this Section.

1.2 SUMMARY

- A. Furnish and install piping for refrigeration systems as described in Contract Documents.

1.3 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Refrigerant piping shall be installed by a refrigeration contractor licensed by State.

PART 2 - PRODUCTS

2.1 REFRIGERANT PIPING

- A. Meet requirements of ASTM B 280-88, "Specification for Seamless Copper Tube for Air Conditioning & Refrigeration Field Service", hard drawn straight lengths.
- B. Do not use pre-charged refrigerant lines.

2.2 REFRIGERANT FITTINGS

- A. Wrought copper with long radius elbows.
- B. Approved Manufacturers:
 - 1. Mueller Streamline
 - 2. Nibco Inc
 - 3. Grinnell
 - 4. Elkhart Products Corp

2.3 SUCTION LINE TRAPS

- A. Manufactured standard one-piece traps.

2.4 CONNECTION MATERIAL

- A. Brazing Rods:
 - 1. Copper to Copper Connections:
 - 2. AWS Classification BCuP-4 Copper Phosphorus (6% silver).
 - 3. AWS Classification BCuP-5 Copper Phosphorus (15% silver).
 - 4. Copper to Brass or Copper to Steel Connections:
 - 5. AWS Classification BAg-5 Silver (45% silver).
 - 6. Do not use rods containing Cadmium.

2.5 FLUX

- A. Approved Manufacturers:
 - 1. "Stay-Silv white brazing flux" by J W Harris Co
 - 2. High quality silver solder flux by Handy & Harmon

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Do not install refrigerant piping underground or in tunnels.

- B. Slope suction lines down toward compressor one inch/10 feet. Locate traps at vertical rises against flow in suction lines.
- C. Refrigeration system connections shall be copper-to-copper, copper-to-brass, or copper-to-steel type properly cleaned and brazed with specified rods. Use flux only where necessary.
 - 1. No soft solder (tin, lead, antimony) connections will be allowed in system.
- D. Braze valve, sight glass, and flexible connections.
- E. Circulate dry nitrogen through tubes being brazed to eliminate formation of copper oxide during brazing operation.

3.2 FIELD QUALITY CONTROL

- A. Make evacuation and leak tests in presence of Architect's Engineer after completing refrigeration piping systems. Positive pressure test will not suffice for procedure outlined below.
 - 1. Draw vacuum on each entire system with vacuum pump to 200 microns using vacuum gauge calibrated in microns. Do not use cooling compressor to evacuate system nor operate it while system is under high vacuum. Isolate compressor from system piping using shut-off valves prior to pulling vacuum.
 - 2. Break vacuum with freon to be used and re-establish vacuum test. Vacuum shall hold for 24 hours at 200 microns without compressor running.
 - 3. Conduct tests at 70 deg F ambient temperature minimum.
 - 4. Do not run systems until above tests have been made and systems started up as specified. Inform Owner's Representative of status of systems at time of final inspection and schedule start-up and testing if prevented by outdoor conditions before this time.
 - 5. After testing, fully charge system with refrigerant and conduct test with Halide Leak Detector.

END OF SECTION 23 2300

SECTION 23 2310 - REFRIGERANT SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, General Provisions of Contract, including General and Supplementary Conditions and Section 23 0100 apply to this Section.

1.2 SUMMARY

- A. Furnish and install refrigeration specialties as described in Contract Documents except for expansion valves on 2 through 5 ton condensing units.

PART 2 - PRODUCTS

2.1 EXPANSION VALVES

- A. For pressure type distributors, externally equalized with stainless steel diaphragm, and same refrigerant in thermostatic elements as in system.
- B. Size valves to provide full rated capacity of cooling coil served. Coordinate selection with evaporator coil and condensing unit.
- C. Approved Manufacturers:
 - 1. Alco
 - 2. Henry
 - 3. Mueller
 - 4. Parker
 - 5. Singer
 - 6. Sporlan

2.2 FILTER-DRIER

- A. On lines 3/4 inch outside diameter and larger, filter-drier shall be replaceable core type with Schraeder type valve.
- B. On lines smaller than 3/4 inch outside diameter, filter-drier shall be sealed type using flared copper fittings.
- C. Size shall be full line size.
- D. Approved Manufacturers:
 - 1. Alco
 - 2. Mueller
 - 3. Parker
 - 4. Sporlan
 - 5. Virginia

2.3 SIGHT GLASS

- A. Combination moisture and liquid indicator with protection cap.
- B. Sight glass shall be full line size.
- C. Sight glass connections shall be solid copper or brass, no copper-coated steel sight glasses allowed.
- D. Approved Manufacturers:
 - 1. Alco
 - 2. Mueller
 - 3. Parker
 - 4. Superior
 - 5. Virginia

2.4 MANUAL REFRIGERANT SHUT-OFF VALVE

- A. Ball valves designed for refrigeration service and full line size.
- B. Valve shall have cap seals.
- C. Valves with hand wheels are not acceptable.
- D. Provide service valve on each liquid and suction line at compressor.
- E. If service valves come as integral part of condensing unit, additional service valves shall not be required.
- F. Approved Manufacturers:
 - 1. ConBraCo (Apollo)
 - 2. Henry
 - 3. Mueller
 - 4. Superior
 - 5. Virginia

2.5 FLEXIBLE CONNECTORS

- A. Provide in each liquid line and suction line at both condensing unit and evaporator on systems larger than five tons.
- B. Anchor pipe near each flexible connector.
- C. Connectors shall be for refrigerant service with bronze seamless corrugated hose and bronze braiding.
- D. Approved Manufacturers:
 - 1. Anaconda "Vibration Eliminators" by Anamet
 - 2. Vibration Absorber Model VAF by Packless Industries
 - 3. Vibration Absorbers by Superior Valve Co
 - 4. Style "BF" Spring-flex freon connectors by Vibration Mountings

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install valves and specialties in accessible locations. Install refrigeration distributors and suction outlet at same end of coil.

END OF SECTION 23 2310

SECTION 23 2311 - REFRIGERANT PIPE COVER

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, General Provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, and Section 23 0100 apply to this Section.

PART 2 - PRODUCTS

2.1 BASIC COVER

- A. Basic refrigerant line cover shall be 18 gauge steel, hot-dipped galvanized steel meeting the requirements of ASTM<A361-85.
- B. Pop rivet attachments will not be allowed.
- C. All fastening devices shall be plated screws. Arrange covers so they may be taken apart for service.

2.2 MANUFACTURED OUTER COVER

- A. Refrigerant line covers at exterior walls shall be 24 ga steel, hot-dipped galvanized meeting requirements of ASTM<A361-85, "Specification for Steel Sheet, Zinc-Coated (Galvanized) by Hot-Dip Process for Roofing and Siding", 1.25 oz/sq ft and complete with accessories recommended by Manufacturer for proper installation.
 - 1. Approved Manufacturers –
 - a. AEP / Span, Dallas, TX or San Diego, CA
 - b. Idose Aluminum Products, Allentown, PA
 - c. Berridge Manufacturing Co., Houston, TX
 - d. Copper Sales Inc., Minneapolis, MN
 - e. Engineered Components Inc., Stafford (Houston), TX
 - f. Fashion Inc., Lenaxa, KS
 - g. Alumax Building Specialties, Mesquite, TX
 - h. MM Systems Corp., Tucker, GA
 - i. Merchant & Evans Industries Inc., Burlington, NJ
 - j. Reynolds Metals Company, Richmond VA
- B. Finish:
 - 1. Fluoropolymer Resin-base finish for coil coating components. Thermo cured two coat system consisting of primer and top coat factory applied over properly pretreated metal.
 - 2. Color as selected by Engineer from Manufacturer's standard colors.
 - 3. Approved Manufacturers –
 - a. Equal to Duranar 200 by PPG or Fluropon by Desoto containing 70% minimum Kynar 500 by Pennwalt Corp.

PART 3 - INSTALLATION

- 3.1 Do not use pop rivets. All fastening devices shall be plated screws and arranged so covers may be taken off for service.
- 3.2 Provide access opening for viewing the sight glass on the refrigerant line.

END OF SECTION 23 2311

SECTION 23 2600- CONDENSATE DRAIN PIPING

PART 1 - GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To:
 - 1. Furnish and install condensate drain piping as described in Contract Documents.
- B. Related Requirements:
 - 1. Section 23 0501: Common HVAC Requirements.

1.2 REFERENCES

- A. Reference Standards:
 - 1. ASTM International:
 - a. ASTM B 88-03, 'Standard Specification for Seamless Copper Water Tube.'

PART 2 - PRODUCTS

2.1 SYSTEMS

- A. Materials:
 - 1. Condensate Drains:
 - a. Schedule 40 PVC for condensate drains from furnace combustion chambers and furnace cooling coils, and auxiliary drain pans.
- B. Manufactured Units
 - 1. Condensate Pump
 - a. Rated at 225 gph at 15 feet total head. Complete with one gallon polystyrene tank with pump and automatic float control. 1/5 hp, 120 V, one phase, 60 Hertz.
 - b. Condensate piping shall be Type M copper or Schedule 40 PVC.
 - c. Approved Manufacturers -
 - 1) No. CU551UL by Beckett Pumps, (888) 232-5388
 - 2) No. VCL45S by Little Giant Pump Co, Oklahoma City, OK (405) 947-2511

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Condensate Drains:
 - 1. Support piping and protect from damage.
 - 2. Do not combine PVC condensate drain piping from furnace combustion chamber with copper condensate drain piping from cooling coil.
 - 3. Do not combine auxiliary drain pan piping with furnace / Cooling Coil Condensate drain piping.

END OF SECTION 23 2600

SECTION 23 3114 - LOW-PRESSURE STEEL DUCTWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, General Provisions of Contract, including General and Supplementary Conditions and Section 23 0100 apply to this Section.

1.2 SUMMARY

- A. Furnish and install above-grade ductwork and related items as described in Contract Documents.

PART 2 - PRODUCTS

2.1 DUCTS

- A. Fabricate of zinc-coated lockforming quality steel sheets meeting requirements of ASTM 653A/653M, "Specification for Sheet Steel Zinc-Coated (Galvanized) by the Hot-Dip Process, Lock Forming Quality", with G 60 coating.
- B. Use of aluminum, non-metallic, or round ducts is not permitted. [Specification writer: Use of aluminum ducts in areas with high chlorine content (eg.: ventilation for pools, spas, etc.) should be considered on a per job basis.]

2.2 DUCT JOINTS

- A. Ducts with sides up to and including 36 inches shall be as detailed in the SMACNA manual.
- B. Duct sizes over 36 inches shall be fabricated using SMACNA T-24 flange joints or pre-fabricated systems as follows:
 - 1. Ducts with sides over 36 inches to 48 inches:
 - a. transverse duct joint system by Ductmate/25, Nexus, Ward, or WDCI (Lite) (SMACNA "E" or "G" Type connection).
 - 2. Ducts 48 inches & larger:
 - a. Ductmate/35, Nexus, or WDCI (Heavy) (SMACNA "J" Type connection).
 - 3. Approved Manufacturers:
 - a. Ductmate Industries Inc, 10760 Bay Meadows Drive, Sandy, UT 84092 (801) 571-5308
 - b. Nexus, Exanno Corp, P O Box 729, Buffalo, NY 14206 (716) 849-0545
 - c. Ward Industries Inc, 1661 Lebanon Church Road, Pittsburg, PA 15236 (800) 466-9374
 - d. WDCI, P O Box 10868, Pittsburg, PA 15236 (800) 245-3188

2.3 FLEXIBLE EQUIPMENT CONNECTIONS

- A. 30 oz closely woven UL approved glass fabric, double coated with neoprene.
- B. Fire retardant, waterproof, air-tight, resistant to acids and grease, and withstand constant temperatures of 250 deg F.
- C. Approved Manufacturers:
 - 1. Cain - N-100
 - 2. Duro Dyne - MFN
 - 3. Elgen - ZLN
 - 4. Ventfabrics - Ventglas

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Ducts:
 - 1. Straight and smooth on inside with joints neatly finished unless otherwise directed.
 - 2. Duct panels through 48 inch dimension having acoustic duct liner need not be crossbroken or beaded.
 - 3. Crossbreak unlined ducts and duct panels larger than 48 inch or bead 12 inches on center.
 - 4. Securely anchor ducts to building structure with specified duct hangers attached with screws. Do not hang more than one duct from a duct hanger.
 - 5. Brace and install ducts so they shall be free of vibration under all conditions of operation.
 - 6. Ducts shall not bear on top of structural members.

7. Make duct take-offs to branches, registers, grilles, and diffusers as detailed on Drawings.
 8. Ducts shall be large enough to accommodate inside acoustic duct liner. Dimensions shown on Drawings are net clear inside dimensions after duct liner has been installed.
 9. Properly flash where ducts protrude above roof.
 10. Install internal ends of slip joints in direction of flow. Make joints air tight using specified duct sealer.
 11. Cover horizontal and longitudinal joints on exterior ducts with two layers of Hardcast tape installed with Hardcast HC-20 adhesive according to Manufacturer's recommendations.
 12. Paint ductwork visible through registers, grilles, and diffusers flat black.
- B. Install flexible inlet and outlet duct connections to each furnace, fan, fan coil unit, and air handling unit.
- C. Air Turns:
1. Permanently installed, consisting of single thickness curved metal blades with one inch straight trailing edge to permit air to make abrupt turn without appreciable turbulence, in 90 degree elbows of above ground supply and return ductwork.
 2. 4-1/2 inch wide minimum vane rail. Do not use junior vane rails.
 3. Double thickness vanes not acceptable.
 4. Quiet and free from vibration when system is in operation. See SMACNA Manual
- D. Repair motorized dampers, actuators and linkages to be operational.

END OF SECTION 23 3114

SECTION 23 3318 - SMOKE DETECTORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, General Provisions of Contract, including General and Supplementary Conditions and Section 23 0100 apply to this Section.

1.2 SUMMARY

- A. Ionization smoke detector mounted in supply air streams or as shown on drawings. Detector to operate on 120 volts AC.

PART 2 - PRODUCTS

2.1 SMOKE DETECTORS

- A. Approved Manufacturers & Models:
 - 1. Series 2650-450 ionization type, duct mounted smoke detector, by Robertshaw
 - 2. MS Series ionization type duct mounted smoke detector by Air Products Controls Ltd.
 - 3. Model DH400 ACDC duct mounted smoke detector by System Sensor, a Division of Pittway
 - 4. Model 0550 duct smoke detector by Maple Chase Co.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install on systems greater than 2000 CFM and interlock with motor control to shut down fan systems upon smoke detection.
- B. Install as shown on drawings at each smoke/fire damper location and connect to damper. Provide access door as specified in Section 23 3114. Smoke detectors to be installed within 5' of fire/smoke damper.

END OF SECTION 23 3318

SECTION 23 3346 - FLEX DUCT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, General Provisions of Contract, including General and Supplementary Conditions and Section 23 0100 apply to this Section.

1.2 SUMMARY

- A. Furnish and install supply air branch duct runouts to diffusers as described in Contract Documents.

PART 2 - PRODUCTS

2.1 DUCTS

- A. Formable, flexible, circular duct which shall retain its cross-section, shape, rigidity, and shall not restrict air flow after bending.
- B. Nominal 1-1/2 inches thick, 3/4 lb/cu ft density fiberglass insulation with air-tight, polyethylene or polyester core, sheathed in seamless vapor barrier jacket factory installed over flexible assembly.
- C. Assembly, including insulation and vapor barrier, shall meet Class I requirement of NFPA 90A and be UL 181 rated, with flame spread of 25 or less and smoke developed rating of 50 or under.
- D. Length of flexible ductwork shall not exceed 8'-0".

2.2 APPROVED MANUFACTURERS

- A. ANCO-FLEX - 4625
- B. Flex-Aire - PF/UPC #090
- C. Hart & Cooley - F114
- D. Thermaflex - G-KM

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install duct in fully extended condition free of sags and kinks.
- B. Make duct connections by coating exterior of duct collar for 3 inches with duct sealer and securing duct in place over sheet metal collar with 1/2 inch wide metal cinch bands and sheet metal screws.

END OF SECTION 23 3346

SECTION 23 4145 – FURNACE AIR PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, General Provisions of Contract, including General and Supplementary Conditions and Section 23 0100 apply to this Section.

1.2 SUMMARY

- A. Furnish and install furnace vent piping and combustion air intake piping as described in Contract Documents. Reconnect to the existing concentric vent through the roof if the size is adequate. Replace concentric vent if the size is required to be larger.

PART 2 - PRODUCTS

2.1 AIR PIPING

- A. Schedule 40 pipe and fittings meeting requirements of one of following:
 - 1. ASTM D 1785-89, "Specification for Poly(Vinyl Chloride)(PVC) Plastic Pipe, Schedules 40, 80, and 120."
 - 2. ASTM D 2661-89, " Specification for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Drain, Waste, and Vent Pipe and fittings."
 - 3. ASTM D 2665-89a, "Specification for Poly(Vinyl Chloride)(PVC) Plastic Drain, Waste, and Vent Pipe and Fittings."

2.2 PRIMER & CEMENT

- A. Meet requirements of ASTM D 2564-88, "Specification for Solvent Cements for Poly(Vinyl Chloride)(PVC) Plastic Pipe and Fittings."

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Do not combine furnace drain piping with cooling coil drain piping.
- B. Run individual vent and individual combustion intake piping from each furnace to outdoors with location and formation recommended by Furnace Manufacturer. Slope lines downward toward furnaces.
- C. Slope combustion chamber drain downward to funnel drain. Anchor to wall with wall clamps, allowing free movement through clamp for expansion.
- D. Use vent terminal kit or clamping system provided by Furnace Manufacturer. Install vent and combustion air intake piping at clearance and distances required by Furnace Manufacturer.
- E. Attach factory-supplied neoprene coupling to furnace combustion-air inlet connection and secure with clamp.
- F. Ensure that factory-supplied perforated metal disc is installed in flexible coupling, unless its removal is required.

END OF SECTION 23 4145

SECTION 23 5417 – HIGH EFFICIENCY NATURAL GAS FURNACE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, General Provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, and Section 23 0501 apply to this Section.

1.2 SUMMARY

- A. Furnish and install gas fired condensing high efficiency furnace as described in Contract Documents.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

- A. Fabrication:
 - 1. Furnaces shall be factory assembled units certified by AGA complete with blower section, furnace section, condensing coil, steel casing, piped, and wired.
 - 2. Blower section shall consist of cabinet, blower, and motor.
 - 3. Cabinet shall be of 22 gauge minimum cold rolled steel and have finish coat of baked-on enamel.
 - 4. Blower shall be Class 1, full DIDW, statically and dynamically balanced.
 - 5. Filters shall be one inch thick pleated throw-away type as furnished by furnace manufacturer.
 - 6. Provide furnace with accessory side mounted filter box frame and factory available bottom closure.
 - 7. Automatic controls:
 - a. 100% cut-off safety pilot
 - b. Manual gas shut-off valve
 - c. Operating automatic gas valve
 - d. Solid state type fan and thermal limit controls
 - e. 24 volt transformer
 - f. Electronic ignition system
 - g. Pressure switch safety for induced draft fan
- B. Units:
 - 1. Blower shall be driven by motor with adjustable pitch V-belt drive or by a multi-speed direct driven motor.
 - 2. Furnace section shall be enclosed in 22 gauge minimum enameled steel casing lined with foil covered insulation.
 - 3. Heat exchanger shall be ceramic or glass coated, stainless steel, or 18 gauge aluminized steel with 20 year minimum limited warranty.
 - 4. Units shall be rated at 93% minimum AFUE (Annual Fuel Utilization Efficiency) calculated in accordance with DOE test procedures.
 - 5. 2" or 3" intake and exhaust lines to outside with factory furnished combination flue/intake assembly for roof or sidewall.
- C. Provide with Web enabled 7 day programmable thermostat equal to Honeywell Prestige.
- D. Approved Manufacturers:
 - 1. Lennox
 - 2. Carrier
 - 3. York
 - 4. Trane

PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL

- A. Quality Assurance: Furnace manufacturer's representative shall start up and check out furnace equipment as follows:
 - 1. Verify proper gas orifice sizing for altitude.
 - 2. Clock gas meter for rated input.
 - 3. Verify and set gas pressure at furnace.
 - 4. Check and measure temperature rise.
 - 5. Check safety controls for proper operation.

END OF SECTION 23 5417

SECTION 23 6213 - AIR-COOLED CONDENSING UNITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, General Provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, and Section 23 0501 apply to this Section.

1.2 SUMMARY

- A. Furnish and install condensing units as described in Contract Documents.

1.3 WARRANTY

- A. Five-year warranty on compressors.
 - 1. Warranty time frame shall be five years from date of "start-up". "Start-up" date shall be recorded on warranty certificate for each unit.

PART 2 - PRODUCTS

2.1 TWO TON THROUGH FIVE TON UNITS

- A. Condenser coil shall have aluminum plate fins mechanically bonded to seamless copper tubes.
 - 1. Provide coil guard for unit.
- B. Fans shall be direct driven propeller upflow type.
 - 1. Fan motor shall be single or two speed, thermostatically controlled, permanently lubricated, and designed with permanent protection and ball bearings.
 - 2. Motors shall be resiliently mounted.
 - 3. Each fan shall have a safety guard.
- C. Units shall be operable down to 0 deg F outdoor temperature.
- D. Compressor shall be of hermetic design with the following features. Each condenser unit shall have only one compressor.
 - 1. Externally mounted brass service valves with charging connections.
 - 2. Crankcase heater.
 - 3. Resilient rubber mounts.
 - 4. Compressor motor overload protection.
 - 5. Single speed
- E. Controls:
 - 1. Factory wired and located in separate enclosure.
 - 2. Safety devices shall consist of high and low pressure cutout and condenser fan motor overload devices.
 - 3. Unit shall have anti-cycle timers to prevent units from starting up again for five minutes after any power interruption.
- F. Casing:
 - 1. Fully weatherproof for outdoor installation. Finish shall be weather resistant.
 - 2. Openings shall be provided for power and refrigerant connections.
 - 3. Panels shall be removable for servicing.
- G. Expansion Valves:
 - 1. Stainless steel diaphragm and same refrigerant in thermostatic elements as in system. Externally or internally equalized as required by evaporator/condensing system.
 - 2. Size valves to provide full rated capacity of cooling coil served.
 - 3. Furnished by evaporator coil/condensing unit supplier and coordinated to provide bleed holes for system pressure equalization, if required.
- H. Condensing units shall use R-410A refrigerant. Only one liquid line, one suction line, and one power connection shall be made to each compressor. Provide charging valves.

- I. SEER rating as defined by ARI shall be not less than 13.0.
- J. Set each unit on neoprene isolation pads located at each corner and sized 4" x 4" x 3/4" high minimum.
- K. Approved Manufacturers:
 - 1. York
 - 2. Carrier
 - 3. Lennox
 - 4. Trane

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Set condensing units as detailed on the drawings.

3.2 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service:
- B. Condensing units shall be started up, checked out, and adjusted by Condensing Unit Manufacturer's authorized factory trained service mechanic.
- C. Mechanic shall use check-out sheet provided by Manufacturer, complete and sign all items on sheet, and submit to Architect.

END OF SECTION 23 6213