Ingham County
Mechanical Improvements

Human Services, Youth Center, and Forest Community Health Center
Lansing, Michigan

PROJECT MANUAL

Bid Package No. 110-15
DLZ Project No. 1541-6681-90

Owner:
Ingham County
121 E. Maple St.
Mason, Michigan 48854

Architect/Engineer:
DLZ Michigan , Inc.
1425 Keystone Ave.
Lansing, Michigan 48911

Bid Set Dated: October 1, 2015
# PROJECT MANUAL
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Ingham County
Mechanical Improvements
DLZ Proj. No.: 1541-6681.90

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NOTICE OF PRE-PROPOSAL CONFERENCE

Ingham County is accepting proposals from experienced and qualified mechanical contractors for three (3) mechanical improvement projects. The work includes replacement of boilers, pumps, air handling units, and appurtenances in three buildings – Human Services, Youth Center, and Forest Community Health Center. Replacements involve demolition of existing systems, and the supply and installation of new equipment, piping, pumps, insulation, piping identification, and interface with existing building HVAC controls. Scope by building:

**Human Services Building**
1. Replacement of two 500 MBH natural gas-fired non-condensing boilers with two 500 MBH condensing boilers.
2. Replacement of two primary boiler circulation pumps and two 1.5 hp secondary heating pumps with like pumps.
3. Retrofit and additions to existing building controls to accommodate the new equipment.

**Youth Center**
1. Replacement of two 1000 MBH natural gas-fired non-condensing fire tube boilers with two 1000 MBH condensing boilers.
2. Replacement of two primary boiler circulation pumps and two 3 hp secondary heating pumps with like pumps.
3. Retrofit and additions to existing building controls to accommodate the new equipment.

**Forest Community Health Center**
1. Replacement of two 24-Ton cooling only rooftop air handling units (Trane) with like units.
2. Retrofit and additions to existing building curbs, ductwork, piping, and controls to accommodate the new equipment.
3. Bid Alternate:
   a. No. 1 – Existing Air Handler No. 9 (Trane Model No. TCD090B400AB) (Serial No. N/A) Remove existing AHU. Retain power, duct, and control connections for reuse. Provide curb adapter as required. Contractor to field verify capacity and configuration.
   b. No. 2 – Existing Air Handler No. 7 (Trane Model No. TCD090B400AB) (Serial No. E08144910D) Remove existing AHU. Retain power, duct, and control connections for reuse. Provide curb adapter as required. Contractor to field verify capacity and configuration.

A mandatory pre-proposal conference is scheduled for **October 29, 2015 at 9:00 A.M. in Conference Rooms D&E of the Human Services Building, 5303 S. Cedar St., Lansing, MI 48911**. Visits to the Youth Center and Forest Community Health Center are also planned. Attendance at this meeting is important in order to fully understand the bid documents. Please send a representative to this meeting if you are planning on bidding. The purpose of this meeting is to allow proposers an opportunity to present questions and obtain clarification relative to any facet of this solicitation. Any material changes resulting from this meeting will be issued in a written addendum.
Send an e-mail to jbuckmaster@ingham.org or call (517) 676-7222 to register for the meeting. Only those vendors attending the meeting will be allowed to submit a proposal.

Copies of the bid documents prepared by the County’s Consultant, including a project manual and drawings, may be obtained from Commercial Blueprint, 3125 Pine Tree Road, Suite B, Lansing, MI 48911; Phone: (517) 372-8360.

Each bid must be accompanied by a bid guarantee in an amount equal to five percent (5%) of the total bid amount. Guarantee shall be in the form of a bid bond executed by an approved surety company, made payable to the County of Ingham. Bid guarantee shall run for a period of not less than ninety (90) days.

Proposals will be received no later than **11:00 A.M., local time prevailing, on November 12, 2015** at which time they will be opened in public and read aloud in the:

    Ingham County Purchasing Department
    Attention: James C. Hudgins, Jr., Director of Purchasing
    PO Box 319
    121 E. Maple St., Room 203
    Mason, Michigan 48854

Proposals received at other locations or delivered after the due date and time will not be accepted and will be returned to the proposer.
1.0 PURPOSE

Ingham County is accepting proposals from experienced and qualified mechanical contractors for three (3) mechanical improvement projects. The work includes, but is not limited to, replacement of boilers, pumps, air handling units, and appurtenances in three buildings – Human Services, Youth Center, and Forest Community Health Center. Replacements involve demolition of existing systems, and the supply and installation of new equipment, piping, pumps, insulation, piping identification, and interface with existing building HVAC controls.

2.0 SCOPE OF WORK - GENERAL

Human Services Building
1. Replacement of two 500 MBH natural gas-fired non-condensing boilers with two 500 MBH condensing boilers.
2. Replacement of two primary boiler circulation pumps and two 1.5 hp secondary heating pumps with like pumps.
3. Retrofit and additions to existing building controls to accommodate the new equipment.

Youth Center
1. Replacement of two 1000 MBH natural gas-fired non-condensing fire tube boilers with two 1000 MBH condensing boilers.
2. Replacement of two primary boiler circulation pumps and two 3 hp secondary heating pumps with like pumps.
3. Retrofit and additions to existing building controls to accommodate the new equipment.

Forest Community Health Center
1. Replacement of two 24-Ton cooling only rooftop air handling units (Trane) with like units.
2. Retrofit and additions to existing building curbs, ductwork, piping, and controls to accommodate the new equipment.
3. Bid Alternate:
   a. No.1 – Existing Air Handler No.9 (Trane Model No. TCD090B400AB) (Serial No. N/A) Remove existing AHU. Retain power, duct, and control connections for reuse. Provide curb adapter as required. Contractor to field verify capacity and configuration.
   b. No.2 – Existing Air Handler No.7 (Trane Model No. TCD090B400AB) (Serial No. E08144910D) Remove existing AHU. Retain power, duct, and control connections for reuse. Provide curb adapter as required. Contractor to field verify capacity and configuration.

3.0 BIDDING DOCUMENTS

Copies of the bid documents prepared by the County’s Consultant, including a project manual and drawings, may be obtained from Commercial Blueprint, 3125 Pine Tree Road, Suite B, Lansing, MI 48911; Phone: (517) 372-8360. Any subsequent contract will incorporate this document, RFP #110-15 Mechanical Improvements, along with the bid documents, project manual and drawings prepared
by the County’s Consultant. If any terms and conditions of the Consultant’s documents differ from
the County’s, the County’s terms and conditions shall prevail.

4.0 **OWNER**

County of Ingham  
121 E. Maple St.  
Mason, Michigan 48854

5.0 **CONSULTANT**

Scott Laubenthal, Assoc. AIA, LEED AP  
Project Manager  
Phone: 517-393-6800 x4942 (office)  
Fax: 517-272-7390 (fax)  
slaubenthal@dlz.com

6.0 **LOCATIONS (3)**

Human Services Building  
5303 S. Cedar St.  
Lansing, MI 48911

Youth Center  
700 E. Jolly Road  
Lansing, MI 48910

Forest Community Health Center  
2316 S. Cedar St.  
Lansing, MI 48910

7.0 **PRE-BID MEETING**

A mandatory pre-bid meeting is scheduled for **October 29, 2015 at 9:00 A.M. in Conference**  
**Rooms D&E of the Human Services Building, 5303 S. Cedar St., Lansing, MI 48911.** Visits to  
the Youth Center and Forest Community Health Center are also planned.

Attendance at this meeting is important in order to fully understand the bid documents. Please send a  
representative to this meeting if you are planning on bidding. The purpose of this meeting is to allow  
proposers an opportunity to present questions and obtain clarification relative to any facet of this  
solicitation. Any material changes resulting from this meeting will be issued in a written addendum.

Send an e-mail to **jbuckmaster@ingham.org** or call (517) 676-7222 to register for the meeting.  
Only those vendors attending the meeting will be allowed to submit a proposal.
8.0 EXAMINATION OF BIDDING DOCUMENTS AND SITE

Before submitting a bid, each bidder must (a) examine the bidding documents thoroughly; (b) familiarize himself/herself with Federal, State, and local laws, ordinances, rules and regulations affecting performance of the work; and, (c) carefully correlate his/her observations with the requirements of the bidding documents.

The bidder shall be responsible for investigating and evaluating subsurface or latent physical conditions along the site of the work. Where information concerning existing conditions, including subsurface conditions, is provided or mentioned in the RFP, such information is provided for the convenience of the bidder and to provide the bidder information known by Ingham County. However, Ingham County does not represent or guarantee any specific site conditions, including subsurface conditions. The bidder shall be solely responsible for all necessary site investigations and measurements to ensure the bid is based on conditions, which exist in and adjacent to the project site.

The submission of a bid will constitute an incontrovertible representation by the bidder that he/she has complied with and understands every requirement of these instructions. Failure or omission of the bidder to do all of the foregoing shall in no way relieve the bidder from any obligations in respect to his/her bid.

9.0 INSTRUCTIONS TO BIDDERS - SUBMISSION REQUIREMENTS

9.1 Bid Guarantee

Each bid must be accompanied by a bid guarantee in an amount equal to five percent (5%) of the total bid amount. Guarantee shall be in the form of a bid bond executed by an approved surety company, made payable to the County of Ingham. Bid guarantee shall run for a period of not less than ninety (90) days. If the successful bidder fails to furnish satisfactory bonds and insurance certificates within ten (10) days after Notice of Award, such guarantee shall be forfeited to the Owner as liquidated damages. The guarantees of the three lowest bidders will be retained until the bonds and insurance of the Contractor have been approved by the Owner. The bid guarantees of all other bidders will be returned within ten (10) days after the bid opening.

9.2 Registering as a Vendor with Ingham County

Bidders who have not registered their company with the County should do so by visiting www.ingham.org/purchasing or by calling the Purchasing Department at (517) 676-7222 for assistance.

Vendors registering to provide goods and services to Ingham County under contract shall certify to their knowledge of the County's Equal Opportunity Employment / Nondiscrimination Policy, and of their agreement to comply, and shall disclose any conclusive findings of violations of Federal, State, or local equal opportunity statutes, ordinances, rules/regulations, or policies within the past three (3)
9.3 Pre-opening Inquires and Response

Any explanation desired by a bidder regarding the meaning or interpretation of this RFP and attachments must be requested to the Ingham County Purchasing Department, attention James C. Hudgins, Jr. at jhudgins@ingham.org. **The deadline for submitting final questions is no later than 3:00 P.M. on November 5, 2015.**

9.4 Due Date, Time & Location

Proposals will be received no later than **11:00 A.M., local time prevailing, on November 12, 2015** at which time they will be opened in public and read aloud in the:

Ingham County Purchasing Department  
Attention: James C. Hudgins, Jr., Director of Purchasing  
PO Box 319  
121 E. Maple St., Room 203  
Mason, Michigan 48854

Proposals received at other locations or delivered after the due date and time will not be accepted and will be returned to the proposer.

9.5 Submission of Bids

Bidders are required to submit *an original (clearly marked) along with three (3) copies* by the date, time, and place designated above. Proposals must be submitted in a sealed, opaque envelope or package and be clearly marked on the outside “**Packet #110-15 Mechanical Improvements**”. Be sure to include the name of your firm on the outside of the envelope or package.

Responses to this RFP should be concise and must include all the requested information. Bidders shall complete and include with their submittals the following enclosed items:

- ✔ Proposal Form  
- ✔ Addenda Form  
- ✔ Legal Status of Bidder Form  
- ✔ Non-Collusion Form  
- ✔ Cost Form  
- ✔ Local Purchasing Preference Form  
- ✔ References Form  
- ✔ Certificate Of Compliance With Public Act 517 Of 2012 Form  
- ✔ Signature Form  
- ✔ The Statistical Questionnaire is strictly optional.
9.6 Signatures

All bids, notifications, claims and statements must be signed as follows:

1. Corporations: Signature of official shall be accompanied by a certified copy of the Resolution of the Board of Directors authorizing the official signing to bind the corporation.

2. Partnerships: Signature of one partner shall be accompanied by a certified copy of the Power of Attorney authorizing the individual signing to bind all partners. If bid is signed by all partners, no authorization for signature is required.

3. Individual: No authorization for signature is needed.

All names must be typed or printed below the signature. Each signature must be witnessed.

9.7 Timely Submittals

Time is of the essence and any Bid or addenda pertaining thereto received after the announced time and date for submittal, whether by mail or otherwise, will be rejected. It is the sole responsibility of the bidders for ensuring that their Bids are time stamped by the Purchasing Department. Bids and/or any addenda pertaining thereto received after the announced time and date of receipt, by mail or otherwise, will be returned to the bidder. However, nothing in this RFP precludes the County from requesting additional information at any time during the procurement process.

9.8 Competency of Bidders

Upon the request of the Owner, Bidders shall be prepared to furnish sufficient evidence as to their qualifications to perform the project work, such as record of past performances including references, equipment and personnel available, and such other pertinent and material facts as may be desirable. Furthermore, upon the request of the Owner, the Bidder shall submit financial statements.

9.9 Deliveries

Should you decide to utilize an express delivery service, please note that we are located at the intersection of Maple Street and Jefferson Street.

9.10 Preparation of Proposal

All bids must be made on the required forms prepared and executed fully and properly. A price must be given for each item in that portion of the Project being bid. The proposed prices and amounts are for furnishing all labor, supervision, materials, equipment, tools, incidentals, bonds, insurance and service required to complete the work in accordance with the Contract Documents. Bidders shall use a computer, type, or write clearly in ink the bid amount. When applicable, each Bidder shall acknowledge receipt of all Addenda issued for the Proposal by signing the form submitted with each
Addendum and submitting it with his bid. Failure of a Bidder to acknowledge receipt of any and all Addenda may result in the rejection of the Bid.

9.11 Authority to Bind Firm in Contract

Bidder shall provide the full legal firm name and address. Any Bid that has not been manually signed will be deemed non-responsive and excluded from consideration. Firm name and authorized signature must appear in the space provided on the enclosed Signature Form.

9.12 No Submittal

If you desire not to respond to this RFP, please forward your acknowledgment of “NO BID SUBMITTED” via an email to jhudgins@ingham.org. Please also state the reason for not submitting a Bid. Failure to comply may be cause for removal of your company's name from the vendor list for subject commodity.

9.13 Special Accommodations

If you are an individual with a disability and require a reasonable accommodation, please notify the Purchasing Department at (517) 676-7222, three (3) working days prior to need.

9.14 Basis of Bid

Ingham County reserves the right to increase or decrease any or all of the proposed quantities. The quantities listed in the RFP may be approximate and are stated solely to provide a uniform base of calculation for comparison of bids and award of contract. No guarantee is made by the County that the actual quantities will correspond with the proposed quantities. The Contractor will be paid based upon his/her lump sum and/or unit prices bid and any alternates accepted by the County and as may be further modified by Change Order for work added or deleted from the project indicated in the RFP.

10.0 GENERAL INFORMATION

10.1 Local Purchasing Preference Policy

The Ingham County Board of Commissioners (BOC) believes that its purchasing policies should encourage local vendors to provide goods and/or services to Ingham County government, resulting in increased economic activity through more local jobs, tax revenues, and expenditures, and to entice business relocations to the County. As such, in 2010, the BOC amended its purchasing policies to include a ten percent (10%) purchasing preference to qualified and registered local vendors who respond to solicitations for the purchase of goods and/or services.

In Ingham County, a local vendor is defined as a vendor that operates a business within the legally defined boundaries of Ingham County. To be considered a local vendor, the vendor must provide a verifiable business address (not a PO Box) on the enclosed Local Purchasing Preference Sheet at
which business is being conducted. The vendor must also agree to comply with all other policies and requirements of the County. More information about the Local Purchasing Preference Policy can be found at www.ingham.org/purchasing.

10.2 Advice of Omission or Misstatement

In the event it is evident to a bidder responding to this RFP that the County has omitted or misstated a material requirement to this RFP and/or the services required by this RFP, the responding vendor shall advise Mr. James C. Hudgins, Jr., Director of Purchasing, at jhudgins@ingham.org of such omission or misstatement.

10.3 Notification of Withdrawal of Bid

Bids may be withdrawn prior to the date and time specified for Bid submission with a formal written notice by an authorized representative of the bidder. No bidder may withdraw a Bid after the opening for a minimum period of 90 days.

10.4 Rights to Pertinent Materials

All responses, inquires, and correspondence relating to this RFP and all reports, charts, displays, schedules, exhibits and other documentation produced by the bidders that are submitted as part of the Bid shall become the property of the County after the Bid submission deadline.

10.5 Firm Pricing for County Acceptance

The Bid price(s) must be firm for County acceptance for 90 days from the Bid opening date, unless the bidder specifically notes otherwise.

10.6 Cost of Preparation

The County will not pay any costs incurred in the Bid preparation, printing or demonstration process. All costs shall be borne by the bidders.

10.7 Standard Forms

Any preprinted contract forms the vendor proposes to include as part of the contract resulting from this solicitation must be submitted as part of the Bid. Any standard contract provisions not submitted as part of the Bid and subsequently presented for inclusion may be rejected. The County reserves the right to accept or reject in whole or in part any form contract submitted by a bidder and/or to require that amendments be made thereto, or that an agreement drafted by the County be utilized.

10.8 Addendum(s)

If it becomes necessary to revise any part of this RFP or if additional data is necessary to enable an exact
interpretation of provisions of this RFP, an addendum will be issued to all vendors known to have
received a Bid. It is the responsibility of the bidder to ensure that he/she has received and signed all
addendums prior to submitting a Bid. No oral explanation or instruction of any kind or nature
whatsoever given before the award of a contract to a bidder shall be binding.

10.9  Workplace Diversity

Ingham County encourages, but in no way requires, its vendors to develop and maintain a diverse
workforce that is reflective of the population of Ingham County. According to the U.S. Census
Bureau, the statistics of Ingham County's population in 2010 was comprised of the following:

   a) White persons – 76.2%
   b) Black or African American persons – 11.8%
   c) American Indian and Alaska Native persons – 0.6%
   d) Asian persons – 5.2%
   e) Native Hawaiian and other Pacific Islander – 0.1%
   f) Persons of Hispanic or Latino origin – 7.3%

Ingham County tracks vendor diversity information for statistical purposes with companies with
which it does business. Reporting of this information to the County is optional and not all companies
participate. Statistical information regarding workplace diversity is submitted to the County in a
separate sealed envelope containing the notation “STATISTICAL INFORMATION-NOT TO BE
OPENED UNTIL AFTER THE AWARD OF THE CONTRACT.” Upon receipt of these separate
sealed envelopes, the Purchasing Department segregates the envelopes from the other proposal
documentation. The envelopes containing the statistical information are not opened until the award of
the contract, and are not considered, in any way, in the award of any contract.

10.10 Precedence of Documents

In the event that any variance should arise between the drawings and specifications, the specifications
shall govern.

10.11 Prime Contractor Responsibilities

The Contractor will be required to assume responsibility for all services offered in the Bid whether or
not they possess them within their organization. Furthermore, Ingham County will consider the
selected Contractor to be the sole point of contact with regard to contractual matters, including
payment of any and all charges resulting from the contract.

10.12 Independent Price Determination (Non-Collusion)

By submission of a Bid, the bidder certifies, and in the case of a joint Bid each party thereto certifies
as to its own organization, that in connection with this Bid:
a) The prices of the Bid have been arrived at independently without consultation, communication, or agreement, for the purpose of restricting competition, as to any matter relating to such prices with any other offer or with any competitor;

b) Unless otherwise required by law, the prices which have been quoted in the Bid have not been knowingly disclosed by the offeror and will not be knowingly disclosed by the offeror to any competitor;

c) No attempt has been made or will be made by the offeror to induce any other person or firm to submit or not to submit a Bid for the purpose of restricting competition; and,

d) The price quoted is not higher than that given to the general public for the same service.

10.13 Exceptions

Bidders must submit a listing of any and all exceptions to this RFP. Suggested substitutions, printed forms, sample contracts etc. may be provided with the listed exceptions.

11.0 CONTRACTUAL TERMS AND CONDITIONS

11.1 Nondiscrimination Clause

The Bidder who is selected as the Contractor, as required by law, and/or the Equal Opportunity Employment and Non-Discrimination Policy of Ingham County, shall not discriminate against an employee or applicant for employment with respect to hire, tenure, terms, conditions or privilege of employment, or a matter directly or indirectly related to employment because of race, color, religion, sex, sexual orientation, gender identity, national origin, disability, height, weight, marital status, age or political affiliation (except where age, sex or lack of disability constitutes a bona fide occupational qualification.)

The Contractor shall adhere to all applicable Federal, State and local laws, ordinances, rules and regulations prohibiting discrimination, including, but not limited to, the following:


Breach of this section shall be regarded as a material breach of the agreement.

Bidders shall disclose with their Bids any conclusive findings of violations of federal, state, or local equal opportunity statues, ordinances, rules, regulations, or policies within the past three (3) years.
11.2 Indemnification and Hold Harmless

The Bidder who is selected as the Contractor shall, at its own expense, protect, defend, indemnify, save and hold harmless the County of Ingham and its elected and appointed officers, employees, servants and agents from all claims, damages, lawsuits, costs and expenses including, but not limited to, all costs from administrative proceedings, court costs and attorney fees that the County of Ingham and its elected and appointed officers, employees, servants and agents may incur as a result of the acts, omissions or negligence of the Contractor or its employees, servants, agents or Subcontractors that may arise out of the agreement.

The Contractor’s indemnification responsibility under this section shall include the sum of damages, costs and expenses which are in excess of the sum of damages, costs and expenses which are paid out in behalf of or reimbursed to the County, its officers, employees, servants and agents by the insurance coverage obtained and/or maintained by the Contractor.

11.3 Insurance Requirements

The Contractor, and any and all of his/her subcontractors, shall not commence work under this contract until they have obtained the insurance required under this paragraph and subsequent contract. All coverages shall be with insurance companies licensed and admitted to do business in the State of Michigan. All coverages shall be with insurance carriers acceptable to the County of Ingham and rated “A” by the A.M. Best Company (www.ambest.com).

a) Worker’s Compensation Insurance: The Contractor shall procure and maintain during the life of this contract, Workers’ Compensation Insurance, including Employers Liability Coverage, in accordance with all applicable Statutes of the State of Michigan.

b) Commercial General Liability Insurance: The Contractor shall procure and maintain during the life of this contract, Commercial General Liability Insurance on an “Occurrence Basis” with limits of liability not less than $1,000,000 (checking with Risk Manager) per occurrence and $1,000,000 aggregate for Personal Injury, Bodily Injury and Property Damage. Coverage shall include the following extensions: (A) Contractual Liability; (B) Products and Completed Operations; (C) Independent Contractors Coverage; (D) Broad Form General Liability Extensions or equivalent, if not already included; (E) Deletion of all Explosion, Collapse, and Underground (XCU) Exclusions, if applicable; (F) Per contract aggregate.

c) Motor Vehicle Liability Insurance: The Contractor shall procure and maintain during the life of this contract Motor Vehicle Liability Insurance, including applicable No-Fault coverages, with limits of liability of not less than $1,000,000 per occurrence and $1,000,000 aggregate for Bodily Injury and Property Damage. Coverage shall include all owned vehicles, all non-owned vehicles and all hired vehicles.

d) Additional Insured: Commercial General Liability and Vehicle Liability, as described above,
shall include an endorsement stating the following shall be “Additional Insureds: The County of Ingham, including all elected and appointed officials, all employees and volunteers, all boards, commissions and/or authorities and their board members, including employees, and volunteers thereof.”

The coverage shall be primary to the Additional Insureds, and not contributing with any other insurance or similar protection available to the Additional Insureds, whether other available coverage is primary, contributing or excess.

e) Cancellation Notice: All insurances described above shall include an endorsement stating the following: “It is understood and agreed that thirty (30) days advanced written notice of cancellation, non-renewal, reduction and/or material change shall be sent to: Ingham County Purchasing Department, P.O. Box 319, Mason, Michigan 48854.”

f) Proof of Insurance: The Contractor shall provide the County of Ingham at the time the contracts are returned by him/her for execution, two (2) copies of aforementioned Certificates of Insurance and/ Policies, acceptable to the County. If so requested, certified copies of all policies will be furnished. Contractor shall provide the County evidence that all subcontractors are included under the Contractor’s policy.

If any of the above coverages expire during the term of this contract, the Contractor shall deliver renewal certificates and/or policies to the County of Ingham at least ten (10) days prior to the expiration date.

11.4 Applicable Law and Venue

Any agreement resulting from this RFP shall be construed according to the laws of the State of Michigan. The County and Contractor agree that the venue for any legal action under this agreement shall be the County of Ingham, State of Michigan. In the event that any action is brought under any agreement resulting from the RFP in Federal Court, the venue for such action shall be the Federal Judicial District of Michigan, Western District - Southern Division.

11.5 Compliance with the Law

Contractor shall render the services to be provided pursuant to this agreement in compliance with all applicable Federal, State, and local laws, ordinances, rules, and regulations.

11.6 Independent Contractor

The Bidder who is selected as the Contractor shall be an independent Contractor. The employees, servants and agents of the Contractor shall not be deemed to be and shall not hold themselves out as employees, servants, or agents of the County and shall not be entitled to any fringe benefits received by the County’s personnel, such as, but not limited to, health and accident insurance, life insurance, longevity or paid sick or vacation leave.
The Contractor shall be responsible for paying all compensation to its personnel for services they have performed under this Contract and for withholding and payment of all applicable taxes to the proper Federal, State and local governments.

11.7 Prevailing Wage Requirement

It is the policy of Ingham County to require the payment of prevailing wages on any construction contract exceeding $10,000 as determined by using the wage guidelines promulgated by the U.S. Secretary of Labor pursuant to the Davis-Bacon Act. The most current Prevailing Wage Determinations are attached.

The Contractor is required to submit certified payrolls for all periods worked on said project to the Purchasing Department, 121 E. Maple St., Mason, MI 48854, to the attention of James C. Hudgins, Jr., Director of Purchasing. Payment shall not be made until such time that the Director has reviewed the certified payrolls.

   a) Contractor shall submit to the Purchasing Department before commencing work a list of all his/her Subcontractors.

   b) It is the responsibility of the Contractor to notify its Subcontractors that said project requires the payment of prevailing wages. It is also the responsibility of the Contractor to supply its Subcontractors with the prevailing wage rate schedule that is included in this solicitation.

   c) Prevailing wage rates shall be conspicuously posted at the jobsite.

   d) Contractor shall not use independent contractors. All persons performing construction trade work under this contract shall be employees of the Contractor or employees of the Subcontractor(s).

   e) Prevailing wage compliance will be monitored by the Ingham County Purchasing Department and Michigan Fair Contracting Center (MFCC).

   f) Compliance monitors will conduct brief interviews with workers throughout the duration of said project.

   g) Workers will be informed of the prevailing wage rates during the interview. Workers will be asked if they are receiving the correct pay, fringe benefits, and overtime as required by the County.

   h) Workers may be asked to show the compliance monitor a paycheck stub on a periodic basis to verify fringe benefit breakdowns and the actual rate of pay received by the worker, including overtime, if applicable.
i) Where applicable, the Contractor shall provide the appropriate ratio of journeymen to apprentice workers as determined by the U.S. Department of Labor, Bureau of Apprenticeship and Training. The ratio will be monitored through worker interviews. Workers may be asked to provide their apprentice or journeymen cards to verify their status.

j) Where apprentices are employed, the Contractor and Subcontractors shall provide the appropriate apprentice level on the certified payroll form, WH-347.

k) When requested by the County, the Contractor and Subcontractors shall submit a detail breakdown of all fringe benefits paid to their employees for all work on County construction projects.

11.8 Bonding Requirements

Any bid that is in excess of $50,000.00, if awarded, will be required to provide 100 percent (100%) of the contract amount coverage in Performance Bond and Payment Bond as required by Public Act 1963, No. 213. The bond must be with surety companies satisfactory to Ingham County and who are listed in the Federal Register as published by the U.S. Department of Treasury under the most recently revised Circular 570. In addition, each surety company shall be admitted and licensed to do business in the State of Michigan by the Michigan Department of Labor and Economic Growth Office of Finance and Insurance and have a minimum A.M. Best Company's Insurance Report Rating of A or A- (Excellent).

a) Performance Bond - The Contractor, as Principal, shall furnish a Surety Bond in form acceptable to the County of Ingham in an amount at least equal to one-hundred (100%) percent of the contract amount as security for faithful performance of this contract. The County of Ingham shall be obligee under said bond. The bond shall guarantee the faithful performance and shall indemnify and save harmless the obligee from all costs and damages by reason of the Principal’s failure to perform in accordance with the contract provisions. The contract, by reference, shall be an integral part of the bond. Said bond shall be with a surety company licensed and admitted to do business in the State of Michigan. The Surety shall be acceptable to the County of Ingham.

b) Payment Bond - The Contractor, as Principal, shall furnish a Surety Bond in form acceptable to the County of Ingham in an amount at least equal to one-hundred (100%) percent of the contract amount as security for the prompt payment to all persons supplying labor and material in the performance of all work under said contract, and any and all authorized modifications under this contract. The contract, by reference, shall be an integral part of this bond. Said bond shall be with a Surety licensed and admitted to do business in the State of Michigan. The Surety shall be acceptable to the County of Ingham.

c) Performance and Payments Bonds shall be submitted to the Ingham County Purchasing Department, Attention: Mr. James C. Hudgins, Jr., Director of Purchasing, at least ten (10) days prior to the commencement of work covered under the contract.
d) **Additional or Substitute Bond** - If at any time the County of Ingham, for a justifiable cause, shall become dissatisfied with any Sureties pursuant to the Performance or Payment Bonds, the Contractor shall within five (5) days after such notice from the County of Ingham to do so, substitute an acceptable bond(s) in such forms and sum and signed by such other Surety as may be satisfactory to the County of Ingham. The Contractor shall pay the premiums on such bond(s). No further payments shall be deemed due nor shall be made until the new Surety or Sureties shall have furnished such an acceptable bond to the County of Ingham.

**11.9 Safety**

The Contractor shall provide temporary safety measures around the areas of construction to minimize the possibility of damage to property and injury to persons. The Contractor and its subcontractors, performing services for the County of Ingham are required and shall comply with all Occupational Safety and Health Administration (OSHA), State and County Safety and Occupational Health Standards and any other applicable rules and regulations. Also, the Contractor and its Subcontractors shall be held responsible for the safety of their employees and any unsafe acts or conditions that may cause injury or damage to any persons or property within and around the work site area under this contract.

Under no circumstances shall any tools of any kind or materials being used be left unattended. If the work to be performed under this contract requires the use of any product which contains any ingredient that could be hazardous or injurious to a person's health, a Material Safety Data Sheet (MSDS) must be submitted to the County prior to commencement of work.

**10.10 Permits, Fees and Notices**

The Contractor shall secure and pay for all building permits and for all other permits and governmental fees, licenses and inspections necessary for the proper execution of the contract and which are legally required at the time the bids are received.

**10.11 Workmanship and Inspection**

All work under the resulting contract shall be performed in a skillful and workmanlike manner, and according to all applicable local and state codes. The County may, at its sole discretion, require the Contractor to remove any employee from work that the County deems incompetent or careless.

The County may, from time to time, make inspections of the work performed under this contract. Any inspection by the County does not relieve the Contractor from any responsibility regarding defects or other failures to meet the contract requirements.

**10.12 Cleaning-up**

The Contractor and its Subcontractors shall at all times keep the areas of the property free from rubbish and the accumulation of any waste materials. Daily clean-up and removal from the work area of all
debris resulting from these operations is required. Contractor is responsible for paying for and hauling away any waste.

10.13 Scheduling

Contractor shall schedule all work with the Consultant and Facilities Department prior to commencement of work.

10.14 Examination of Existing Facility

The Contractor shall be responsible for examining the existing conditions in order to gain full information under which the work is to be carried out. The Contractor shall also compare the existing conditions with the plans and specifications, if provided. Failure of the Contractor to inform him/herself will in no way relieve him/her from the necessity to complete the work without additional cost to the County.

10.15 Materials

Unless otherwise specifically noted, the Contractor shall provide and pay for all labor, materials, equipment, tools, debris removal, equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for the proper execution and completion of the work. All materials shall be new and workmanship and materials shall be of good quality. The Contractor shall, if required, furnish satisfactory evidence as to the kind and quality of materials.

10.16 Skilled Labor

The Contractor shall employ only persons who are skilled in the work to be performed.

10.17 Protection of Work and Property

The Contractor shall continuously protect all existing facilities and new work as it is completed and shall be responsible for making good any damage or injury.

12.0 EVALUATION, AWARD & TIMELINE

12.1 Proposal Evaluation

An Evaluation Committee will review the proposals to determine those firms deemed qualified to perform services. This determination will be based on qualification data submitted or past performance. This process typically takes 2-3 weeks from the proposal opening date.

The detailed evaluation may result in one or more finalists. At this point, presentations may be requested of the proposers and negotiation will be carried out to finalize the award of the project. Finalists shall be afforded fair and equal treatment with respect to any opportunity for discussion and
revision of proposals and such revisions may be permitted after submissions and prior to award for the purpose of obtaining best and final offers. Any response that takes exception to any mandatory items in this proposal process may be rejected and not considered.

12.2 Evaluation Methodology

The factors considered in making the recommendation for award will be all the information requested in this RFP. The technical and price proposals of the RFP are typically evaluated independently of each other.

12.3 Award of Contract

It is the intention of the County to award a contract to the lowest responsive and most responsible proposer provided that the proposal has been submitted in accordance with the terms and conditions of the RFP and does not exceed the budgeted funds available.

12.4 Basis for Award

Information and/or factors gathered during interviews, negotiations and any reference checks, in addition to the evaluation criteria stated in the RFP, if any, and any other information or factors deemed relevant by the County, shall be utilized in the final award.

12.5 Right of Rejection

Ingham County reserves the right to reject any or all responses to this Request for Proposal, to waive any informalities or minor irregularities in responses, and/or to negotiate the terms and conditions of all or any part of the responses as determined to be in the County's best interests in its sole discretion.

The Owner will not be obligated to accept the lowest proposal. The owner further reserves the right to approve all subcontractors.

The Owner shall have the right to accept alternates, if provided, in any order or combination, and to determine the low bidder on the basis of the sum of the base bid and the alternates accepted.

12.6 Contract Type

An American Institutes of Architects (AIA) contract form will be used as the basis for this contract.

12.7 Contract Approval

The Ingham County Board of Commissioners and other boards and committees must approve the contract resulting from this solicitation. This process typically takes 2-4 weeks from the date the successful Contractor is identified.
12.8  Contract Development & Preparations

a) Ingham County reserves the right to negotiate further with one or more responsible and responsive proposers. The content of the RFP and the successful proposer’s proposal will become an integral part of the contract, but may be modified by the provisions of the contract.

b) By submission of proposals pursuant to this RFP, proposers acknowledge that they are amenable to the inclusion in a contract of any information provided either in response to this RFP or subsequently during the selection process. A proposal in response to an RFP is an offer to contract with the County based upon the terms, conditions, scope of work and specifications contained in this RFP. The County retains the right not to make any subsequent award.

c) Furthermore, all proposers, by submitting proposals, agree that they have read, are familiar with all the terms and conditions of the different documents and will abide by the terms and conditions thereof. The County has the right to use, as it determines to be appropriate and necessary, any information, documents, and anything else developed pursuant to the RFP and the proposal.

d) The County will prepare a formal contract, if one is awarded, specific to this solicitation for execution by the successful proposer. This process typically takes 2-3 weeks from the date the Board has approved the contract.

e) The County reserves the right to accept or reject in whole or in part any form contract submitted by a proposer and/or to require that amendments be made thereto, or that an agreement drafted by the County be utilized.

f) The successful proposal shall be incorporated into a resulting contract and shall be a matter of public record subject to the provisions of Michigan law.

12.9  Notification of Award

Upon acceptance by the County, and approval by the Board of Commissioners, the successful proposer will be notified of award in writing by e-mail. Recommendations for awards will be posted on the County's website at http://pu.ingham.org. All proposers will be notified by e-mail of the County’s decision.

12.10  Contract Execution

The successful proposer shall commence work only after the transmittal of a fully executed contract and after receiving written notification to proceed from the County. A valid and enforceable contract exists when an agreement is fully executed between the parties. The successful proposer will perform all the services indicated in the RFP and in the negotiated
contract. The successful proposer shall within ten (10) days of commencement of work under contract furnish the required insurance. Bonds, if required, shall also be submitted at this time.

12.11 Escalation Clause (if applicable)

a) The Ingham County Board of Commissioners (Board) recognizes the current difficult economic conditions and the subsequent minimal cost of living increases for County employees. As such, Contractors should fully understand that proposed contracts with cost increases greater than 1% will receive extra scrutiny from the Board and may be rejected and rebid.

b) Price adjustments may be requested pursuant to the terms of the contract; however, the Contractor must notify the County within ninety (90) days prior to the current term’s expiration date.

c) Prior to commencement of subsequent renewal terms, the County may entertain a request for escalation in accordance with the current Consumer Price Index (CPI) at the time of the request or up to a maximum 1% increase on the current pricing, whichever is lower. For purposes of this section, “Consumer Price Index” shall mean the Consumer Price Index-All Urban Consumers-United Stated Average-All Items (CPI-U), as published by the United States Department of Labor, Bureau of Labor Statistics.

d) The County reserves the right to accept or reject the request for a price increase. If the price increase is approved, the price will remain firm for one (1) year from the date of the increase or whatever term was previously authorized by the Board.
PROPOSAL FORM (4 pages)
Packet #110-15 Mechanical Improvements
(Please Type or Print Clearly in Ink)

BIDDER’S NAME: __________________________________________________________

LEGAL ADDRESS: __________________________________________________________
________________________________________________________________________
________________________________________________________________________

TELEPHONE NO.: ________________________ FAX NO.: ________________________

CONTACT PERSON: ________________________ CELL PHONE: ______________________

PROPOSAL FOR: Packet #110-15 Mechanical Improvements

BID OPENING: November 12, 2015 at 11:00 A.M.

Time is of the essence and any Bid or addenda pertaining thereto received after the announced time and date for submittal, whether by mail or otherwise, will be rejected. It is the sole responsibility of the bidders for ensuring that their Bids are time stamped by the Purchasing Department. Bids and/or any addenda pertaining thereto received after the announced time and date of receipt, by mail or otherwise, will be returned to the bidder. However, nothing in this solicitation precludes the County from requesting additional information at any time during the procurement process.

TO: Ingham County Purchasing Department
    Attention: Mr. James C. Hudgins, Jr., Purchasing Director
    C. Ross Hilliard Building, 2nd Floor
    121 E. Maple St
    Mason, MI 48854

Each bid must be accompanied by a bid guarantee in an amount equal to five percent (5%) of the total bid amount. Guarantee shall be in the form of a bid bond executed by an approved surety company, made payable to the County of Ingham. Bid guarantee shall run for a period of not less than ninety (90) days.

Should you decide to utilize an express delivery service, please note that we are located at the intersection of Maple Street and Jefferson Street.

To The Bidder:
The undersigned, as Bidder, hereby declares that before submitting a bid, he/she will: (a) examine the
Ingham County Request for Proposals
Mechanical Improvements - Packet #110-15

bidding documents thoroughly; (b) familiarize himself/herself with Federal, State, and local laws, ordinances, rules and regulations affecting performance of the work; and, (c) carefully correlate his/her observations with the requirements of the bidding documents. The bidder shall be responsible for investigating and evaluating subsurface or latent physical conditions along the site of the work. Where information concerning existing conditions, including subsurface conditions, is provided or mentioned in the RFP, such information is provided for the convenience of the bidder and to provide the bidder information known by Ingham County. However, Ingham County does not represent or guarantee any specific site conditions, including subsurface conditions. The bidder shall be solely responsible for all necessary site investigations and measurements to ensure the bid is based on conditions, which exist in and adjacent to the project site.

The submission of a bid will constitute an incontrovertible representation by the bidder that he/she has complied with and understands every requirement of these instructions. Failure or omission of the bidder to do all of the foregoing shall in no way relieve the bidder from any obligations in respect to his/her bid.

The undersigned agrees upon submitting this bid that his/her agents, officers, or employees have not directly or indirectly entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of free competitive bidding in connection with this proposal for the above project.

The Bidder understands, that Ingham County reserves the right to increase or decrease any or all of the proposed quantities. The quantities listed in the RFP may be approximate and are stated solely to provide a uniform base of calculation for comparison of bids and award of contract. No guarantee is made by the County that the actual quantities will correspond with the proposed quantities. The Contractor will be paid based upon his/her lump sum and/or unit prices bid and any alternates accepted by the County and as may be further modified by Change Order for work added or deleted from the project indicated in the RFP.

The Bidder acknowledges that he/she has not received or relied upon any representations or warranties of any nature whatsoever from the Ingham County, its agents or employees as to any conditions to be encountered in accomplishing the Work (specifically including subsoil conditions), and that this bid is based solely upon the Bidder’s own independent judgment. The work shall be performed in accordance with the enclosed Drawings and Specifications prepared by the County’s Architect.

This proposal will not be withdrawn for a period of ninety (90) days from the date of bid opening. If, during this ninety (90) day bid acceptance period, a letter of notification is sent to the legal address stated above indicating the undersigned’s bid has been selected, the undersigned agrees to deliver within the ten (10) succeeding days surety bonds and certificates of insurance in the form specified, or will forfeit the enclosed certified check, cashier’s check or bid bond accompanying this proposal.

If awarded the Contract, the undersigned agrees that time is an essential condition of the Contract and will totally complete the work as specified from Notice to Proceed. Normal delays in this project will be accepted due to rain or inclement weather. These delays must be submitted in writing to the Owner.
for review and approval within forty-eight (48) hours of the event.

This Proposal has been prepared with the knowledge that control of the project site and coordination of the work of this Contract with the work of others will be subject to the direction of Ingham County and/or its agents. The undersigned agrees that cooperation with other contractors and the Ingham County in coordinating the work is offered as a part of this Proposal.

If the undersigned enters into the Contract in accordance with this Proposal, or if this Proposal is rejected, then the accompanying check or bid bond will be returned to the undersigned.

In submitting this bid, it is understood that the right is reserved by the Ingham County to accept any bid, or reject any or all bids, to waive irregularities and/or formalities in any bid and to make award in any manner deemed in the best interest of the Ingham County.

Any bid that is in excess of $50,000.00, if awarded, will be required to provide 100 percent (100%) of the contract amount coverage in Performance Bond and Payment Bond as required by Public Act 1963, No. 213. The bond must be with surety companies satisfactory to Ingham County and who are listed in the Federal Register as published by the U.S. Department of Treasury under the most recently revised Circular 570. In addition, each surety company shall be admitted and licensed to do business in the State of Michigan by the Michigan Department of Labor and Economic Growth Office of Finance and Insurance and have a minimum A.M. Best Company's Insurance Report Rating of A or A- (Excellent).

The name and address of the bonding company proposed by this bidder is:

_________________________________________________________________________________
_________________________________________________________________________________
_________________________________________________________________________________

The Owner reserves the right to evaluate all proposed bonding, with regards to conformance with current laws of the State of Michigan. No Offshore Bonding Companies will be accepted.

The Contractor will be required to assume responsibility for all services offered in the Bid whether or not they possess them within their organization. Furthermore, Ingham County will consider the selected Contractor to be the sole point of contact with regard to contractual matters, including payment of any and all charges resulting from the contract.

ACCEPTANCE
This Proposal shall be valid for ninety (90) days after the date of opening of bids; the undersigned agrees to begin work within ten (10) days of Notice to Proceed.

NOTICE OF INTENT
Prior to bid award and after bid tabulations, the Owner will provide the recommended bidder with a Notice of Intent Letter so the Contractor can secure the required bonding.
NOTICE TO PROCEED
After bonding is received and approved, the Owner will provide the Contractor a Notice to Proceed. The authorized contract will follow within 7-10 days.

COMENCEMENT OF WORK AND WORK LIMITATIONS
The undersigned will begin work as specified after receipt of a Notice to Proceed.

FINAL COMPLETION
Final completion is expected by March 30, 2016.

SUB-CONTRACTORS, SUPPLIERS, AND VENDORS
The undersigned, upon request of the Owner, agrees to submit to the Owner a complete list of sub-contractors, suppliers, and vendors whom he or she proposes to employ on this project, to be approved by the Owner.
The following addenda have been received and acknowledged:

#1 date __________ #2 date __________ #3 date __________

SIGNED THIS _________________________DAY OF ______________________, 2014

Respectfully Submitted,

BY: ________________________________________________

Authorized Signature of Bidder

TITLE: ________________________________________________
LEGAL STATUS OF BIDDER FORM
Packet #110-15 Mechanical Improvements
(Please Type or Print Clearly in Ink)

(The Bidder shall check and fill out the appropriate form.)

( ) Corporation

( ) Partnership

( ) Individual

___________________________________  ______________ ______________________
Name       Title

___________________________________  ______________ ______________________
Address      Phone #

___________________________________
Fax #

___________________________________
Federal Tax I.D. Number
NON-COLLUSION AFFIDAVIT OF PRIME BIDDER FORM
Packet #110-15 Mechanical Improvements
(Please Type or Print Clearly in Ink)

State of ______________________, County of __________________________________
____________________________________, being first duly sworn, deposes and says that:

(1) He/she is the ___________________________________ , of _______________________________.
   (Name)                                           (Company Name)

(2) He/she is fully informed respecting preparation and content of the attached Bid and of all pertinent circumstances respecting such Bid;

(3) Such Bid is genuine and not a collusive or sham bid;

(4) Neither the Bidder nor any of its officers, partners, owners, agents, representatives, employees, or parties in interest, including this affiant, has any way colluded, conspired, connived, or agreed directly or indirectly, with any other Bidder, firm, or person to submit a collusive or sham Bid in connection with the Contract for which the attached Bid has been submitted or to refrain from bidding in connection with such Contract, or has in any manner, directly or indirectly, sought by agreement or collusion or communication or conference with any other Bidder, firm, or person to fix the price or prices in the attached Bid or of any other Bidder, or to fix any overhead, profit, or cost element of the bid price of any other Bidder, or to secure through any collusion, conspiracy, connivance, or unlawful agreement any advantage against the Charter Township of Delhi or any person interested in the proposed Contract;

(5) The price or prices quoted in the attached Bid are fair and proper and are not tainted by any other collusion, conspiracy, connivance, or unlawful agreement on the part of the Bidder or any of its agents, representatives, owners, employees, or parties in interest, including this affiant.

__________________________________________
(Signature)

__________________________________________ (Title)

Subscribed and sworn before me
This ______ day of __________________ , 20____

__________________________________________
Signature of Notary Public

Name of Notary _____________________________,

County _____________________, Commission Expiration ________________________
Bidder Name: ___________________________________________
Address: ___________________________________________
_________________________________________________________________________

Base Bids and Alternates:

Having carefully examined the information provided in this RFP as well as construction documents, specifications, City review letters, and the premises and conditions affecting the work, the Undersigned proposes to furnish all labor, materials, tools, equipment, permit fees, and services necessary to perform and complete the entire work for the fee as listed below. A schedule of values will be required as part of the contract, if awarded.

**Human Services Building (HSB) Base Bid** - All the work contained in the RFP, drawings, specifications & Project Manual

$____________________

**Youth Center (YC) Base Bid** - All the work contained in the RFP, drawings, specifications & Project Manual

$____________________

**Forest Community Health Center (FCHC) Base Bid** - All the work contained in the RFP, drawings, specifications & Project Manual

$____________________

**Alternate No. 1 for Forest Community Health Center** - Existing Air Handler No. 9 (Trane Model No. TCD090B400AB) (Serial No. N/A)
Remove existing AHU. Retain power, duct, and control connections for reuse. Provide curb adapter as required.

$____________________

(In amount shall be shown in both words and figures. In case of discrepancy, the amount shown in words shall govern.)
Alternate No. 2 for Forest Community Health Center - Existing Air Handler No.7 (Trane Model No. TCD090B400AB) (Serial No. E08144910D) Remove existing AHU. Retain power, duct, and control connections for reuse. Provide curb adapter as required. $___________________

Dollars

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

Total Bid - HSB, YC, FCHC Base Bids plus Alternates #1 & #2 $___________________

Dollars

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

Substitutions (Optional):

In accordance with the stipulations herein, the Undersigned submits the following substitutions:

Add $___________________ Deduct $___________________

_________________________________________________________________________________

Add $___________________ Deduct $___________________

_________________________________________________________________________________

Add $___________________ Deduct $___________________

_________________________________________________________________________________

It is expressly understood that this substitution is for consideration only and, that after due investigation, if any such substitution is accepted, the applicable amount will be deducted from the Base Bid as stated. Further, this substitute proposal is separate from and not a part of the Base Bid. (Attach separate sheet if required).

Signed _____________________________ Date ________________
LOCAL PURCHASING PREFERENCE FORM
Packet #110-15 Mechanical Improvements
(Please type or print clearly in ink only)

1. Do you desire to have your company considered a “local vendor” and therefore have your Bid evaluated with the 10% local purchasing preference? ___ Yes ___ No

2. If yes, please provide below the verifiable business address (not a PO Box) at which your business is being conducted?

3. Complete Legal Firm Name: ________________________________________________

4. Company Address: ________________________________________________________

5. Company Phone: (   )______________________  Fax: (   )______________________

6. Name and title of person authorized to sign on behalf of your company:
   ____________________________________________________ ______________________

7. Signature/date: ___________________________________________________________

Note: Local vendors who utilize non-local vendors as subcontractors for more than 50% of the work in a specific Bid or Bid are not entitled to the preference for that specific Bid or Bid.
REFERENCES FORM
Packet #110-15 Mechanical Improvements
(Please type or print clearly in ink only)

The Contractor shall have the capability and capacity in all respects to fulfill the contractual requirements to the satisfaction of the County.

Indicate the length of time you have been in business as a company providing the type of service required for this contract.

__________ Years __________ Months  SOM Business license #: ______________________

Provide a minimum of three (3) references that may substantiate your past work performance and experience in the type of work required for this contract.

Name, Address, Phone Number, Scope of Services Performed and Contact Person

1._________________________________________________________________________________
   _______________________________________________________________________________
   _______________________________________________________________________________
   _______________________________________________________________________________

2._________________________________________________________________________________
   _______________________________________________________________________________
   _______________________________________________________________________________
   _______________________________________________________________________________

3._________________________________________________________________________________
   _______________________________________________________________________________
   _______________________________________________________________________________
CERTIFICATE OF COMPLIANCE WITH PUBLIC ACT 517 OF 2012
Packet #110-15 Mechanical Improvements
(Please type or print clearly in ink only)

I certify that neither ________________________________ (Company), nor any of its successors, parent companies, subsidiaries, or companies under common control, is an “Iran Linked Business” engaged in investment activities of $20,000,000.00 or more with the energy sector of Iran, within the meaning of Michigan Public Act 517 of 2012. In the event it is awarded a Contract as a result of this solicitation, Company will not become an “Iran linked business” during the course of performing the work under the Contract.

NOTE: IF A PERSON OR ENTITY FALSELY CERTIFIES THAT IT IS NOT AN IRAN LINKED BUSINESS AS DEFINED BY PUBLIC ACT 517 OF 2012, IT WILL BE RESPONSIBLE FOR CIVIL PENALTIES OF NOT MORE THAN $250,000.00 OR TWO TIMES THE AMOUNT OF THE CONTRACT FOR WHICH THE FALSE CERTIFICATION WAS MADE, WHICHEVER IS GREATER, PLUS COSTS AND REASONABLE ATTORNEY FEES INCURRED, AS MORE FULLY SET FORTH IN SECTION 5 OF ACT NO. 517, PUBLIC ACTS OF 2012.

__________________________
(Name of Company)

By: _____________________________

Date: _______________________ Title: _____________________________

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

________________________________________
__________________ Notary Public,
_______________, County, State of Michigan
My Commission Expires: ________________
SIGNATURE FORM
Packet #110-15 Mechanical Improvements
(Please type or print clearly in ink only)

My signature certifies that the Bid as submitted complies with all terms and conditions as set forth in this solicitation, except as noted herein. My signature also certifies that the accompanying Bid is not the result of, or affected by, any unlawful act of collusion with another person or company engaged in the same line of business or commerce.

I hereby certify that I am authorized to sign as a representative for the firm:

Complete Legal Name of Firm:

Order from Address:

Remit to Address:

Fed ID No.:

Signature:

Name (type/print):

Title:

Telephone: (____) ___________________ Fax No.: (____) _______________________

Date: _____________________________________

Notification of Award sent to: ___________________________________________________

E-mail of Person Receiving Award Notification: ____________________________________
The Ingham County Board of Commissioners monitors workplace demographics of bidders and vendors for statistical purposes and to indicate the need for inclusive outreach efforts to ensure that members of underutilized groups have equal opportunity to contract with the affected departments.

To that end, the County requests vendors to submit as part of their response to any formal solicitations, the following workplace diversity information. Vendors are encouraged to complete as much information as possible. This information will be used for statistical purposes only. Statistical information shall be submitted to the County in a separate sealed envelope containing the notation “STATISTICAL INFORMATION-NOT TO BE OPENED UNTIL AFTER THE AWARD OF THE CONTRACT”. Upon receipt of these separate sealed envelopes, the Purchasing Department segregates the envelopes from the other Bid documentation. The envelopes containing the statistical information are not opened until the award of the contract, and are not considered, in any way, in the award of any contract.

1. What percentage of your firm’s workforce is?
   - Female ____%
   - Physically-disabled ____%
   - Veteran ____%
   - African-American ____%  Caucasian ____%
   - Asian-Indian American ____%  Hispanic-American ____%
   - Asian-Pacific American ____%  Native-American ____%

2. If your business is at least 51% owned by one of the following individuals, please check all that apply:
   - □ Female
   - □ African-American
   - □ Disabled
   - □ Asian-Indian American
   - □ Veteran
   - □ Asian-Pacific American
   - □ Caucasian
   - □ Hispanic-American
   - □ Native-American

3. Complete Legal Firm Name: __________________________________________________________
4. Company Address: ________________________________________________________________
5. Company Phone: (     ) _____________________  Fax: (     ) ______________________
6. Name and title of person authorized to sign on behalf of your company:

__________________________________________________ ______________________

Signature/date: __________________________________ ______________
General Decision Number: MI150084 10/09/2015 M184

Superseded General Decision Number: MI20140084

State: Michigan

Construction Type: Building

County: Ingham County in Michigan.

BUILDING CONSTRUCTION PROJECTS (does not include single family homes or apartments up to and including 4 stories).

Note: Executive Order (EO) 13658 establishes an hourly minimum wage of $10.10 for 2015 that applies to all contracts subject to the Davis-Bacon Act for which the solicitation is issued on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least $10.10 (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract. The EO minimum wage rate will be adjusted annually. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

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<td>2</td>
<td>02/20/2015</td>
</tr>
<tr>
<td>3</td>
<td>03/20/2015</td>
</tr>
<tr>
<td>4</td>
<td>06/05/2015</td>
</tr>
<tr>
<td>5</td>
<td>06/26/2015</td>
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<tr>
<td>6</td>
<td>07/03/2015</td>
</tr>
<tr>
<td>7</td>
<td>08/21/2015</td>
</tr>
<tr>
<td>8</td>
<td>10/02/2015</td>
</tr>
<tr>
<td>9</td>
<td>10/09/2015</td>
</tr>
<tr>
<td>ASBE0047-002</td>
<td>07/01/2015</td>
</tr>
<tr>
<td>Trade</td>
<td>Rates</td>
</tr>
<tr>
<td>------------------------------</td>
<td>--------</td>
</tr>
<tr>
<td>Asbestos Worker/Heat &amp; Frost Insulator</td>
<td>$29.22</td>
</tr>
</tbody>
</table>

**BOIL0169-001 01/01/2014**

<table>
<thead>
<tr>
<th>Rates</th>
<th>Fringes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boilermaker</td>
<td>$32.78</td>
</tr>
</tbody>
</table>

**BRMI0009-009 12/01/2013**

<table>
<thead>
<tr>
<th>Rates</th>
<th>Fringes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bricklayer</td>
<td>$27.37</td>
</tr>
<tr>
<td>Terrazzo and Tile Finisher</td>
<td>$17.67</td>
</tr>
<tr>
<td>Terrazzo and Tile Setter</td>
<td>$21.02</td>
</tr>
</tbody>
</table>

**FOOTNOTE:**

Paid Holiday: Fourth of July, if the worker was employed by the contractor in any period of seven working days before said holiday within the current calendar year.

**CARP1004-004 06/01/2015**

<table>
<thead>
<tr>
<th>Rates</th>
<th>Fringes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carpenter (Soft Floor Layer, Including Carpet &amp; Resilient Flooring)</td>
<td>$24.79</td>
</tr>
</tbody>
</table>

**CARP1004-018 06/01/2015**

<table>
<thead>
<tr>
<th>Rates</th>
<th>Fringes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carpenter, Includes Acoustical Ceiling Installation, Drywall Hanging, Form Work, and Metal Stud Installation</td>
<td>$24.79</td>
</tr>
</tbody>
</table>
CARP1102-002 06/01/2013

Rates Fringes

MILLWRIGHT.......................$ 31.11  28.64

ELEC0252-001 06/03/2013

Townships of Bunker Hill, Leslie, Onodaga & Stockbridge

Rates Fringes

ELECTRICIAN
  Alarm Installation & Low Voltage Wiring..............$ 25.72  13.87
  Excludes Alarm Installation and Low Voltage Wiring..............$ 39.03  20.88

ELEC0665-004 06/01/2014

Townships of Alaiedon, Aurelius, Delhi, Ingham, Lansing, Leroy, Locke, Meridian, Vevay, Wheatfield, White Oak and Williamson

Rates Fringes

ELECTRICIAN
  Alarm Installation & Low Voltage Wiring..............$ 25.89  14.22
  Excludes Alarm Installation & Low Voltage Wiring..............$ 32.30  20.22

ENGI0324-012 07/01/2014

Rates Fringes

OPERATOR: Power Equipment
  GROUP 1.......................$ 29.09  21.70
  GROUP 2.......................$ 28.84  21.70
  GROUP 3.......................$ 27.74  21.70
  GROUP 4.......................$ 22.94  21.70
  GROUP 5.......................$ 22.34  21.70
GROUP 6.....................$ 19.89 21.70
GROUP 7.....................$ 18.19 21.70

FOOTNOTES:

Crane operator with main boom and jib 300' or longer: $1.50 per hour above the group 1 rate. Crane operator with main boom and jib 400' or longer: $3.00 per hour above the group 1 rate.


POWER EQUIPMENT OPERATOR CLASSIFICATIONS

GROUP 1: Crane operator with main boom and jib 400', 300', or 220' or longer.

GROUP 2: Crane operator with main boom and jib 140' or longer, tower crane, gantry crane, whirley derrick

GROUP 3: Concrete Pump; Crane; Highlift; Hoist; Loader; Roller; Scraper; Stiff Leg Derrick; Trencher

GROUP 4: Bobcat/Skid Loader; Broom/Sweeper; Fork Truck (over 20' lift)

GROUP 5: Boom Truck (non-swinging)

GROUP 6: Fork Truck (20' lift and under for masonry work)

GROUP 7: Oiler

--------------------------------------------------------------------------------
IRON0025-001 06/01/2015

<table>
<thead>
<tr>
<th>Rates</th>
<th>Fringes</th>
</tr>
</thead>
<tbody>
<tr>
<td>IRONWORKER</td>
<td></td>
</tr>
<tr>
<td>REINFORCING.................$ 28.30</td>
<td>24.60</td>
</tr>
<tr>
<td>STRUCTURAL (Excluding Metal Building Erection)....$ 33.78</td>
<td>27.84</td>
</tr>
</tbody>
</table>

--------------------------------------------------------------------------------
* LABO0499-012 10/01/2015
Rates  Fringes

LABORER
  Common or General; Grade Checker; Mason Tender - Brick; Mason Tender - Cement/Concrete; Pipelayer; Sandblaster......$ 22.97  12.75

PAIN0845-001 11/01/2014

Rates  Fringes

PAINTER:  Brush, Roller, Spray and Paperhanging........$ 22.14  11.97
PAINTER:  Drywall Finishing/Taping.....................$ 24.00  12.89

PLAS0016-011 04/01/2014

Rates  Fringes

CEMENT MASON/CONCRETE FINISHER...$ 24.64  12.88

PLUM0333-006 06/01/2015

Rates  Fringes

PIPEFITTER, Includes HVAC Pipe and Unit Installation.......$ 33.19  19.78
PLUMBER, Excludes HVAC Pipe and Unit Installation........$ 33.89  21.64

FOOTNOTE:

Paid Holidays: Memorial Day, Independence Day and Labor Day, if the employee works the work day preceding and following the holiday unless proven illness or injury prevents the employee from working.

ROOF0070-003 06/01/2014
<table>
<thead>
<tr>
<th>Job Description</th>
<th>Rate</th>
<th>Fringe</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROOFER</td>
<td>$26.63</td>
<td>13.22</td>
</tr>
<tr>
<td>SFMI0669-001 07/01/2013</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPRINKLER FITTER (Fire Sprinklers)</td>
<td>$31.25</td>
<td>17.12</td>
</tr>
<tr>
<td>SHEE0007-004 05/01/2014</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SHEET METAL WORKER (Including HVAC Duct Installation; Excluding HVAC System Installation)</td>
<td>$27.82</td>
<td>19.55</td>
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<tr>
<td>SUMI2011-009 02/01/2011</td>
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</tr>
<tr>
<td>IRONWORKER, ORNAMENTAL</td>
<td>$18.48</td>
<td>7.93</td>
</tr>
<tr>
<td>LABORER: Landscape &amp; Irrigation</td>
<td>$8.00</td>
<td>0.00</td>
</tr>
<tr>
<td>METAL BUILDING ERECTOR</td>
<td>$16.92</td>
<td>6.32</td>
</tr>
<tr>
<td>OPERATOR: Backhoe/Excavator/Trackhoe</td>
<td>$21.34</td>
<td>7.57</td>
</tr>
<tr>
<td>OPERATOR: Bulldozer</td>
<td>$20.63</td>
<td>8.21</td>
</tr>
<tr>
<td>OPERATOR: Grader/Blade</td>
<td>$22.00</td>
<td>6.29</td>
</tr>
<tr>
<td>OPERATOR: Tractor</td>
<td>$19.10</td>
<td>8.48</td>
</tr>
<tr>
<td>TRUCK DRIVER: Dump Truck</td>
<td>$16.00</td>
<td>7.26</td>
</tr>
<tr>
<td>TRUCK DRIVER: Lowboy Truck</td>
<td>$14.50</td>
<td>0.44</td>
</tr>
</tbody>
</table>
TRUCK DRIVER: Tractor Haul
Truck............................$ 13.57 1.18
----------------------------------------------------------------

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than "SU" or "UAVG" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.
Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the "SU" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.
WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

* an existing published wage determination
* a survey underlying a wage determination
* a Wage and Hour Division letter setting forth a position on a wage determination matter
* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.
3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

   Administrative Review Board  
   U.S. Department of Labor  
   200 Constitution Avenue, N.W.  
   Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

END OF GENERAL DECISION
SECTION 00 52 13 - CONTRACTOR'S AGREEMENT FORM

AGREEMENT:

The form of agreement between the Owner and the Contractor shall be the "Standard Form of Agreement Between Owner and Contractor" (AIA Document A101), 2007 Edition, as published by the American Institute of Architects. Refer to ‘Exhibit 00 52 13A’.

END OF SECTION 00 52 13
SECTION 00 54 00 – AGREEMENT FORM SUPPLEMENTS

These modifications shall delete, modify and supplement the provisions contained in the “Standard Form of Agreement Between Owner and Contractor”, AIA Document A101/2007 Edition. The provisions contained in these modifications shall supersede any conflicting provisions of the AIA Document.

B. ARTICLE 5, PAYMENTS

1. 5.1.3 Provided that an Application for Payment is received by the Architect not later than the first day of the month, the Owner shall make payment of the certified amount to the Contractor not later than the last day of the following month. If an Application for Payment is received by the Architect after the application date fixed above, payment shall be made by the Owner not later than sixty (60) days after the Architect received the Application for Payment.

2. 5.1.6.1 Insert “ten” and “10” in the appropriate spaces.

3. 5.1.6.2 Insert “ten” and “10” in the appropriate spaces.

4. 5.1.8 Until the work is fifty percent (50%) complete, the Owner will pay ninety percent (90%) of the amount due to the contractor on account of progress payments. Thereafter, retainage may be reduced to five percent (5%). The Contractor must submit a Consent of Surety (AIA for G707A), authorizing the retainage to be reduced. The full contract retainage may be reinstated if the manner of completion of the work and its progress do not remain satisfactory or if the surety revokes its consent or for other good and sufficient reasons.

5. 5.2.2 Revise “30” to read “61”.

END OF SECTION 00 54 00
AIA Document A201 "General Conditions of the Contract for Construction" is hereby made a part of the Contract Documents and is attached herein. See **EXHIBIT '00 72 13 A',** AIA Document A201 2007.

END OF SECTION 00 72 13
AIA Document A201™ – 2007

General Conditions of the Contract for Construction

for the following PROJECT:
(Name and location or address)
Ingham County
Mechanical Improvements
Lansing, Michigan (Multiple Locations)

THE OWNER:
(Name, legal status and address)
Ingham County
121 E. Maple Street
Mason, Michigan 48854

THE ARCHITECT:
(Name, legal status and address)
DLZ Michigan, Inc.
1425 Keystone Avenue
Lansing, Michigan 48911

TABLE OF ARTICLES

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

ADDITIONS AND DELETIONS:
The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An Additions and Deletions Report that notes added information as well as revisions to the standard form text is available from the author and should be reviewed.

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

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ARTICLE 1   GENERAL PROVISIONS
§ 1.1 BASIC DEFINITIONS
§ 1.1.1 THE CONTRACT DOCUMENTS
The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive or (4) a written order for a minor change in the Work issued by the Architect. Unless specifically enumerated in the Agreement, the Contract Documents include the Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor’s bid, and Addenda relating to bidding requirements.

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

§ 1.1.3 THE WORK
The term “Work” means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment and services provided or to be provided by the Contractor to fulfill the Contractor’s obligations. The Work may constitute the whole or a part of the Project. No asbestos containing material shall be used within the work of this project.

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

§ 1.1.5 THE DRAWINGS
The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, and photographs.
1.1.5.1 Depictions of systems and assemblies are diagrammatic, and do not indicate every offset, fitting, and accessory required to avoid conflicts with other trades. Contractor to coordinate installations as required to maintain headroom, access to equipment, and other specified requirements at no additional cost to the Owner.

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

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

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

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

§ 1.2.1.1 If the Contractor notifies the Architect of a perceived inconsistency among the Contract Documents, the Architect’s interpretations shall be prioritized as follows:
1. The Owner-Contractor Agreement
2. Addenda, with those of later date having precedence over those of earlier date
3. The General Conditions of the Contract for Construction
4. Drawings and Specifications.

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

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

§ 1.2.4 Material and equipment incorporated into the project which by its nature is governed by OSHA regulations shall conform to said OSHA regulations for both manufacturer and installation. If, during the progress of the work, it is discovered that the installation does not conform to said OSHA regulations, the Contractor shall take such steps as necessary to comply at no additional cost to the Owner.

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

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

§ 1.5 OWNERSHIP AND USE OF DRAWINGS, SPECIFICATIONS AND OTHER INSTRUMENTS OF SERVICE
§ 1.5.1 The Architect and the Architect’s consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and will retain all common law, statutory and other reserved rights, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with this Project is not to be construed as publication in derogation of the Architect’s or Architect’s consultants’ reserved rights.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors and material or equipment suppliers are authorized to use and reproduce the Instruments of Service provided to them solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers may not use the Instruments of Service on other projects or for additions to this Project outside the scope of the Work without the specific written consent of the Owner, Architect and the Architect’s consultants.

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

ARTICLE 2 OWNER
§ 2.1 GENERAL
§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner’s approval or authorization.
Except as otherwise provided in Section 4.2.1, the Architect does not have such authority. The term “Owner” means the Owner or the Owner’s authorized representative.

§ 2.1.2 The Owner shall furnish to the Contractor, upon receipt of a reasonable written request, information necessary and relevant for the Contractor to evaluate, give notice of or enforce mechanic’s lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the Site, and the Owner’s interest therein at the time of execution of the Agreement.

§ 2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

§ 2.2.1 Prior to execution of the Agreement, the Contractor may request in writing that the Owner provide reasonable evidence that the Owner has made financial arrangements to fulfill the Owner’s obligations under the Contract.

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

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

§ 2.2.4 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner’s control and relevant to the Contractor’s performance of the Work with reasonable promptness after receiving the Contractor’s written request for such information or services.

§ 2.2.5 Unless otherwise provided in the Contract Documents, the Contractor shall furnish copies of the Contract Documents as required to complete the Work.

§ 2.3 OWNER’S RIGHT TO STOP THE WORK

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

§ 2.4 OWNER’S RIGHT TO CARRY OUT THE WORK

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

§ 2.4.1 In the event that workers performing Work under the Agreement engage in a strike or similar work stoppage, or cease to work due to picketing or a labor dispute of any kind, the failure of the Contractor to cause those workers to resume work or provide other properly skilled workers shall be construed as neglecting to carry out the Work in accordance with the Contract Documents. The Owner may therefore take action as described in Article 2.4.

§ 2.4.2 The Contractor’s inability or failure to provide sufficient resources in the form of materials, tools or equipment to properly maintain the project schedule shall be construed as neglecting to carry out the Work in accordance with the Contract Documents. The Owner may therefore take action as described in Article 2.4.
ARTICLE 3  CONTRACTOR

§ 3.1 GENERAL

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

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

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

§ 3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

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

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.2.3, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor’s review is made in the Contractor’s capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

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

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

§ 3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

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

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

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

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

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

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

1. All workers will be subject to criminal background checks.
2. If a criminal background check is determined to be unacceptable (conviction of a felony offense constitutes unacceptability) by the Owner, that worker will be removed and replaced at no additional cost to the Owner.
3. Strict discipline and good order shall include: no fighting, no possession or use of drugs, no possession or use of alcohol, no use of tobacco products, and no profane language at the Site. The Owner shall have the authority to require a Contractor to have non-compliant workers removed from the Site.

§ 3.4.5 Equal Employment and Non-Discrimination. During the performance of this Contract the Contractor shall maintain the following policies of employment. Contractor and all subcontractors shall not discriminate against any employee or applicant for employment because of race, religion, color, sex, national origin or age, and shall comply with all Federal Executive Orders and State and local requirements related thereto.

§ 3.4.6 Contractors who are signatory to any union agreement shall observe all established union rules and regulations, and shall cooperate with the labor union officials toward elimination and/or settlement of all labor disputes, in order to maintain the Project Schedule.

§ 3.5 WARRANTY
The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor’s warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

§ 3.5.1 Specific warranties and bonds called for in the Contract Documents, in addition to that falling under the general warranty as set forth in the General Conditions, shall be furnished in accordance with the requirements of the Specifications.
§ 3.5.2 Unless longer periods are identified in individual product Specifications, the Contractor hereby warrants all Work performed under the Agreement for a period of two (2) years following the date of Substantial Completion, as issued by the Architect.

§ 3.5.3 The Contractor hereby agrees to remedy any defect within the Work, due to faults in either the product or its installation, to the Owner and Architect’s satisfaction. Corrective action, including costs associated with repairing all Work affected by the defect, shall be completed at the Contractor’s expense within fourteen (14) days after the Contractor has received notification of the defect from the Owner.

§ 3.6 TAXES
§ 3.6.1 The Contractor shall pay sales, consumer, use and similar taxes for the Work provided by the Contractor that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

§ 3.6.2 The Owner is a Withholding Agent for the payment of Michigan Gross Income Tax on Contracts with the Owner. As a Withholding Agent, the Owner is required to withhold from non-resident Contractors the Michigan Gross Income Tax. A non-resident Contractor does not include a Contractor that is a corporation organized under laws of states other than the State of Michigan but which is duly licensed, qualified and registered with the Secretary of State of Michigan to engage in business within the State of Michigan.

§ 3.7 PERMITS, FEES, NOTICES AND COMPLIANCE WITH LAWS
§ 3.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit as well as for other bonds, permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded.

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

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

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

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

§ 3.8.2 Unless otherwise provided in the Contract Documents,
.1 Allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;
.2 Contractor’s costs for unloading and handling at the site, labor, installation costs, overhead, profit and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and
.3 Whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor’s costs under Section 3.8.2.2, except when installation is specified as part of the Allowance in Division 01 General Requirements.

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

§ 3.8.4 Additional provisions pertaining to cash allowances are included in Division 01, General Requirements.

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

.1 The Contractor’s superintendent shall be acceptable to the Owner and Architect and shall not be changed without the approval of the Owner and Architect, unless the superintendent ceases to be in the Contractor’s employ.

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Architect the name and qualifications of a proposed superintendent. The Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to the proposed superintendent or (2) that the Architect requires additional time to review. Failure of the Architect to reply within the 14 day period shall constitute notice of no reasonable objection.

§ 3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner’s consent, which shall not unreasonably be withheld or delayed.

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

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

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

§ 3.11.2 Additional provisions pertaining to Project Record Documents are included in Division 01, General Requirements.

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

§ 3.12.1.1 Contractor shall submit material and safety data sheets on all material, equipment and products incorporated in to the Work, including certification that no asbestos containing materials have been installed in the Work.

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

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

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

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

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

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

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

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

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

§ 3.12.11 When a material or product is specified or referenced only by ASTM or similar standard, the Contractor
may select any compliant material or product.

§ 3.12.12 The term ‘or Approved Equal’, or any other term that requires or implies approval, requires submittal of the
proposed item in accordance with Article 3.12.

§ 3.12.13 When only one product or manufacturer is specified, this is the Basis of Design. Proposed substitutions
require review and approval in accordance with Section 016200 ‘Product Options’.

§ 3.12.14 Additional provisions pertaining to Shop Drawings, Product Data and Samples are included in Division 01,
General Requirements, and more specifically, Section 016200 ‘Product Options’.

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

§ 3.13.2 Use of the Site restricted to Owner approval and as outlined in the Contract Documents.

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

§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed
construction of the Owner or separate contractors by cutting, patching or otherwise altering such construction, or by
excavation. The Contractor shall not cut or otherwise alter such construction by the Owner or a separate contractor
except with written consent of the Owner and of such separate contractor; such consent shall not be unreasonably
withheld. The Contractor shall not unreasonably withhold from the Owner or a separate contractor the Contractor’s
consent to cutting or otherwise altering the Work.
§ 3.14.3 Additional provisions pertaining to Cutting and Patching are included in Division 01, General Requirements.

§ 3.15 CLEANING UP
§ 3.15.1 The Contractor shall, on a daily basis, keep the premises and surrounding area free from accumulation of waste materials or rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor’s tools, construction equipment, machinery and surplus materials from and about the Project. The cost of cleaning up shall be included in the Contractor’s Bid.

§ 3.15.1.1 Tools, equipment and materials shall be stored in a neat and orderly fashion to promote safety and not delay the work of other Contractors.

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

§ 3.15.3 Coordinate acceptable locations for dumpsters with the Owner prior to placement. This area shall be maintained in a neat and orderly fashion at all times.

§ 3.15.4 Additional provisions pertaining to cleaning up are included in Division 01, General Requirements.

§ 3.16 ACCESS TO WORK
The Contractor shall provide the Owner and Architect access to the Work in preparation and progress wherever located.

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

§ 3.18 INDEMNIFICATION
§ 3.18.1 To the fullest extent permitted by law, the Contractor and Subcontractors (hereinafter Indemnitors) shall indemnify, hold harmless, and defend at its own expense, the Owner, Architect, Architect’s consultants, and agents and employees and volunteers of any of them, and any other person or entity for whom any of them may be legally responsible (hereinafter Indemnities) from and against claims, damages, losses and expenses, costs, including but not limited to attorneys’ fees, arising out of or resulting from, or are related to, or are alleged to arise out of, result from or relate to performance of the Work, including all liability for damages, loss, costs, expenses, and claims including death, damage to property, damages to any Indemnitee or Indemnitor or its employees, servants, and agents, whether based upon, or claimed to be based upon statutory, contractual, tort, or other liability of any Indemnitee whether or not caused, or alleged to be caused in whole or in part by the joint or several negligence (but not sole negligence) of contract, breach of warranty, strict liability of other breach of duty by any Indemnitee. In the event more than one Indemnitor is responsible, or alleged to be responsible, in respect to an accident or occurrence covered by this Indemnification, then all of such Indemnitors shall be jointly and severally responsible to the Indemnitees for Indemnification, and the ultimate responsibility among such Indemnitors for the loss and expense of any such indemnification shall be settled by separate proceedings and without jeopardy to any Indemnitee.

§ 3.18.2 In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation or benefits payable by or for the Contractor or a Subcontractor under workers’ compensation acts, disability benefit acts or other employee benefit acts.
§ 3.18.3 The contractor is solely responsible for all citations and penalties arising out of, or resulting from, the performance of the Work.

§ 3.18.4 The Contractor shall indemnify and hold harmless the Owner and Architect, and their agents and employees from and against all claims, damages, losses and expenses, including attorney’s fees, arising out of such Occupational Safety and Health Act violations and other applicable ordinances, rules and regulations.

ARTICLE 4 ARCHITECT
§ 4.1 GENERAL
§ 4.1.1 The Owner shall retain an architect lawfully licensed to practice architecture or an entity lawfully practicing architecture in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

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

§ 4.1.3 If the employment of the Architect is terminated, the Owner shall employ a successor architect as to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Architect.

§ 4.2 ADMINISTRATION OF THE CONTRACT
§ 4.2.1 The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner’s representative during construction until the date the Architect issues the final Certificate for Payment. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

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

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

§ 4.2.4 COMMUNICATIONS FACILITATING CONTRACT ADMINISTRATION
Except as otherwise provided in the Contract Documents or when direct communications have been specially authorized, the Owner and Contractor shall endeavor to communicate with each other through the Architect about matters arising out of or relating to the Contract. Communications by and with the Architect’s consultants shall be through the Architect. Communications by and with Subcontractors and material suppliers shall be through the Contractor. Communications by and with separate contractors shall be through the Owner.

§ 4.2.5 Based on the Architect’s evaluations of the Contractor’s Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts. The Owner shall have final approval of Applications for Payment.

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

§ 4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor’s submittals such as Shop Drawings, Product Data and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect’s action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect’s professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect’s review of the Contractor’s submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5 and 3.12. The Architect’s review shall not constitute approval of safety precautions or, unless otherwise specifically stated by the Architect, of any construction means, methods, techniques, sequences or procedures. The Architect’s approval of a specific item shall not indicate approval of an assembly of which the item is a component.

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

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

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

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

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

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

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

ARTICLE 5  SUBCONTRACTORS
§ 5.1 DEFINITIONS
§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term “Subcontractor” is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term “Subcontractor” does not include a separate contractor or subcontractors of a separate contractor.
§ 5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term “Sub-subcontractor” is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

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

§ 5.2.1 Unless otherwise stated in the Contract Documents or the bidding requirements, Bidders, within two days of request from the Architect, shall furnish in writing to the Owner through the Architect the names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for each principal portion of the Work. The list shall include complete names, addresses, and contact information. The Architect may reply within 14 days to the Bidder in writing stating (1) whether the Owner or the Architect has reasonable objection to any such proposed person or entity or (2) that the Architect requires additional time for review. Failure of the Owner or Architect to reply within the 14 day period shall constitute notice of no reasonable objection.

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

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

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

§ 5.3 SUBCONTRACTUAL RELATIONS

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

§ 5.4 CONTINGENT ASSIGNMENT OF SUBCONTRACTS

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

.1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor in writing; and

.2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.
When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor’s rights and obligations under the subcontract.

§ 5.4.2 Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor’s compensation shall be equitably adjusted for increases in cost resulting from the suspension.

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

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

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

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

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

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

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

§ 6.2 MUTUAL RESPONSIBILITY

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

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

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

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

§ 6.2.5 The Owner and each separate contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.
§ 6.3 OWNER'S RIGHT TO CLEAN UP
If a dispute arises among the Contractor, separate contractors and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Architect will allocate the cost among those responsible.

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

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

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

§ 7.1.4 The combined overhead and profit included in the total cost to the Owner for a change in the Work shall be based on the following schedule:

.1 For the Contractor, for Work performed by the Contractor's own forces, ten percent (10%) of the material and labor cost.
.2 For the Contractor, for Work performed by the Contractor's Subcontractors and/or Suppliers, five percent (5%) of the amount due the Subcontractor.
.3 For each Subcontractor involved, for Work performed by the Subcontractor's own forces ten percent (10%) of the cost.
.4 For each Subcontractor involved, for Work performed by the Subcontractor's Sub-subcontractors, five percent (5%) of the amount due the Sub-subcontractor.
.5 Cost to which overhead and profit is to be applied shall be determined in accordance with Section 7.3.7. Overhead and profit includes compensation to cover the cost of supervision, overhead, bond, profit and all other general expense. The fee shall not include depreciation of machinery and/or tools.
.6 In order to facilitate checking of quotations for extras or credits, all proposals, except those so minor that their propriety can be seen by inspection, shall be accompanied by a complete itemization of costs including labor, materials and Subcontracts. Labor and materials shall be itemized in the manner prescribed above. Where major cost items are Subcontracts, they shall be itemized also. In no case will a change involving over $500.00 be approved without such itemization.

§ 7.1.5 In the event that mutually agreed upon costs for labor and material changes are accepted and the associated costs are deducted from an established Construction Allowance, premiums for Bonds and Insurance shall be excluded.

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

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

§ 7.2.2 A Contractor's Request for Change Order shall be prepared in accordance with Article 7.3.3

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

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

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

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

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

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

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

§ 7.3.7 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the method and the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, an amount as outlined in Article 7.3.3. In such case, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.7 shall be itemized as follows:

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

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

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

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

§ 7.3.11 For Change Orders that result in a net deduct that are not signed by the Contractor, the Owner will hold funds equal to the deduct until signed.

§ 7.4 MINOR CHANGES IN THE WORK
The Architect has authority to order minor changes in the Work not involving adjustment in the Contract Sum or extension of the Contract Time and not inconsistent with the intent of the Contract Documents, with the consent of the Owner. Such changes will be effected by written order signed by the Architect and shall be binding on the Owner and Contractor.

ARTICLE 8   TIME
§ 8.1 DEFINITIONS
§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

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

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

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

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

.1 Timely performance is an express condition of the Contract, and any delay in the Contractor’s performance may excuse the Owner from his obligation to perform. Failure to abide by the time condition may be treated as a breach of contract.

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

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

§ 8.2.4 The Contractor shall furnish labor (including overtime), materials, equipment, temporary heated enclosures, and similar measures as required during construction to ensure work progresses in accordance with the established project schedule. If either the Owner or Architect deems the progress of the work has fallen substantially behind the established project schedule, the Contractor shall take such steps as necessary to expedite the work. Failure of the Contractor to progress the Work in accordance with the project schedule shall be grounds for the Owner to correct such deficiencies in accordance with Article 2.4.

§ 8.3 DELAYS AND EXTENSIONS OF TIME
§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by an act or neglect of the Owner or Architect, or of an employee of either, or of a separate contractor employed by the Owner; or by changes ordered in the Work; or by fire, unusual delay in deliveries, or unavoidable casualties; or by delay authorized by the Owner pending mediation and litigation; or by other causes that the Architect determines may
§ 8.3.1.1 The Contractor shall not be allowed to claim weather delays for those days the U.S. National Climatic Data Center (NCDC) reports as the average number of days per month of inclement weather for the closest reporting station to the Project Site. The Contractor shall take this number of days and the Project Schedule into account when preparing their bid proposal. Historical data for all areas may be obtained from the NCDC at: www.ncdc.noaa.gov. The Contractor shall include an NCDC report, including information at the time of bidding as well as when the delay occurred, with any delay Claim filed that is related to weather.

§ 8.3.1.2 The Contractor shall not be allowed to claim weather delays unless inclement weather affects a specific ‘critical path’ construction activity. The Contractor shall account for measures to accommodate inclement weather in their bid proposal as required to maintain the Project Schedule.

§ 8.3.1.3 Approved delay claims related to weather shall grant the Contractor an extension of the Contract Time only; no adjustments shall be made to the Contract Amount.

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

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

§ 8.3.4 If either the Owner or Architect deems the progress of the work has been delayed due to a failure to timely deliver materials, equipment, or labor, the Owner retains the right to deal directly with the delinquent suppliers and/or Subcontractors. The Contractor shall take such action as required to assist the Owner with facilitating a timely resolution of the delay, including, but not limited to, termination of delinquent orders and the issuance of replacement orders as selected by the Owner on behalf of the Contractor. Any expediting measures carried out by the Owner does not relieve the Contractor of their obligations. No additional costs will be approved by the Owner as a result of the Contractor’s suppliers or Subcontractors failure to meet their obligations.

§ 8.3.5 If any delay on the part of the Contractor, any subcontractor of sub-subcontractor, any one directly or indirectly employed by any of them, or anyone for whose acts any of them may be liable results in any claim by third parties against the Owner or the Architect arising out of such delay, the Contractor shall pay, satisfy, and discharge all losses, damages and expenses arising out of such claims, including attorney’s fees, and shall indemnify and hold harmless the Owner and the Architect and their agents and employees from and against all costs, fees, losses, damages and expenses arising out of such claims enforced against the Owner or the Architect.

ARTICLE 9 PAYMENTS AND COMPLETION

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

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

§ 9.3 APPLICATIONS FOR PAYMENT
§ 9.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2, for completed portions of the Work. Such application shall be notarized, and supported by such data substantiating the Contractor’s right to payment as the Owner or Architect may require, such as copies of requisitions from Subcontractors and material suppliers, and shall reflect retainage if provided for in the Contract Documents.
§ 9.3.1.1 As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Architect, but not yet included in Change Orders.

§ 9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or material supplier, unless such Work has been performed by others whom the Contractor intends to pay.

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner’s title to such materials and equipment or otherwise protect the Owner’s interest, and shall include the costs of applicable insurance, storage and transportation to the site for such materials and equipment stored off the site.

§ 9.3.2.1 Notify the Architect, in writing, prior to requesting payment for materials stored off-site. Notifications shall include the following:

1. A list of the fabricated materials consigned to the project (which shall be clearly identified), giving the place of storage, together with copies of invoices and reasons why materials cannot be delivered to the site;
2. Certification that all items have been tagged for delivery to the project and that they will not be used for any other purpose;
3. A letter from the bonding company indicating agreement to the arrangements and that payment to the contractor shall not relieve either party of their responsibility to complete the facility;
4. Evidence of adequate insurance covering the material in storage; and
5. Any costs incurred by the Architect to inspect material in off-site storage outside a 25 mile limit of the project site shall be paid by the Contractor.

§ 9.3.2.2 When partial payment is approved for material delivered to the site of the work or in the vicinity thereof or under the possession and control of the Contractor, but not yet incorporated therein, such material shall become the property of the Owner, but if such material is stolen, destroyed, or damaged by casualty before being used, the Contractor will be required to replace it at their own expense until those materials are properly incorporated into the Work.

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor’s knowledge, information and belief, be free and clear of liens, claims, security interests or encumbrances in favor of the Contractor, Subcontractors, material suppliers, or other persons or entities making a claim by reason of having provided labor, materials and equipment relating to the Work.

.1 The Contractor shall submit a Partial Lien Waiver on AIA Document G706 Application for Payment. Document G706 shall be modified so it applies to Progress Payments instead of Final Payments.

§ 9.3.4 Until the work is fifty percent (50%) complete, the Owner will pay ninety percent (90%) of the amount due to the contractor on account of progress payments. Thereafter, retainage may be reduced to five percent (5%). The Contractor must submit a Consent of Surety (AIA For G707A), authorizing the retainage to be reduced. The full contract retainage may be reinstated if the manner of completion of the work and its progress do not remain satisfactory or if the surety revokes its consent or for other good and sufficient reasons.

§ 9.4 CERTIFICATES FOR PAYMENT

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor’s Application for Payment, either issue to the Owner a Certificate for Payment, with a copy to the Contractor, for such amount as the Architect determines is properly due, or notify the Contractor and Owner in writing of the Architect’s reasons for withholding certification in whole or in part as provided in Section 9.5.1.
§ 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect’s evaluation of the Work and the data comprising the Application for Payment, that, to the best of the Architect’s knowledge, information and belief, the Work has progressed to the point indicated and that the quality of the Work is in accordance with the Contract Documents. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion and to specific qualifications expressed by the Architect. The issuance of a Certificate for Payment will further constitute a representation that the Contractor is entitled to payment in the amount certified. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work, (2) reviewed construction means, methods, techniques, sequences or procedures, (3) reviewed copies of requisitions received from Subcontractors and material suppliers and other data requested by the Owner to substantiate the Contractor’s right to payment, or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 9.5 DECISIONS TO WITHHOLD CERTIFICATION

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

1. defective Work not remedied;
2. third party claims filed or reasonable evidence indicating probable filing of such claims unless security acceptable to the Owner is provided by the Contractor;
3. failure of the Contractor to make payments properly to Subcontractors or for labor, materials or equipment;
4. reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
5. damage to the Owner or a separate contractor;
6. reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
7. repeated failure to carry out the Work in accordance with the Contract Documents.

§ 9.5.2 When the above reasons for withholding certification are removed, certification will be made for amounts previously withheld.

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

§ 9.6 PROGRESS PAYMENTS

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

§ 9.6.2 The Contractor shall pay each Subcontractor no later than seven days after receipt of payment from the Owner the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor’s portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.
§ 9.6.3 The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor.

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

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

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

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

§ 9.7 FAILURE OF PAYMENT
If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor’s Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents the amount certified by the Architect, then the Contractor may, upon seven additional days’ written notice to the Owner and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor’s reasonable costs of shut-down, delay and start-up, plus interest as provided for in the Contract Documents.

§ 9.8 SUBSTANTIAL COMPLETION
§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use.

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

§ 9.8.2.2 If, during the course of the Architect’s inspection, the Architect discovers that the Contractor’s list is deficient, or fails to include a substantial number of items requiring correction or completion, the Architect may stop their inspection and return the list to the Contractor with instructions to prepare a revised list accurately reflecting the actual conditions of the Work. Upon making such a discovery, the Architect shall have no further duty to inspect until a corrected list is received from the Contractor. Under such circumstances, the Contractor shall promptly prepare a corrected comprehensive list of items to be corrected or completed, or complete all deficient work not included on the Contractor’s list before requesting a re-inspection.

§ 9.8.3 Upon receipt of the Contractor’s list, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect’s inspection discloses any item, whether or not included on the Contractor’s list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.
§ 9.8.4 When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion, shall establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance, and shall fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in such Certificate. Upon such acceptance and consent of surety, if any, the Owner shall make payment of retainage applying to such Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

§ 9.9 PARTIAL OCCUPANCY OR USE

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

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

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

§ 9.10 FINAL COMPLETION AND FINAL PAYMENT

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

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner’s property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect and will not be canceled or allowed to expire until at least 30 days’ prior written notice has been given to the Owner, (3) a written statement that the Contractor knows of no substantial reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment and (5), if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts, releases and waivers of liens, claims, security interests or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien. If such lien remains unsatisfied after
§ 9.10.2.1 The Contractor shall furnish such evidence as may be necessary to show that any out-of-state subcontractor or supplier has fully met the requirements of payment of taxes as established in any law of the State or local subdivision thereof which may be in effect at the time of final payment. The Owner will require the submission of such proof or evidence before final payment will be approved or made.

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

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

1. liens, Claims, security interests or encumbrances arising out of the Contract and unsettled;
2. failure of the Work to comply with the requirements of the Contract Documents; or
3. terms of special warranties required by the Contract Documents.

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

§ 9.10.6 Final Payment, including all escrowed principal and escrowed income, shall be due within sixty-one (61) days following the Date of Final Completion, as defined above. If at that time there are any remaining uncompleted minor items, an amount equal to 200% of the value of each item as determined by Architect shall be withheld until said item or items are completed. The cost of the review estimate and other efforts necessary to establish the value of the incomplete work will be deducted from the remaining funds owed to the Contractor.

1. Actions against a surety on a performance bond must be brought within one (1) year after the date of the board's final settlement with the contractor.

§ 9.11 Operation and Maintenance manual completion is a prerequisite for reduction of retainage when the contract is 90% complete. Exceptions may granted for balancing reports and certain warranties which are to be supplied within 30 days of Substantial Completion.

§ 9.12 The Contractor and the Contractor’s surety, if any, shall be liable for and shall pay the Owner all sums incurred and attributable to remedial action performed by the Owner under Article 2.4 to complete the Work.

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 SAFETY PRECAUTIONS AND PROGRAMS
The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the performance of the Contract.

§ 10.1.1 Each Contractor is responsible for coordination and implementation of their safety program within the safety and health standards for construction as set forth in the Federal Register publication for the Occupational Safety and Health Administration (OSHA), Department of Labor, titled Bureau of Labor Standards “Safety and Health Regulations for Construction”, and any state or local regulations or codes governing or providing for the safety and health of employees and the general public. This includes all OSHA safety requirements for the specific type of work or condition built by the Contractor. All Contractors shall perform their own safety inspections.
§ 10.2 SAFETY OF PERSONS AND PROPERTY

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

.1 employees on the Work and other persons who may be affected thereby;
.2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody or control of the Contractor or the Contractor’s Subcontractors or Sub-subcontractors; and
.3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.
.4 All work, materials, apparatus and fixtures, which may be affected by weather (rain, winds, storms, frost and heat).
.5 Excessive wind forces. At all times during the construction and/or erection of the project and/or its component parts, each Contractor shall provide, install and maintain properly designed and constructed temporary bracing of adequate strength to prevent dislocation, distorting, cracking, failing of, or any other damage to their work on the project and/or its component parts.

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

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

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

§ 10.2.4.1 Obtain approval of the Owner, in writing, for each specific occurrence prior to use or storage.

§ 10.2.4.2 The Contractor shall have their Hazard Communication Program in effect with all personnel working on the project. All Material Safety Data Sheets shall be maintained and current as required by law.

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Section 10.2.1 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Section 10.2.1, except damage or loss attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor’s obligations under Section 3.18.

§ 10.2.5.1 Should the Contractor fail to remedy all damage or loss (other than damage or loss insured under Paragraph 11.3) to property referenced in Provision 10.2.5 within two days of notice, the Owner shall have the right to remedy the situation; the cost thereof will be deducted from the Contractor’s contract.

§ 10.2.6 The Contractor shall designate a responsible member of the Contractor’s organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor’s superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect.

§ 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.
§ 10.2.8 INJURY OR DAMAGE TO PERSON OR PROPERTY

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

§ 10.3 HAZARDOUS MATERIALS

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

§ 10.3.3 Not Used.

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

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

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

§ 10.4 EMERGENCIES

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

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 CONTRACTOR’S LIABILITY INSURANCE

§ 11.1.1 The Contractor shall purchase from and maintain in a company or companies with ratings of no less than A as determined by A.M. Best Company licensed to do business in the state where the project is located and to which the Owner has no reasonable objection, such insurance as will protect the Contractor from claims set forth below which may arise out of or result from the Contractor’s operations and completed operations under the Contract and for which the Contractor may be legally liable, whether such operations be by the Contractor or by a Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

1. Claims under workers’ compensation, disability benefit and other similar employee benefit acts that are applicable to the Work to be performed including private entities work at the site and exempt from the coverage on account of number of employees or occupation, which entities shall maintain voluntary compensation at the same limits specified for mandatory coverage for the duration of the project;

2. Claims for damages because of bodily injury, occupational sickness or disease, or death of the Contractor’s employees or persons or entities excluded by statute from the requirements of Clause 11.1.1.1, but required by the Contract Documents to provide the insurance required by the Clause;

3. Claims for damages because of bodily injury, sickness or disease, or death of any person other than the Contractor’s employees;

4. Claims for damages insured by usual personal injury liability coverage;

5. Claims for damages, other than to the Work itself, because of injury to or destruction of tangible property, including loss of use resulting therefrom;

6. Claims for damages because of bodily injury, death of a person or property damage arising out of ownership, maintenance or use of a motor vehicle;
Claims for bodily injury or property damage arising out of completed operations; and
Claims involving contractual liability insurance applicable to the Contractor’s obligations under Section 3.18.

§ 11.1.2 Insurance shall be in accordance with section 10.3 – Insurance Requirements of the Instructions to Bidders.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 UNCOVERING OF WORK

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

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

§ 12.2 CORRECTION OF WORK

§ 12.2.1 BEFORE OR AFTER SUBSTANTIAL COMPLETION

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

§ 12.2.2 AFTER SUBSTANTIAL COMPLETION

§ 12.2.2.1 In addition to the Contractor’s obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of an applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of written notice from the Owner to do so unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the two (2) year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.4.

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

§ 12.2.2.3 The two (2) year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.

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

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

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

§ 12.2.6 If any Subcontractor chooses to use any system, equipment, facilities, or services which have been installed into
the building as a permanent part thereof by any other Contractor, said Contractor shall assume full responsibility for
damage to said system, equipment, facilities, or services and shall make such arrangements with the installing
Subcontractor as are necessary, so that in no case the performance for the period mentioned above shall be jeopardized as
a result of such use; and said use can be implemented only after written approval is given by the Architect.

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

ARTICLE 13 MISCELLANEOUS PROVISIONS
§ 13.1 GOVERNING LAW
The Contract shall be governed by the law of the place where the Project is located except that, if the parties have
selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section
15.4.

§ 13.2 SUCCESSORS AND ASSIGNS
§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns and legal
representatives to covenants, agreements and obligations contained in the Contract Documents. The Contractor shall
not assign the Contract or sublet it as a whole without the written consent of the Owner. Owner may assign, in
whole or in part, the Contract without written consent of the Contractor.

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

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

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

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

§ 13.5 TESTS AND INSPECTIONS
§ 13.5.1 Tests, inspections and approvals of portions of the Work shall be made as required by the Contract
Documents and by applicable laws, statutes, ordinances, codes, rules and regulations or lawful orders of public
authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections and
approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public
authority, and shall bear all related costs of tests, inspections and approvals. The Contract of the Architect
shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such
procedures. The Owner shall bear costs of (1) tests, inspections or approvals that do not become requirements until
after bids are received or negotiations concluded, and (2) tests, inspections or approvals where building codes or
applicable laws or regulations prohibit the Owner from delegating their cost to the Contractor.
§ 13.5.2 If the Architect, Owner or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection or approval not included under Section 13.5.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection or approval by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.5.3, shall be at the Owner’s expense.

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

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

§ 13.6 INTEREST
 Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at such rate as the parties may agree upon in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

§ 13.7 TIME LIMITS ON CLAIMS
 The Owner and Contractor shall commence all claims and causes of action, whether in contract, tort, breach of warranty or otherwise, against the other arising out of or related to the Contract in accordance with the requirements of the final dispute resolution method selected in the Agreement within the time period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all claims and causes of action not commenced in accordance with this Section 13.7. All applicable lien laws in the State of Michigan shall apply.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT
§ 14.1 TERMINATION BY THE CONTRACTOR
§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, for any of the following reasons:
   .1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;
   .2 An act of government, such as a declaration of national emergency that requires all Work to be stopped;
   .3 Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or
   .4 The Owner has failed to furnish to the Contractor promptly, upon the Contractor’s request, reasonable evidence as required by Section 2.2.1.

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, repeated suspensions, delays or interruptions of the entire Work by the Owner as described in Section 14.3 constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days’ written notice to the Owner and Architect, terminate the Contract.

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor or a Subcontractor or their agents or employees or any other persons performing portions of the Work under contract with the Contractor because the Owner has repeatedly failed to fulfill the Owner’s obligations under the Contract

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Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days’ written notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

§ 14.2 TERMINATION BY THE OWNER FOR CAUSE
§ 14.2.1 The Owner may terminate the Contract if the Contractor
.1 repeatedly resists or fails to supply enough properly skilled workers or proper materials;
.2 fails to make payment to Subcontractors for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractors;
.3 repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or
.4 otherwise is guilty of substantial breach of a provision of the Contract Documents.

§ 14.2.2 When any of the above reasons exist, the Owner, upon certification by the Initial Decision Maker that sufficient cause exists to justify such action, may without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor’s surety, if any, seven days’ written notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:
.1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;
.2 Accept assignment of subcontracts pursuant to Section 5.4; and
.3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

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

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, the escrowed principal and escrowed income paid (if applicable) to the Owner pursuant to subparagraph 14.2.1 and including compensation for the Architect’s services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.

§ 14.2.5 The Owner shall have the right at anytime to terminate the contract if such termination is in the public interest. In such case, the Owner’s liability to the Contractor will be limited to payment of work completed, and reasonable charges for return and restocking of materials purchased, but not incorporated into the work.

§ 14.2.6 In the event the Owner so terminates the Contract, the Owner shall be entitled to a distribution of the escrowed principal and escrowed income pursuant to the terms of the escrow agreement.

§ 14.3 SUSPENSION BY THE OWNER FOR CONVENIENCE
§ 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work in whole or in part for such period of time as the Owner may determine.

§ 14.3.2 The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay or interruption as described in Section 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent
.1 that performance is, was or would have been so suspended, delayed or interrupted by another cause for which the Contractor is responsible; or
.2 that an equitable adjustment is made or denied under another provision of the Contract.

§ 14.4 TERMINATION BY THE OWNER FOR CONVENIENCE
§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner’s convenience and without cause.
§ 14.4.2 Upon receipt of written notice from the Owner of such termination for the Owner’s convenience, the Contractor shall

1. cease operations as directed by the Owner in the notice;
2. take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and
3. except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.4.3 In case of such termination for the Owner’s convenience, the Contractor shall be entitled to receive payment for Work executed, and costs incurred by reason of such termination, along with reasonable overhead and profit on the Work not executed.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 CLAIMS

§ 15.1.1 DEFINITION

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

§ 15.1.2 NOTICE OF CLAIMS

Claims by either the Owner or Contractor must be initiated by written notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party must be initiated within 10 days after occurrence of the event giving rise to such Claim or within 10 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later. In the case of continuing delay, the claim along with estimated associated costs must be updated weekly and submitted to the Architect for the duration of the delay.

§ 15.1.3 CONTINUING CONTRACT PERFORMANCE

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

§ 15.1.4 CLAIMS FOR ADDITIONAL COST

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

§ 15.1.5 CLAIMS FOR ADDITIONAL TIME

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

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

§ 15.1.6 CLAIMS FOR CONSEQUENTIAL DAMAGES

The Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes

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

This mutual waiver is applicable, without limitation, to all consequential damages due to either party’s termination in accordance with Article 14. Nothing contained in this Section 15.1.6 shall be deemed to preclude an award of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.2 INITIAL DECISION
§ 15.2.1 Claims, excluding those arising under Sections 10.3, 10.4, 11.3.9, and 11.3.10, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim arising prior to the date final payment is due, unless 30 days have passed after the Claim has been referred to the Initial Decision Maker with no decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

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

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

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

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

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

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

§ 15.2.7 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor’s default, the Owner may, but is not obligated to, notify the surety and request the surety’s assistance in resolving the controversy.

§ 15.2.8 If a Claim relates to or is the subject of a mechanic’s lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.
§ 15.3 MEDIATION
§ 15.3.1 Any claim arising out of or related to the Contract shall be first submitted to non-binding mediation unless the parties mutually agree otherwise. The parties further agree to include a similar mediation provision in all agreements with independent contractors and consultants retained for the Work and to require all independent contractors and consultants to likewise include a similar mediation provision in all agreements with subcontractors, sub-consultants, suppliers and fabricators so retained, thereby providing for mediation as the primary method for dispute resolution between the parties to those Agreements. After non-binding mediation, the parties may proceed to arbitration as the secondary method for dispute resolution.

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

§ 15.4.4.2 Either party, at its sole discretion, may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in litigation, provided that the party sought to be joined consents in writing to such joinder. Consent to litigation involving an additional person or entity shall not constitute consent to litigation of any claim, dispute or other matter in question not described in the written consent.

§ 15.4.4.3 The Owner and Contractor grant to any person or entity made a party to litigation conducted under this Section 15.4, whether by joinder or consolidation, the same rights of joinder and consolidation as the Owner and Contractor under this Agreement.

END OF GENERAL CONDITIONS
SECTION 01 10 00 – SUMMARY OF WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Work covered by the Contract Documents.
2. Type of Contract.
3. Use of premises.
4. Work restrictions.
5. Specification formats and conventions.
6. Examination of Site.
8. Field Measurements.
9. Project Coordination.
10. Layout the Work.
11. Errors and Omissions.
12. Contractor’s Acknowledgement.

1.3 WORK COVERED BY CONTRACT DOCUMENTS

A. Project Identification:

Ingham County
Mechanical Improvements


1. All project correspondence shall be directed to the attention of the following:
   a. Mr. Scott D. Laubenthal, Assoc. AIA, LEED AP – Project Manager

C. Summary of Work. Briefly and without force and effect upon the Contract Documents, the Work of the Contractor can be summarized as follows:

1. Project scope includes, but is not limited to, replacement of boilers, pumps, air handling units, and appurtenances in three buildings – Human Services, Youth Center, and Forest Community Health Center. Replacements involve demolition of existing systems, and the supply and installation of new equipment, piping, pumps, insulation, piping identification, and interface with existing building HVAC controls.

SCOPE OF WORK - GENERAL

Human Services Building
1. Replacement of two 500 MBH natural gas-fired non-condensing boilers with two 500
MBH condensing boilers.

2. Replacement of two primary boiler circulation pumps and two 1.5 hp secondary heating pumps with like pumps.

3. Retrofit and additions to existing building controls to accommodate the new equipment.

Youth Center

1. Replacement of two 1000 MBH natural gas-fired non-condensing fire tube boilers with two 1000 MBH condensing boilers.

2. Replacement of two primary boiler circulation pumps and two 3 hp secondary heating pumps with like pumps.

3. Retrofit and additions to existing building controls to accommodate the new equipment.

Forest Community Health Center

1. Replacement of two 24-Ton cooling only rooftop air handling units (Trane) with like units.

2. Retrofit and additions to existing building curbs, ductwork, piping, and controls to accommodate the new equipment.

3. Bid Alternate:
   a. No.1 – Existing Air Handler No.9 (Trane Model No. TCD090B400AB) (Serial No. N/A) Remove existing AHU. Retain power, duct, and control connections for reuse. Provide curb adapter as required. Contractor to field verify capacity and configuration.
   b. No.2 – Existing Air Handler No.7 (Trane Model No. TCD090B400AB) (Serial No. E08144910D) Remove existing AHU. Retain power, duct, and control connections for reuse. Provide curb adapter as required. Contractor to field verify capacity and configuration.

D. The Project as defined above will be constructed under a single-prime lump sum contract.

1.4 USE OF PREMISES

A. Contractor shall limit work activities and access to the portions of the building and site as required to perform work as defined within the limits of construction.

B. Use of Site: Limit use of premises to work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.

1.5 WORK RESTRICTIONS

A. On-Site Work Hours: Work shall generally be performed at the project site during normal business working hours of 7:00 a.m. to 5:00 p.m., Monday through Friday.

1. Contractor shall notify the facility security personnel or designated County staff upon daily arrival and departure while performing work at the Courthouse.

B. Existing Utility Interruptions: Do not interrupt utilities serving facility.
1.6 INTENT OF THE SPECIFICATIONS

A. The intent of these specifications is to describe the material and methods of construction required for the performance of the work. In general, it is intended that the drawings shall delineate the detailed extent of the work. When there is a discrepancy between drawings, referenced specifications, and standards and this specification, this specification shall govern.

1.7 SPECIFICATION FORMATS AND CONVENTIONS

A. Specification Format: The Specifications are organized into Divisions and Sections using the 33-division format and CSI/CSC's "MasterFormat" numbering system.

1. Section Identification: The Specifications use Section numbers and titles to help cross-referencing in the Contract Documents. Sections in the Project Manual are in numeric sequence; however, the sequence is incomplete because all available Section numbers are not used. Consult the Table of Contents at the beginning of the Project Manual to determine numbers and names of Sections in the Contract Documents.

2. Division 01: Sections in Division 01 govern the execution of the Work of all Sections in the Specifications.

1.8 EXAMINATION OF SITE

A. The Contractor is held to have examined the site and to have compared it with the Contract Drawings and Specifications and to have satisfied himself as to the conditions and intent of work to be done before the delivery of his Bid. No use of the allowance on this project may be subsequently made, on behalf of the Contractor by reason of any error or oversight on his part or lack of coordination.

1.9 GRADES, LINES, LEVELS AND DIMENSIONS

A. The Contractor shall verify all lines, levels, and dimensions indicated on the Drawings, under his work and must report all inconsistencies before commencing work.

B. The Contractor shall coordinate the layout of the work.

C. As soon as practicable, the Contractor shall verify the layout. All Work that is not correctly located, relocate or alter to conform to the Contract Drawings as directed by the Architect.

D. Areas of work are approximated based on field takeoffs and are intended for bidding purposes only. The Contractor is required to confirm the areas indicated for improvement to determine the actual areas of improvement to meet the intent of the Contract Documents. As areas of work are approximated, all work varying from the areas indicated is incidental to the work performed and shall be included within the Contractors base bid.

1.10 FIELD MEASUREMENTS
A. The Contractor shall obtain their own lines and grades and assume all responsibility for their accuracy. They must reconcile all measurements and conditions on the site of the proposed work.

1.11 PROJECT COORDINATION

A. The Contractor and subcontractors have full responsibility to coordinate and expedite all phases of the Work. Contractor shall provide sufficient notice of his work schedule to allow his/her subcontractors ample time to install their Work.

1.12 LAY OUT THE WORK

A. Thoroughly examine the Contract Drawings and Specifications carefully checking the figured dimensions before commencing work and report to the Architect if any error, discrepancy or defect appears. Unless otherwise directed by the Architect, the location and arrangement of the various parts of the installations must be as indicated on the Contract Drawings. Contractor shall be responsible to make any changes necessary to pass immovable obstructions without additional cost to the Owner.

B. Under no circumstances is any size to be decreased or any radical changes to be made in any part of the installation without the written consent of the Architect.

1.13 PROTECTION

A. The contractor shall use every available precaution to provide for the safety of the property owner, visitors to the site, and all connected with the work under the Contract.

B. All existing facilities both above and below ground shall be protected and maintained free of damage. Existing facilities shall remain operating during the period of construction unless otherwise permitted. All access roadways must remain open to traffic unless otherwise permitted.

C. Barricades shall be erected to fence off all construction areas from operations personnel.

D. Safety Requirements:

1. All application, material handling, and associated equipment shall conform to and be operated in conformance with OSHA safety requirements.

2. Comply with federal, state, and local and owner fire and safety requirements.

3. Advise owner whenever work is expected to be hazardous to owner employees and/or operations.

4. ALL SAFETY REQUIREMENTS OF THE BUILDING OWNER MUST BE FOLLOWED. NO EXCEPTIONS WILL BE PERMITTED. SAFETY ORIENTATION MEETING REQUIRED PRIOR TO PERFORMING ANY WORK.
1.14 HOUSEKEEPING

A. Keep materials neat and orderly.

B. Remove scrap, waste and debris from the project area.

C. Maintenance of clean conditions while work is in progress and cleanup when work is completed shall be in strict accordance with the “General Conditions” of this contract.

D. Follow all requirements established by the building owner.

1.15 ERRORS AND OMISSIONS

A. The Specifications, Contract Drawings, and directions furnished by the Architect are intended to cooperate and agree. If any discrepancies or variations appear between any of the Drawings or Specifications, such discrepancies are to be interpreted by the Architect. The Architect has the right to correct any errors or omissions in the work as necessary for proper fulfillment of their intentions for the Work.

1. Contractor shall not assume that any item takes precedence over any other item.

B. Anything shown on the Contract Drawings and not mentioned in the Specifications, or vice-versa, must be furnished by the Contractor without extra compensation.

1.16 CONTRACTOR’S ACKNOWLEDGMENT

A. The Contractor acknowledges upon submittal of a Bid:

1. That he understands the Contract Drawings and Specifications.

2. That he has the equipment, technical ability, personnel and facilities to construct the Project in accordance with the Contract Drawings and Specifications.

3. That he has examined the Contract Drawings and Specifications and has found them sufficiently complete to prepare a sound bid for the construction of the facilities contemplated.

4. That he has personally inspected the project site and verified information indicated.

5. That everything is included within their bid to provide a fully operational system that will meet applicable code requirements and Owner’s expectations.

6. Owner maintains final determination whether the project is acceptable and approvable for substantial completion.
PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 01 10 00
SECTION 01 26 00 – CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Request for pricing.

B. Documentation of change in Contract Sum and Contract Time.

C. Change procedures.

D. Stipulated Sum change order.

E. Time and material change order.

F. Execution of change orders.

G. Correlation of Contractor submittals.

1.2 RELATED DOCUMENTS

A. General Conditions: Governing requirements for changes in the work, in contract sum, and contract time.

B. Section 00 72 13 - General Conditions-Stipulated Sum (Single-Prime Contract)

C. Section 01 29 00 – Payment Procedures

D. Section 01 60 00 – Product Requirements

E. Section 01 77 00 – Closeout Procedures

1.3 DOCUMENTATION OF CHANGE IN CONTRACT SUM AND CONTRACT TIME

A. Maintain detailed records of work done on a time and material basis. Provide full information required for evaluation of proposed changes, and to substantiate costs of changes in the work.

B. Document each lump sum quotation for a change in cost or time with sufficient data to allow evaluation of the quotation. Include material and labor unit cost and quantities.

C. Provide additional data to support computations:

1. Quantities of products, labor, and equipment.
2. Overhead and profit.
3. Justification for any change in contract time.
4. Credit for deletions from contract, similarly documented.
D. Support each claim for additional costs prior to work being done. Provide origin and date of each claim.

1.4 CHANGE PROCEDURES

A. The Architect will advise of minor changes or clarifications in the work that may or may not involve an adjustment to contract sum or contract time as authorized by AIA A201, 1992 Edition, by issuing Architect’s Supplemental Instructions on AIA Form G710. Contractor will prepare and submit an estimate within fourteen (14) days.

B. The Architect may issue a Proposal Request which includes a detailed description of a proposed change with supplementary or revised drawings and specifications, a change in contract time for executing the change and the period of time during which the requested price will be considered valid. Contractor will prepare and submit an estimate within fourteen (14) days.

1. Refer to Proposal Worksheet Detail, Exhibit 01 2 6 00 A1, and Proposal Worksheet Summary, Exhibit 01 26 00 A2.

1.5 CHANGE DIRECTIVE

A. Construction Change Directive: When the Owner and the Contractor disagree on the terms of a Proposal Request, the Architect may issue a Construction Change Directive on AIA Form G714. The Construction Change Directive instructs the Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

1. The Construction Change Directive contains a complete description of the change in the Work. It also designates the method to be followed to determine change in the Contract Sum or Contract Time.

2. Change Directives are used on emergency items.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.

1. After completion of the change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

C. Promptly execute the change in work.

1.6 PROPOSAL REQUESTS

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

1. Proposal requests issued by the Architect are for information only. Do not consider them as an instruction either to stop work in progress or to execute the proposed change.

2. Within fourteen (14) days of receipt of a proposal request, submit an estimate of cost necessary to execute the change to the Architect for the Owner's review.
a. Include a list of quantities of products required and unit costs, with the total amount of purchases to be made. Where requested, furnish survey data to substantiate quantities.
b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
c. Include a statement indicating the effect the proposed change in the Work will have on the Contract Time.

B. Contractor-Initiated Proposals: When latent or unforeseen conditions require modifications to the Contract, the Contractor may propose changes by submitting a request for a change to the Architect.
   1. Include a statement outlining the reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and Contract Time.
   2. Include a list of quantities of products required and unit costs, with the total amount of purchases to be made. Where requested, furnish survey data to substantiate quantities.
   3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
   4. Refer to Proposal Worksheet Detail, Exhibit 01 26 00 A1, and Proposal Worksheet Summary, Exhibit 01 26 00 A2.

1.7 STIPULATED SUM CHANGE ORDER (CO)
   A. A Change Order will be issued based upon the Contractor's estimated price quotation as recommended by the Architect and approved by the Owner.

1.8 TIME AND MATERIAL CHANGE ORDER (CO)
   A. Submit itemized account and supporting data after completion of change within (15) days after completion.
   B. The Architect will determine the change allowable in contract sum and contract time as provided in the contract documents.
   C. Maintain detailed records of work done on Time and Material basis. The Contractor’s on-site representative must verify and sign the contractor's daily timesheets, not as approval for payment, but for record that work was completed per the change order.
   D. Provide full information required for evaluation of proposed changes and to substantiate costs for changes in the work.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 EXECUTION OF CHANGE ORDERS
A. Execution of Change Orders: Architect will prepare and issue Change Orders for signatures of parties. Owner, Architect, Contractor, shall sign all change orders.

3.2 CORRELATION OF CONTRACTOR SUBMITTALS

A. Promptly revise Schedule of Values and Application for Payment forms to record each authorized change order as a separate line item and adjust the contract sum.

B. Promptly revise progress schedules to reflect any change in contract time, revise sub-schedules to adjust time for other items of work affected by the change, and resubmit.

C. Promptly enters changes in project record documents.

END OF SECTION 01 26 00
SECTION 01 26 13 – REQUEST FOR INTERPRETATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements governing requests for interpretation.

1.3 DOCUMENTATION OF REQUESTS FOR INTERPRETATION

A. Contractor shall provide written requests for interpretation utilizing Request For Information form, refer to Exhibit 01 26 13A.

B. Provide full information required for Architect’s review and evaluation of conditions.

C. Provide additional supportive information to clearly identify conditions.

1.4 RESPONSE TO REQUESTS FOR INTERPRETATION

A. The Architect will advise of minor changes or clarifications in the work that may or may not involve an adjustment to contract sum or contract time as authorized by AIA A201, 1992 Edition, by issuing Architect’s Supplemental Instructions on AIA Form G710.

B. The Architect may issue a Proposal Request which includes a detailed description of a proposed change with supplementary or revised drawings and specifications, a change in contract time for executing the change and the period of time during which the requested price will be considered valid.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01 26 13
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SECTION 01 29 00 – PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements governing the Contractor's Applications for Payment.

B. Related Sections: The following Sections contain requirements that relate to this Section.

1. Schedules: The Contractor's Construction Schedule and Submittal Schedule are specified in Division 01 Section “Submittal Procedures”.

C. Sequence of Approval

1. The Architect shall review, and, if acceptable, certify the application.
2. The Owner will review, and, if acceptable, will approve the application.

1.3 APPLICATIONS FOR PAYMENT

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

1. The initial Application for Payment, the Application for Payment at time of Substantial Completion, and the final Application for Payment involve additional requirements.

B. Payment-Application Times: The date for each progress payment is the first day of each month. The period covered by each Application for Payment starts on the day following the end of the preceding period and ends on the last day of the month for each progress payment.

1. Submit to the Architect a draft of Payment Applications no less than ten (10) days prior to each Payment Application.

C. Transmittal: Upon receipt of an approved draft, submit three (3) signed and notarized copies of each Application for Payment to the Architect by a method ensuring receipt within 24 hours. One billing shall be made on original AIA G702 & G703 forms dated 1992, including waivers of lien and similar attachments. The other two (2) may be copies, but with wet signatures and notarized

1. Transmit each copy with a transmittal form listing attachments and recording appropriate information related to the application, in a manner acceptable to the Architect.

for Payment, refer to Exhibit 01 29 00A.

E. Application Preparation: Complete every entry on the form. Include notarization and execution by a person authorized to sign legal documents on behalf of the Contractor. The Architect will return incomplete applications without action.

1. Entries shall match data on the Schedule of Values and the Contractor's Construction Schedule. Use updated schedules if revisions were made.
2. Include amounts of fully executed Change Orders issued prior to the last day of the construction period covered by the application.
3. Submit a statement of any schedule impact for review by the Architect with every payment application.
4. Submit a copy of Contractor’s Daily Reports which coincide with the payment application period.

F. Waivers of Mechanics Lien: With each Application for Payment, submit waivers of mechanics liens from subcontractors, sub-subcontractors and suppliers for the construction period covered by the previous application, for line items whose value exceeds $5,000; refer to Exhibit 01 29 00B.

1. Submit partial waivers on each item for the amount requested, prior to deduction for retainage, on each item.
2. When an application shows completion of an item, submit final or full waivers.
3. The Owner reserves the right to designate which entities involved in the Work must submit waivers.
4. Waiver Delays: Submit each Application for Payment with the Contractor's waiver of mechanics lien for the period of construction covered by the application.
   a. Submit final Applications for Payment with or preceded by final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
5. Waiver Forms: Submit waivers of lien on forms, and executed in a manner, acceptable to the Owner.

G. Initial Application for Payment: Administrative actions and submittals, that must precede or coincide with submittal of the first Application for Payment, include the following:

1. List of subcontractors.
2. List of principal suppliers and fabricators.
3. Contractor's Construction Schedule (preliminary if not final).
4. Submittal Schedule (preliminary if not final).
5. Copies of building permits.
6. Certificates of insurance and insurance policies.
7. Performance and payment bonds.

H. Application for Payment at Substantial Completion: Following issuance of the Certificate of Substantial Completion, submit an Application for Payment.

1. This application shall reflect Certificates of Partial Substantial Completion issued previously.
for Owner occupancy of designated portions of the Work.

2. Administrative actions and submittals that shall precede or coincide with this application include:
   a. Warranties (guarantees) and maintenance agreements.
   b. Maintenance instructions.
   c. Final cleaning.
   d. Application for reduction of retainage and consent of surety.
   e. List of incomplete Work, recognized as exceptions to Architect's Certificate of Substantial Completion.
   f. Spare Maintenance Parts and Extra Materials are delivered to Owner.

I. Final Payment Application: Administrative actions and submittals that must precede or coincide with submittal of the final Application for Payment include the following: refer to AIA Document G707.

1. Completion of Project closeout requirements including all Record Documents and Manuals.
2. Completion of items specified for completion after Substantial Completion.
3. Ensure that unsettled claims will be settled.
4. Ensure that incomplete Work is not accepted and will be completed without undue delay.
5. Transmittal of required Project construction records to the Owner.
6. Proof that taxes, fees, and similar obligations were paid.
7. Removal of temporary facilities and services.
8. Removal of surplus materials, rubbish, and similar elements.
9. Obtain Consent of Surety to Final Payment; Refer to AIA G707, Exhibit 01 29 00C.
10. Obtain Consent of Surety to Reduction of Retainage; Refer to AIA G707A, Exhibit 01 29 00D.

1.4 SCHEDULE OF VALUES

A. Coordination Contractor shall coordinate preparation of its Schedule of Values for its part of the Work with preparation of the Contractors' Construction Schedule.

1. Correlate line items in the Schedule of Values with other required administrative schedules and forms, including:
   a. Contractor's Construction Schedule.
   b. Application for Payment forms, including Continuation Sheets.
   c. List of subcontractors.
   d. Schedule of alternates.
   e. List of products.
   f. List of principal suppliers and fabricators.
   g. Schedule of submittals.

2. Submit the Schedule of Values to the Architect at the earliest possible date, but no later than ten (10) days after contract award.
   a. A proposed Schedule of Values shall be submitted to the Architect within twenty-four (24) hours of the Bid Date. Refer to instructions to Bidders.

3. Subschedules: Where Work is separated into phases requiring separately phased payments, provide subschedules showing values correlated with each phase of payment.
B. Format and Content: Use the Project Manual table of contents as a guide to establish the format for the Schedule of Values. Provide at least one line item for each Specification Section per each work area unit.

1. Identification: Include the following Project identification on the Schedule of Values:
   a. Project name and location.
   b. Name of the Architect.
   c. Project number.
   d. Contractor's name and address.
   e. Date of submittal.

2. Arrange the Schedule of Values in tabular form with separate columns to indicate the following for each item listed:
   a. Related Specification Section or Division.
   b. Description of Work.
   c. Name of subcontractor.
   d. Name of manufacturer or fabricator.
   e. Name of supplier.
   f. Change Orders (numbers) that affect value.
   g. Each Allowance Adjustment.
   h. Dollar value.
      1) Percentage of Contract Sum to nearest one-hundredth percent, adjusted to total 100%.

3. Provide a breakdown of the Contract Sum in sufficient detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Break principal subcontract amounts down into several line items.

4. Round amounts to nearest whole dollar; the total shall equal the Contract Sum.

5. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment, purchased or fabricated and stored, but not yet installed.
   a. Differentiate between items stored on-site and items stored off-site. Include requirements for insurance and bonded warehousing, if required.

6. Provide separate line items on the Schedule of Values for initial cost of the materials, for each subsequent stage of completion, and for total installed value of that part of the Work.

7. Margins of Cost: Show line items for indirect costs and margins on actual costs only when such items are listed individually in Applications for Payment. Each item in the Schedule of Values and Applications for Payment shall be complete. Include the total cost and proportionate share of general overhead and profit margin for each item.
   a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the Schedule of Values or distributed as general overhead expense, at the Contractor's option.
8. Schedule Updating: Update and resubmit the Schedule of Values prior to the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

END OF SECTION 01 29 00
SECTION 01 31 00 – PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and supervisory requirements necessary for coordinating construction operations including, but not necessarily limited to, the following:

1. General project coordination procedures.
2. Cleaning and protection.
3. Supervisory personnel
4. Limitations for use of site
5. General installation provisions

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 01 Section 01 33 00 “Submittal Procedures” for preparing and submitting the Contractor's Construction Schedule.
2. Division 01 Section 01 60 00 "Product Requirements" for coordinating general installation.
3. Division 01 Section 01 77 00 "Closeout Procedures" for coordinating contract closeout.

1.3 COORDINATION

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

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

B. Where necessary, prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and attendance at meetings.

1. Prepare similar memoranda for the Owner and separate contractors where coordination of their work is required.
C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and assure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of schedules.
2. Installation and removal of temporary facilities.
3. Delivery and processing of submittals.
4. Progress meetings.
5. Project closeout activities.

D. Conservation: Coordinate construction operations to assure that operations are carried out with consideration given to conservation of energy, water, and materials.

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

E. The Contractor will manage construction of the project. The Architect will confirm compliance to Contract Documents.

F. Contractor shall schedule, manage, and expedite all work under his contract, coordinating his work with all other contractors and trades so that no conflicts of timing or location occur. The work shall progress according to the approved and current construction progress schedule.

G. Contractor shall:

1. Assume full responsibility for protection and safekeeping of products stored on premises.
2. Move any stored products which interfere with operations of Owner or other contractors.
3. Furnish, erect and maintain barricades, warning lights, signs and guards as may be required for his work.
4. Prepare coordination drawings where work by separate entities requires fabrication off-site of products and materials which must accurately interface. Coordination drawings shall indicate how work will interface and shall indicate installation sequence.
   a. Where coordination drawings cover primarily the work of one prime contractor, with only minor amounts of work required by other prime contractors, the prime contractor with the major amount of work shall prepare coordination drawings, as designated by the Architect.
   b. Where coordination drawings cover substantial amounts of work by more than one prime contractor, including the contractor for general work, the contractor for general work shall prepare coordination drawings, as designated by the Architect.

1.4 SUPERVISORY PERSONNEL

A. Contractor must designate a superintendent who shall represent the contractor on the jobsite. Directions given to the superintendent shall be as binding as if given to the contractor.

B. Once a superintendent is assigned to the project he cannot be removed or replaced without receiving the Architect and Owner’s approval.
C. The prime contractor and/or superintendent shall:

1. Man, schedule, and supervise the work to meet the current construction schedule.
2. Purchase and schedule delivery of materials and sublet subcontractors to meet the construction schedule.
3. Inspect the work of other contractors which precedes your work and upon which your work depends. Report to the Architect any deviations from the contract documents. Commencement of work on substrate constitutes acceptance of the other contractor's work.
4. Cooperate with other contractors doing work on this project.
5. Notify the Architect of conditions that could delay the work.
6. Furnish the Architect with a daily manpower report and description of work completed. Submit Contractor’s Daily Reports on a monthly basis.
5. Attend coordination and progress meetings as scheduled by Architect to review coordination of various phases of work. The Contractor shall be represented by persons with full authority to act on matters pertaining to the work.

D. Contractor’s site superintendent shall be present at the job site at all times during all on-site construction activities.

1.5 LIMITATIONS FOR USE OF SITE

A. General: Limitations on site usage as well as specific requirements that impact utilization are indicated on the site utilization drawings and by other Contract Documents.

B. Confine operations at site to areas permitted by law, ordinances, permits, and contract documents.

C. Reference site plans showing general boundaries for new construction phase and demolition/sitework phase.

D. Long term storage will not be allowed without prior approval from the Architect and Owner. Coordinate all installations with adjoining and related items of work. Check the scopes of work being provided by other contractors and their respective drawings, specifications and shop drawings for proper coordination of details. In the event of conflicting requirements, consult with the Architect prior to proceeding with the work.

E. All work force personnel shall visibly display identification as part of the workforce.

1.6 GENERAL INSTALLATION PROVISIONS

A. Inspection of Conditions: Require the installer of each major component to inspect both the substrate and conditions under which work is to be performed. Do not proceed until unsatisfactory conditions have been corrected in an acceptable manner.

B. Manufacturer's Instructions: Comply with manufacturer's installation instructions and recommendations, to the extent that those instructions and recommendations are more explicit or stringent than requirements contained in contract documents.

C. Inspect materials or equipment immediately upon delivery and again prior to installation. Reject
damaged and defective items.

D. Provide attachment and connection devices and methods necessary for securing Work. Secure work true to line and level. Allow for expansion and building movement.

E. Re-check measurements and dimensions before starting each installation.

F. **Mounting Heights:** Where mounting heights are not indicated, submit a Request for Information (RFI) to the Architect for direction.

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

1.7 SUBMITTALS

A. **Coordination Drawings:** Prepare coordination drawings where careful coordination is needed for installation of products and materials fabricated by separate entities. Prepare coordination drawings where limited space availability necessitates maximum utilization of space for efficient installation of different components.

   1. Show the relationship of components shown on separate Shop Drawings.
   2. Indicate required installation sequences.

B. **Staff Names:** Within ten (10) days of Notice to Proceed, submit a list of the Contractor's principal staff assignments, including the superintendent and other personnel in attendance at the Project Site. Identify individuals and their duties and responsibilities. List their cell phone numbers and email addresses.

   1. Include principal staff assignments of each major subcontractor.
   2. Post copies of the list in the Project meeting room, each temporary field office, and each temporary telephone.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 GENERAL COORDINATION PROVISIONS

A. **Inspection of Conditions:** Require the Installer of each major component to inspect both the substrate and conditions under which Work is to be performed. Do not proceed until unsatisfactory conditions have been corrected in an acceptable manner.

B. **Coordinate temporary enclosures with required inspections and tests to minimize the necessity of uncovering completed construction for that purpose.**

3.2 CLEANING AND PROTECTION
A. Clean and protect construction in progress and adjoining materials in place, during handling and installation. Apply protective covering where required to assure protection from damage or deterioration at Substantial Completion.

B. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period.

C. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period. Where applicable, such exposures include, but are not limited to, the following:

1. Excessive static or dynamic loading.
2. Excessive internal or external pressures.
3. Excessively high or low temperatures.
4. Thermal shock.
5. Excessively high or low humidity.
6. Air contamination or pollution.
7. Water or ice.
8. Solvents or Chemicals.
9. Sun Light or Radiation.
10. Punctures, Abrasions, or Heavy traffic.
11. Soiling, staining, and corrosion.
12. Unusual wear or other misuse.
13. Contact between incompatible materials.
15. Unprotected storage.
16. Improper shipping or handling.
17. Vandalism.

3.3 COMMUNICATION PROCEDURES

A. All correspondence must go through the Architect.

1. The Architect shall designate a single-point of contact for all correspondence.

B. In the event contract document clarification is required, Contractor to submit a ‘Request for Information’ (RFI) must be submitted to the Architect. See EXHIBIT ‘01 26 13A’.

1. Exhibit 01 26 13 A shall be made available in an electronic format (MSWORD) for Contractor’s use.

END OF SECTION 01 31 00
SECTION 01 33 00 – SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for submittal of Shop Drawings, Product Data, Samples, Construction Schedule and other miscellaneous quality-control submittals.

1. All submittals are to be provided to the Architect no later than fifteen (15) days after Notice to Proceed.

B. Product Data include, but are not limited to, the following:

1. Manufacturer's product specifications.
2. Manufacturer's installation instructions.
4. Catalog cuts.
5. Standard product operating and maintenance manuals.

C. Samples include, but are not limited to, the following:

1. Partial Sections of manufactured or fabricated components.
2. Small cuts or containers of materials.
3. Complete units of repetitively used materials.
4. Swatches showing color, texture, and pattern.
5. Color range sets.
   a. Color range sets shall include manufacturer’s full range of colors, unless otherwise noted.
6. Components used for independent inspection and testing.
7. Field samples.

D. Administrative Submittals: Refer to other Division 01 Sections and other Contract Documents for requirements for administrative submittals. Such submittals include, but are not limited to, the following:

1. Permits.
2. Applications for Payment.
4. Insurance Certificates.
5. Listing of Subcontractors.
7. Contractor’s Daily Reports.
8. Waiver of Liens.
10. Operation and Maintenance Manuals.
11. Other submittals as specified.

E. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 01 Section 01 45 16 “Quality Control Procedures” specifies Manufacturer’s field services and reports.
2. Division 01 Section 01 77 00 "Closeout Procedures" specifies requirements for submittal of Project Record Documents, including copies of final Shop Drawings, at project closeout.

1.3 DEFINITIONS

A. Coordination Drawings show the relationship and integration of different construction elements that require careful coordination during fabrication or installation to fit in the space provided or to function as intended.

1. Preparation of Coordination Drawings is specified in Division 01 Section 01 31 13 "Project Coordination" and may include components previously shown in detail on Shop Drawings or Product Data.

B. Field samples are full-size physical examples erected on-site to illustrate finishes, coatings, or finish materials. Field samples are used to establish the standard by which the Work will be judged.

C. Mockups are full-size assemblies for review of construction, coordination, testing, or operation; they are not Samples.

1.4 SUBMITTAL PROCEDURES

A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delays.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals and related activities that require sequential activity.

2. Coordinate transmittal of different types of submittals for related elements of the Work so processing will not be delayed by the need to review submittals concurrently for coordination.
   a. Architect will note that final approval will not occur until listed related submittals are received.
3. **Processing:** Allow fourteen (14) for Architect’s review time so that installation will not be delayed as a result of the time required to process submittals.
   
a. Allow no less than fourteen (14) days for initial review.
b. If an intermediate submittal is necessary, process the same as the initial submittal.
c. Allow not less than fourteen (14) for reprocessing each submittal.
d. No extension of Contract time will be authorized because of failure to transmit submittals to the Architect sufficiently in advance of the Work to permit processing.

4. Submittals and shop drawings must be procured in order to meet the schedule requirements and substantial completion.

   **B. Submittal Preparation:** Except as indicated below for Product Data and Shop Drawings, place a permanent label on each submittal for identification. Indicate the name of the entity that prepared each submittal on the label. Apply permanent adhesive label.

   1. Provide a space approximately 4” x 5” beside the title block on Shop Drawings to record the Contractor’s review and markings for the action taken.
      
a. Contractor shall review all submittals prior to submitting to the Architect.

   2. Provide a space approximately 4” x 5” beside the title block on Shop Drawings to record the Architect’s review and markings for the action taken.

   3. Include the following information on the label for processing and recording action taken.
      
a. Project name, and Project number.
b. Date.
c. Name and address of Architect
d. Name and address of Contractor
e. Name and address of subcontractor
f. Name and address of supplier
g. Name of manufacturer
h. Number and title of appropriate Specification Section
i. Drawing number and detail reference, as appropriate.
j. Architect’s project number and Owner’s project number.

   **C. Submittal Transmittal:** Package each submittal appropriately for transmittal and handling. Transmit each submittal from Contractor to Architect using a transmittal form. Submittals received from sources other than the Contractor will be returned without action.

   1. On the transmittal record relevant information and requests for data. In the “Stamp” of Contractor” column on submittal cover sheet record deviations from Contract Document requirements, including minor variations and limitations.
1.5 PROPOSED PRODUCT LIST

A. Within five (5) days of Notice to Proceed submit a completed list of long lead material items and/or equipment.

1. Specification section.
2. Name of material or equipment.
3. Anticipated shop drawings submittal date.
4. Fabrication duration (weeks).
5. Anticipated delivery date (assume 3 week shop drawing review).
6. Manufacturer’s name.
7. Manufacturer’s address.
8. Manufacturer’s phone numbers.

1.6 SCHEDULE

A. Submittal Log: Contractor shall prepare a complete submittal log listing all required project submittals.

1. Preliminary Submittal Log shall be submitted for Architect review within ten (10) days of Notice to Proceed.
2. Submittal Log shall be organized by Specification Section number.
3. Submittal Log shall be reviewed at each Progress Meetings to review status of project submittals.
4. Refer to Section 01 33 00-D for a sample Submittal Log.

1.7 PRODUCT DATA

A. Collect Product Data into a single submittal for each element of construction or system. Product Data includes printed information such as manufacturer’s installation instructions, catalog cuts, standard color charts, roughing-in diagrams and templates, standard wiring diagrams and performance curves. Where Product Data must be specifically prepared because standard printed data is not suitable for use, submit as “Shop Drawing”.

1. Mark each copy to show applicable choices and options. Where printed Product Data includes information on several products, some of which are not required, mark copies to indicate the applicable information. Include the following information:

   a. Manufacturer’s printed recommendations
   b. Compliance with recognized trade association standards
   c. Compliance with recognized testing agency standards
   d. Application of testing agency labels and seals
   e. Notation of dimensions verified by field measurements
f. Notation of coordination requirements

2. Do not submit Product Data until compliance with requirements of the Contract Documents has been confirmed.

3. Preliminary Submittal: Submit a preliminary single-copy of Product Data where selection of options is required.

4. Submittals: Submit minimum of four (4) copies of each required submittal. The Architect will retain one (1) copy and will return the other marked-up copies to the Contractor.

   a. Contractor shall retain one (1) complete set of Product Data to be included with Final Record Documents.

5. Distribution: Make copies of final submittal and distribute to installers, subcontractors, suppliers, manufacturers, fabricators, and others required for performance of construction activities. Show distribution on transmittal forms.

   a. Do not proceed with installation until an applicable copy of Product Data is in the installers’ possession.
   b. Do not permit use of unmarked copies of Product Data in connection with construction.
   c. Make copies of shop drawings and Product Data for the Operation and Maintenance Manuals.

1.8 SAMPLES

A. Submit Samples cured and finished as specified and physically identical with the material or product proposed. Samples include partial sections of manufactured or fabricated components, cuts or containers of materials, color range sets, and swatches showing color, texture and pattern.

1. Mount, display, and package Samples in a manner which will protect them in transit and will facilitate review of qualities indicated. Include the following information:

   a. Generic description of the Sample
   b. Sample source
   c. Product name or name of manufacturer
   d. Compliance with recognized standards
   e. Availability and delivery time

2. Submit Samples for review of kind, color, pattern, and texture, for a final check of these characteristics with other elements, and for a comparison of these characteristics between the final submittal and the actual component as delivered and installed.
a. Where variation in color, pattern, texture or other characteristics are inherent in the material or product represented, submit multiple units (not less than 3), that show approximate limits of the variations.
b. Refer to other Specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation and similar construction characteristics.
c. Refer to other Sections for Samples to be returned to the Contractor for incorporation in the Work. Such Samples must be undamaged at time of use. On the transmittal, indicate special requests regarding disposition of these Samples.

3. Preliminary submittals: Where Samples are for selection of color, pattern, texture or similar characteristics from a range of standard choices, submit a full set of choices for the material or product.
   a. Preliminary submittals will be reviewed and returned with the Architect’s mark indicating selection and other action.

4. Submittals: Except for Samples illustrating assembly details, workmanship, fabrication techniques, connections, operation and similar characteristics, submit four (4) sets; three (3) will be returned marked with the action taken.

5. The Architect will retain one (1) set of Samples, as returned, at the Project site, for quality comparisons throughout the course of construction.
   a. Sample sets may be used to obtain final acceptance of the construction associated with each set.

B. Distribution of Samples: Prepare and distribute additional sets to subcontractors, manufacturers, fabricators, suppliers, installers, and others as required for performance of the Work. Show distribution on transmittal forms.

1. Field Samples specified in individual Sections are special types of Samples. Field Samples are full-size examples erected on site to illustrate finishes, coatings, or finish materials and to establish the standard by which the Work will be judged.
   a. Comply with submittal requirements to the fullest extent possible. Process transmittal forms to provide a record of activity.

1.9 MANUFACTURER’S CERTIFICATES

A. When specified in individual Specification Sections, submit manufacturer’s certificate to Architect/Engineer for review, in quantities specified for product data.

B. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference date, affidavits, and certifications as appropriate.
C. Certificates may be recent or previous test results on material or product, but must be acceptable to Architect/Engineer.

1.10 SCHEDULE OF VALUES

A. Submit a detailed schedule of values separating labor and material for all individual items within ten (10) days of Notice to Proceed.

1.11 CONSTRUCTION SCHEDULE

A. General

1. In order to assure completion of the Work within the time stipulated, all activities of the Contractor will be scheduled and monitored by use of the critical path method, utilizing both activity diagram and computer printout.

2. The schedule, including the printout and arrow diagram shall be prepared by an expert having substantial experience in critical path scheduling.

3. The Contractor shall submit three (3) copies of the schedule for approval within ten (10) days of Notice to Proceed.

4. The schedule shall be detailed in nature and shall include the calendar dates of start and completion of each task on the critical path as well as dates and float times of tasks not on the critical path and of tie-ins to existing facilities, if any. The critical path diagram shall show all activities in detail, and the computer printout shall include for each activity its number, description, duration, early start, early finish, late start, late finish, and float time. Both the initial and subsequent submissions shall be time scaled.

5. In the preparation of the schedule, the Contractor shall take into consideration Shop Drawing submittal and approval time, the delivery times of equipment and materials, Subcontractors’ work, availability and abilities of workmen, weather conditions, and restrictions in operations at the Work site, and all other items that may affect completion of the Work within the time requirements of the Contract Documents.

6. If the schedule as submitted by the Contractor is not sufficiently detailed, contains errors, or is unrealistic, it will be rejected in writing, and the Contractor shall submit an appropriately revised schedule within seven (7) days of the date of the notice of rejection. The procedure will be repeated as often as may be necessary until the schedule is found acceptable and approved by the Engineer.

7. Pending approval of the construction schedule, no progress payment will be made, except in such amounts as may be approved by the Engineer for materials received at the Project site as provided in the General Conditions.
1.14 ARCHITECT’S ACTION

A. Except for submittals for record, information or similar purposes, where action and return is required, the Architect will review each submittal, mark to indicate action taken, and return within a minimum of two weeks. Review records may require longer time due to multi disciplinary review.

1. Compliance with specified characteristics is the Contractor’s responsibility.

B. Action Stamp: The Architect will stamp each submittal with a uniform, action stamp. The Architect will mark the stamp appropriately to indicate the action taken, as follows:

1. Reviewed: When the Architect marks a submittal “Reviewed,” the Work covered by the submittal may proceed provided it complies with requirements of the Contract Documents. Final payment depends on that compliance.

2. Reviewed and Comment: When the Architect marks a submittal “Reviewed and Comment,” the Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents. Final payment depends on that compliance.

3. Revise and Resubmit: When the Architect marks a submittal “Revise and Resubmit,” do not proceed with Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal according to the notations; resubmit without delay. Repeat if necessary to obtain different action mark.

   a. Do not use, or allow others to use, submittals marked “Revise and Resubmit” at the Project Site or elsewhere where Work is in progress.

4. Rejected, Resubmit: When the Architect marks a submittal “Rejected, Resubmit,” do not proceed with Work covered by the submittal, including purchasing, fabrication, deliver, or other activity. Prepare a new submittal according to the notations; resubmit without delay. Repeat if necessary to obtain different action mark.

   a. Do not use, or allow others to use, submittals marked “Rejected, Resubmit” at the Project Site or elsewhere where Work is in progress.

2. Action Not Required: Where a submittal is for information or record purposes or special processing or other activity, the Architect will return the submittal marked “Action Not Required.”

C. Unsolicited Submittals: The Architect will return unsolicited submittals to the sender without action.

1.15 SUBCONTRACTOR AND / OR MANUFACTURER LIST
A. Submit a detailed subcontractor and/or manufacturer list using **EXHIBIT '01 33 00A'** that has been provided at the end of this section. This list becomes part of the contract proposal and shall be presented within 24 hours after bid opening. Subcontractor purchased material, equipment, and labor shall be under the direct management of the Prime Contractor. If dual listing of manufactures or subcontractors is herein made, it is understood the Architect/Engineer (not the Contractor) will select the manufacturer or subcontractor of his choice.
SECTION 01 41 00 – REGULATORY REQUIREMENTS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Regulations having jurisdiction over this Project and obligations with responsibilities applicable.

B. The Engineer/Architect does not imply that all governing code and regulations are enumerated. It is Contractor's responsibility to verify own obligations.

1.2 SCOPE

A. Permits, Fees.

1. Permits
   a. Contractor will secure and pay for any permits and inspections required for project.

B. Building Codes and Regulations

1. Federal
   OSHA
   EPA
   ADA

2. State of Michigan
   Michigan Department of Environmental Quality
   Michigan Mechanical Code
   Michigan Plumbing Code
   National Electrical Code (National Fire Protection Code 70)
   Michigan Uniform Energy Act

3. Comply with anti-pollution, environmental regulations, accessibility codes as applicable.

4. Local zoning ordinance and other codes and regulations shall apply.

C. Safety Regulations

1. Comply with all Federal, State, and Local safety regulations applicable to project.

2. Consult specific specification sections for special safety requirements including proper precautions for fire safety.

3. Each employer whether prime contractor, or subcontractor is separately responsible for all specific safety requirements promulgated by any governmental authority,
including without limitation, the requirements of Occupational Safety and Health Act of 1970, the Construction Safety Act of 1969, and all standards and regulations promulgated by parties or agencies which administer such acts. Each contractor and subcontractor is responsible for the acts of his employees and for appropriate record keeping and reporting.

END OF SECTION 01 41 00
SECTION 01 60 00 – PRODUCT REQUIREMENTS

PART 1: GENERAL

1.1 SECTION INCLUDES

A. Products.
B. Transportation and handling.
C. Storage and protection.
D. Product options.
E. Substitutions.

1.2 PRODUCTS

A. Products: Means new material, machinery, components, equipment, fixtures, and systems forming the Work. Does not include machinery and equipment used for preparation, fabrication, conveying and erection of the Work.

B. Do not use materials and equipment removed from existing premises, except as specifically directed by the Contract Documents.

C. Provide interchangeable components of the same manufacturer, for similar components.

1.3 TRANSPORTATION AND HANDLING

A. Transport and handle products in accordance with manufacturer's instructions.

B. Promptly inspect shipments to assure that products comply with requirements, quantities are correct, and products are undamaged.

C. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

1.4 STORAGE AND PROTECTION

A. Store and protect products in accordance with manufacturer's instructions, with seals and labels intact and legible. Store sensitive products in weather-tight, climate controlled enclosures.

B. For exterior storage of fabricated products, place within secured trailer.

C. Provide ventilation to avoid condensation.

D. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

E. Arrange storage of products to permit access for inspection. Periodically inspect to assure products are undamaged and are maintained under specified conditions.
1.5 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Any product meeting those standards or description.

B. Products Specified by naming one or more Manufacturers: Products of manufacturers named and meeting specifications, no options or substitutions allowed.

C. Products specified by naming one or more manufacturers with a provision for substitutions: Submit a request for substitution for any manufacturer not named.

1.6 SUBSTITUTIONS

A. Instructions to Bidders specify time restrictions for submitting requests for substitutions during the bidding period to requirements specified in this Section.

B. Substitutions may be considered when a product becomes unavailable through no fault of the Contractor.

C. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.

D. A request constitutes a representation that the bidder:

1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.

2. Will provide the same warranty for the substitution as for the specified product.

3. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to the Owner.

4. Waive claims for additional costs or time extension which may subsequently become apparent.

5. Will reimburse Owner for review or redesign services associated with re-approval by authorities.

E. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.

PART 2: PRODUCTS (NOT APPLICABLE)

PART 3: EXECUTION (NOT APPLICABLE)

END OF SECTION 01 60 00
SECTION 01 66 00 – FIELD TESTS OF EQUIPMENT

PART 1 - GENERAL

A. In addition to testing required by this Section, Contractor shall perform all other tests required by detailed equipment Specifications.

1.2 PRELIMINARY TESTS

A. Contractor shall make preliminary field tests of all equipment as soon as conditions permit.

B. Purpose of tests is to determine if equipment is:

1. Properly installed.
2. Complies with operating cycles.
3. Operational and free from overheating, overloading, vibration or other operating problems.

C. Contractor shall furnish all labor, materials, instruments, fuel, incidentals, and expendables required, unless otherwise provided.

D. Contractor shall make all changes, adjustments and replacements required to place equipment in service and test it.

E. Architect and Owner shall be given sufficient prior notice to witness tests.

F. Prepare test and inspection reports and submit to Architect within seven (7) days.

1.3 FINAL TESTS

A. To the maximum extent possible, Contractor shall perform final field tests of equipment prior to initial start-up and operation of the Project. Where this is not practical, final field tests shall be performed during initial start-up and operation of the Project.

B. Purpose of the tests is to demonstrate that equipment is:

1. Properly installed.
2. Completely ready for operation by the Owner.
3. In compliance with design conditions, material specifications and all other requirements of the Contract Documents.

C. Contractor shall furnish all fuel and energy, labor, materials, instruments, lubricants and expendables required for the tests except where otherwise specified.

D. Until final field tests are completed and approved, Contractor shall make all necessary changes, adjustments and replacements.

E. Contractors shall notify Architect at least 48 hours prior to beginning of tests. Contractor shall keep notes and data on tests and submit copy to the Architect. Architect and Owner’s operating personnel shall witness all tests.
F. Contractor shall prepare test and inspection reports and shall submit to Architect within seven (7) days.

END OF SECTION 01 66 00
SECTION 01 71 50 – FINAL CLEANING

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

A. Conditions of the Contract.
B. Section 01 10 00 – Summary of Work.
C. Section 01 70 00 – Project Closeout.
D. Cleaning of certain specific products are specified in their respective sections.

1.2 SAFETY REQUIREMENTS

A. Hazards Control.
   1. Store volatile wastes in covered metal containers, and remove from premises daily.
   2. Prevent accumulation of wastes which create hazardous conditions.
   3. Provide adequate ventilation during use of volatile or noxious substances.

B. Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.
   1. Do not burn or bury rubbish and waste materials on project site.
   2. Do not dispose of volatile wastes such as mineral spirits, oil, or paint thinner in storm or sanitary drains.
   3. Do not dispose of wastes into streams or waterways.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Use only cleaning materials recommended by manufactured or surface to be cleaned.
B. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to the condition expected in a normal, commercial building cleaning and maintenance program. Comply with manufacturer's instructions.
   1. Complete the following cleaning operations before requesting inspection for certification of
Substantial Completion.

a. Remove labels that are not permanent labels.

b. Clean exposed exterior and interior hard-surfaced finishes to a dust-free condition, free of stains, films, and similar foreign substances.

c. Clean the site, including landscape development areas, of rubbish, litter, and other foreign substances. Remove stains, spills, and other foreign deposits from paved areas.

B. In preparation for substantial completion or occupancy, conduct final inspection of sight-exposed interior and exterior surfaces and of concealed spaces.

C. Remove grease, dust, dirt, stains, labels, fingerprints and other foreign materials from sight-exposed interior and exterior finished surfaces.

D. Broom clean paved surfaces; rake clean other surfaces of grounds.

E. Maintain cleaning until project, or portion thereof, is occupied by Owner.

F. Contractors failing to provide final clean up as noted in Article 3.15 of the General Conditions will be given 24 hours notice to complete the work or the Construction Manager shall have the right to contract the work done and the costs thereof shall be deducted from the Contract Amount in accordance with the Conditions of the Contract.

END OF SECTION 01 71 50
SECTION 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

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

1.2 SUMMARY
   A. Section includes administrative and procedural requirements for the following:
      1. Salvaging nonhazardous demolition waste.
      2. Recycling nonhazardous demolition and construction waste.
      3. Disposing of nonhazardous demolition and construction waste.

1.3 DEFINITIONS
   A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
   B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.
   C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.
   D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
   E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.
   F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.4 PERFORMANCE REQUIREMENTS
   A. General: Practice efficient waste management in the use of materials in the course of the Work. Use all reasonable means to divert construction and demolition waste from landfills and incinerators. Facilitate recycling and salvage of materials, including the following:
1. Construction Waste:
   a. Masonry and CMU.
   b. Metals.
   c. Packaging: Regardless of salvage/recycle goal indicated in "General" Paragraph above, salvage or recycle 100 percent of the following uncontaminated packaging materials:
      1) Paper.
      2) Cardboard.
      3) Boxes.
      4) Plastic sheet and film.
      5) Polystyrene packaging.
      7) Plastic pails.

1.5 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.

1.6 WASTE MANAGEMENT PLAN

A. General: Develop a waste management plan according to ASTM E 1609 and requirements in this Section. Plan shall consist of waste identification and waste reduction work plan. Distinguish between demolition and construction waste. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.

B. Waste Identification: Indicate anticipated types and quantities of demolition, site-clearing, and construction waste generated by the Work.

C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator.
   1. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
   2. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
   3. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location where materials separation will be performed.
PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.

1. Comply with operation, termination, and removal requirements in Division 01 Section "Temporary Facilities and Controls."

B. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
2. Comply with Division 01 Section "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

3.2 RECYCLING DEMOLITION AND CONSTRUCTION WASTE, GENERAL

A. General: Recycle paper and beverage containers used by on-site workers.

B. Preparation of Waste: Prepare and maintain recyclable waste materials according to recycling or reuse facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.

C. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan.

1. Provide appropriately marked containers or bins for controlling recyclable waste until removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.

   a. Inspect containers and bins for contamination and remove contaminated materials if found.

2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
4. Store components off the ground and protect from the weather.
5. Remove recyclable waste from Owner's property and transport to recycling receiver or processor.

3.3 RECYCLING CONSTRUCTION WASTE

A. Packaging:

1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

3.4 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn waste materials.

C. Disposal: Remove waste materials from Owner's property and legally dispose of them.

END OF SECTION 01 74 19
SECTION 01 75 00 – SPARE PARTS AND MAINTENANCE MATERIALS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Contractor shall furnish spare parts and maintenance materials as specified in the individual Sections.

B. Furnish parts and materials clearly marked and identified in manufacturers’ unopened cartons, boxes, crates or other protective covering suitable for prevention of corrosion or deterioration for the maximum length of storage which may be normally anticipated.

C. During construction, store parts in buildings or trailers with floor, roof and closed sides and in accordance with manufacturers’ recommendations. Protect from weather, condensation and humidity.

D. Delivery:

1. Spare Parts, Special Tools and Test Equipment: Furnish prior to
   a. Start-up testing as set forth in Section 01 65 50 – Starting and Placing Equipment in Operation.
   b. Operation of equipment by Owner.
   c. 75% Project completion, whichever occurs first.

2. Maintenance Materials: Deliver to Owner prior to Substantial Completion; to be stored in labeled containers on the Mezzanine level.

E. Provide a letter of transmittal including the following:
   1. Date of transfer of parts and material.
   2. Contract title and number.
   3. Contractor’s name and address.
   4. A complete inventory of the parts and material, listing the applicable Specification Section for each.
   5. Owner’s acknowledgement of receipt of the parts and materials.

F. Contractor shall be fully responsible for loss or damage to parts and materials until they are delivered to the Owner.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 – EXECUTION (NOT APPLICABLE)

END OF SECTION 01 75 00
SECTION 01 77 00 – CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. Closeout requirements for specific construction activities are also included in the appropriate Sections.

C. Division 01 Section 01 78 23 “Operation and Maintenance Data” for operation and maintenance manuals.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for contract closeout including, but not limited to, the following:

1. Inspection procedures.
2. Project record document submittal.
4. Final cleaning.
5. Other closeout submittals as specified.

1.3 SUBSTANTIAL COMPLETION

A. Preliminary Procedures: Before requesting inspection for certification of Substantial Completion, complete the following. List exceptions in the request.

1. In the Application for Payment that coincides with, or first follows, the date Substantial Completion is claimed, show 100 percent completion for the portion of the Work claimed as substantially complete.

   a. Include supporting documentation for completion as indicated in these Contract Documents and a statement showing an accounting of changes to the Contract Sum.

   b. If 100 percent completion cannot be shown, include a list of incomplete items, the value of incomplete construction, and reasons the Work is not complete.

2. Advise the Owner of pending insurance changeover requirements.
3. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications, and similar documents.
4. Obtain and submit releases enabling the Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
5. Submit record drawings, maintenance manuals, and similar final record information.
6. Deliver tools, spare parts, extra stock, and similar items.
CLOSEOUT PROCEDURES

7. Complete testing of systems and instruction of the Owner's operation and maintenance personnel. Discontinue and remove temporary facilities from the site, along with mockups, construction tools, and similar elements.
8. Complete final cleanup requirements, including touchup painting.
9. Touch up and otherwise repair and restore marred, exposed finishes.

B. Inspection Procedures: On receipt of a request for inspection, the Architect will either proceed with inspection or advise the Contractor of unfilled requirements. The Architect will prepare the Certificate of Substantial Completion following inspection or advise the Contractor of construction that must be completed or corrected before the certificate will be issued.

1. The Architect will repeat inspection when requested and assured that the Work is substantially complete.
2. Results of the completed inspection will form the basis of requirements for final acceptance.


1.4 FINAL ACCEPTANCE

A. Preliminary Procedures: Before requesting final inspection for certification of final acceptance and final payment, complete the following. List exceptions in the request.

1. Submit the final payment request with releases and supporting documentation not previously submitted and accepted. Include insurance certificates for products and completed operations where required.
2. Submit an updated final statement, accounting for final additional changes to the Contract Sum.
3. Submit a certified copy of the Architect's final inspection list of items to be completed or corrected, endorsed and dated by the Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance and shall be endorsed and dated by the Architect.
4. Submit final meter readings for utilities, a measured record of stored fuel, and similar data as of the date of Substantial Completion or when the Owner took possession of and assumed responsibility for corresponding elements of the Work.
5. Submit consent of surety to final payment.
6. Submit a final liquidated damages settlement statement.
7. Submit evidence of final, continuing insurance coverage complying with insurance requirements.

B. Reinspection Procedure: The Architect will reinspect the Work upon receipt of notice that the Work, including inspection list items from earlier inspections, has been completed, except for items whose completion is delayed under circumstances acceptable to the Architect.

1. Upon completion of reinspection, the Architect will prepare a certificate of final acceptance. If the Work is incomplete, the Architect will advise the Contractor of Work that is incomplete
2. If necessary, reinspection will be repeated.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 CLOSEOUT PROCEDURES

A. Operation and Maintenance Instructions: Arrange for each Installer of equipment that requires regular maintenance to meet with the Owner's personnel to provide instruction in proper operation and maintenance. Provide instruction by manufacturer's representatives if installers are not experienced in operation and maintenance procedures. Include a detailed review of the following items:

1. Maintenance manuals.
2. Spare parts and materials.
3. Cleaning.
4. Warranties and bonds.

3.2 FINAL CLEANING

A. General: The General Conditions require general cleaning during construction.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to the condition expected in a normal, commercial building cleaning and maintenance program. Comply with manufacturer's instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion.

   a. Remove labels that are not permanent labels.
   b. Clean exposed exterior and interior hard-surfaced finishes to a dust-free condition, free of stains, films, and similar foreign substances.
   c. Clean the site, including landscape development areas, of rubbish, litter, and other foreign substances. Remove stains, spills, and other foreign deposits from paved areas.

C. Removal of Protection: Remove temporary protection and facilities installed for protection of the Work during construction.

D. Compliance: Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on the Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from the site and dispose of lawfully.

1. Where extra materials of value remain after completion of associated Work, they become the
Owner's property. Dispose of these materials as directed by the Owner.

END OF SECTION 01 77 00
SECTION 01 78 23 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:

1. Operation and maintenance documentation directory.
2. Maintenance manuals for the care and maintenance of products, materials, and finishes.

B. Related Sections include the following:

1. Division 1 Section 01 33 00 "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
2. Division 1 Section 01 77 00 "Closeout Procedures" for submitting operation and maintenance manuals.
3. Division 1 Section 01 78 39 "Project Record Documents" for preparing Record Drawings for operation and maintenance manuals.
4. Divisions 2 through 33 Sections for specific operation and maintenance manual requirements for products in those Sections.

1.3 DEFINITIONS

A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.

B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 SUBMITTALS

A. Submittal: Submit two (2) copies of each manual in final form no less than fifteen (15) days before final inspection.

1.5 COORDINATION
A. Where operation and maintenance documentation includes information on installations by more than one factory-authorized service representative, assemble and coordinate information furnished by representatives and prepare manuals.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

A. Organization: Include a section in the directory for each of the following:

1. List of documents.
2. List of systems.
3. List of equipment.

B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.

C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.

D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.

2.2 MANUALS, GENERAL

A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:

1. Title page.
2. Table of contents.

B. Title Page: Enclose title page in transparent plastic sleeve. Include the following information:

1. Subject matter included in manual.
2. Name and address of Project.
3. Name and address of Owner.
4. Date of submittal.
5. Name, address, and telephone number of Contractor.
6. Name and address of Architect.
7. Cross-reference to related systems in other operation and maintenance manuals.

C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

1. Binders: Heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch (115-by-280-mm) paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
   a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
   b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.

2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.

3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software diskettes for computerized electronic equipment.

4. Supplementary Text: Prepared on 8-1/2-by-11-inch (115-by-280-mm), 20-lb/sq. ft. (75-g/sq. m) white bond paper.

5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
   a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
   b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.3 PRODUCT MAINTENANCE MANUAL

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

C. Product Information: Include the following, as applicable:
1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.
5. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and the following:
1. Inspection procedures.
2. Types of cleaning agents to be used and methods of cleaning.
3. List of cleaning agents and methods of cleaning detrimental to product.
4. Schedule for routine cleaning and maintenance.
5. Repair instructions.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
1. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.

B. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

C. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

D. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in Record Drawings to ensure correct illustration of completed installation.
1. Do not use original Project Record Documents as part of operation and maintenance manuals.
2. Comply with requirements of newly prepared Record Drawings in Division 1 Section 01 78 39 "Project Record Documents."
E. Comply with Division 1 Section 01 77 00 "Closeout Procedures" for the schedule for submitting operation and maintenance documentation.

END OF SECTION 01 78 23
SECTION 01 78 36 - WARRANTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for warranties required by the Contract Documents, including manufacturers standard warranties on products and special warranties.

1. Refer to the General Conditions for terms of the Contractor's period for correction of the Work.

2. Project Warranty shall be not less than one (1) years from the date of Substantial Completion.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 01 Section 01 77 00 "Closeout Procedures" specifies contract closeout procedures.

2. Divisions 02 through 33 Sections for specific requirements for warranties on products and installations specified to be warranted.

3. Certifications and other commitments and agreements for continuing services to Owner are specified elsewhere in the Contract Documents.

C. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products. Manufacturer's disclaimers and limitations on product warranties do not relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

1.3 DEFINITIONS

A. Standard product warranties are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.

1.4 WARRANTY REQUIREMENTS

A. Related Damages and Losses: When correcting failed or damaged warranted construction, remove and replace construction that has been damaged as a result of such failure or must be removed and replaced to provide access for correction of warranted construction.

B. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.

C. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of the Contract
Ingham County
Mechanical Improvements
DLZ Proj. No.: 1541-6681.90

Documents. The Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether the Owner has benefited from use of the Work through a portion of its anticipated useful service life.

D. Owner's Recourse: Expressed warranties made to the Owner are in addition to implied warranties and shall not limit the duties, obligations, rights, and remedies otherwise available under the law. Expressed warranty periods shall not be interpreted as limitations on the time in which the Owner can enforce such other duties, obligations, rights, or remedies.

1. Rejection of Warranties: The Owner reserves the right to reject warranties and to limit selection to products with warranties not in conflict with requirements of the Contract Documents.

E. Where the Contract Documents require a special warranty, or similar commitment on the Work or part of the Work, the Owner reserves the right to refuse to accept the Work, until the Contractor presents evidence that entities required to countersign such commitments are willing to do so.

1.5 SUBMITTALS

A. Submit written warranties to the Architect prior to the date certified for Substantial Completion. If the Architect's Certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion for the Work, or a designated portion of the Work, submit written warranties upon request of the Architect.

1. When a designated portion of the Work is completed and occupied or used by the Owner, by separate agreement with the Contractor during the construction period, submit properly executed warranties to the Architect within fifteen (15) days of completion of that designated portion of the Work.

B. Contractor and a subcontractor, supplier or manufacturer to execute warranty, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to the Owner, through the Architect, for approval prior to final execution.

C. Prepare a written document ready for execution by the Contractor, or by the Contractor, subcontractor, supplier, or manufacturer. Submit a draft to the Owner, through the Architect, for approval prior to final execution.

1. Refer to Divisions 2 through 33 Sections for specific content requirements and particular requirements for submitting special warranties.

D. Form of Submittal: At Final Completion compile three (3) copies of each required warranty properly executed by the Contractor, or by the Contractor, subcontractor, supplier, or manufacturer. Organize the warranty documents into an orderly sequence based on the table of contents of the Project Manual.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

WARRANTIES 01 78 36-2
3.1 LIST OF WARRANTIES

A. Provide a list of all warranties associated with the Project including the description and duration of each warranty.

END OF SECTION 01 78 36
SECTION 01 78 39 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

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

1.2 SUMMARY
   A. This Section includes administrative and procedural requirements for Project Record Documents, including the following:
      1. Record Drawings.
      2. Record Specifications.
      3. Record Product Data.
   B. Related Sections include the following:
      1. Division 01 Section 01 77 00 "Closeout Procedures" for general closeout procedures.
      2. Division 01 Section 01 78 23 "Operation and Maintenance Data" for operation and maintenance manual requirements.
      3. Divisions 02 through 33 Sections for specific requirements for Project Record Documents of products in those Sections.

1.3 SUBMITTALS
   A. Record Drawings: Comply with the following:
      1. Submit Record Drawings as follows:
         a. Final Submittal: Submit three (3) set of marked-up Record Drawings to the Architect.
   B. Record Specifications: Submit three (3) copies of Project's Specifications, including addenda and contract modifications.
   C. Record Product Data: Submit three (3) copies of each Product Data submittal.
      1. Where Record Product Data is required as part of operation and maintenance manuals, submit marked-up Product Data as an insert in the manual instead of submittal as Record Product Data.
PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

A. Record Drawing: Maintain one (1) original set of black-line white prints of the Contract Drawings and Shop Drawings.

1. Preparation: Mark Record Drawings to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.
   a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
   b. Accurately record information in an understandable drawing technique.
   c. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.

2. Content: Types of items requiring marking include, but are not limited to, the following:
   a. Dimensional changes to Drawings.
   b. Revisions to details shown on Drawings.
   c. Actual equipment locations.
   d. Changes made by Change Order or Allowance Adjustment.
   e. Changes made following Architect's written orders.
   f. Details not on the original Contract Drawings.
   g. Field records for variable and concealed conditions.
   h. Record information on the Work that is shown only schematically.

3. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, show cross-reference on the Contract Drawings.

4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at the same location.

5. Mark important additional information that was either shown schematically or omitted from original Drawings.

6. Note Allowance Adjustment numbers, Architects Supplemental Instructions, Proposal Request, Change Order numbers, and similar identification, where applicable.

7. Note date of revisions on the Record Drawings where applicable.

2.2 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Record the name of the manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
4. For each principal product, indicate whether Record Product Data has been submitted in operation and maintenance manuals instead of submitted as Record Product Data.
5. Note related Change Orders, Allowance Adjustments, Record Drawings, and Product Data where applicable.
6. Note dates of revisions where applicable

2.3 RECORD PRODUCT DATA

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

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.

2.4 MISCELLANEOUS RECORD SUBMITTALS

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

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one (1) copy of each submittal during the construction period for Project Record Document purposes. Post changes and modifications to Project Record Documents as they occur; do not wait until the end of Project.

B. Maintenance of Record Documents and Samples: Store Record Documents and Samples in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Architect's reference during normal working hours.

END OF SECTION 01 78 39
SECTION 01 82 00 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
   1. Demonstration of operation of systems, subsystems, and equipment.
   2. Training in operation and maintenance of systems, subsystems, and equipment.

B. Related Sections include the following:
   1. Division 01 Section 01 20 00 "Project Meeting" for requirements for preinstruction conferences.

1.3 SUBMITTALS

A. Instruction Program: Submit two copies of outline of instructional program for demonstration and training, including a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.
   1. At completion of training, submit two (2) complete training manuals for Owner's use.

B. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

C. Attendance Record: For each training module, submit list of participants and length of instruction time.

D. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.

E. Demonstration and Training Video: Submit two (2) copies of each training session on DVD.
1.4 QUALITY ASSURANCE

A. Instructor Qualifications: A factory-authorized service representative, complying with experienced in operation and maintenance procedures and training.

1.5 COORDINATION

A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations.

B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.

C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

D. Demonstration and Training activities shall be completed to the full satisfaction of the Owner’s representatives.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

A. Program Structure: Develop an instruction program that includes individual training modules for each system and equipment not part of a system, as required by individual Specification Sections, and as follows:

1. Motorized doors, including overhead coiling doors and detention doors.
2. Equipment, including all process, instrumentation and controls equipment.
3. Fire-protection systems, including fire alarm, and fire-extinguishing systems.
4. Heat generation, including boilers, pumps and water distribution piping.
5. Refrigeration systems, including chillers, pumps and distribution piping.
6. HVAC systems, including air-handling equipment, air distribution systems and terminal equipment and devices.
7. HVAC instrumentation and controls.
8. Electrical service and distribution, including transformers, switchboards, panel boards, uninterruptible power supplies and motor controls.
9. Lighting equipment and controls.
10. Emergency generator.
11. Laundry equipment.
14. Telephone systems.
17. Water Heater System.
18. Oil & Sediment Interceptor.
19. All scheduled equipment and systems.

B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following:

1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
   a. System, subsystem, and equipment descriptions.
   b. Performance and design criteria if Contractor is delegated design responsibility.
   c. Operating standards.
   d. Regulatory requirements.
   e. Equipment function.
   f. Operating characteristics.
   g. Limiting conditions.
   h. Performance curves.

2. Documentation: Review the following items in detail:
   a. Emergency manuals.
   b. Operations manuals.
   c. Maintenance manuals.
   d. Project Record Documents.
   e. Identification systems.
   f. Warranties and bonds.
   g. Maintenance service agreements and similar continuing commitments.

3. Emergencies: Include the following, as applicable:
   a. Instructions on meaning of warnings, trouble indications, and error messages.
   b. Instructions on stopping.
   c. Shutdown instructions for each type of emergency.
   d. Operating instructions for conditions outside of normal operating limits.
   e. Sequences for electric or electronic systems.
   f. Special operating instructions and procedures.

4. Operations: Include the following, as applicable:
   a. Startup procedures.
   b. Equipment or system break-in procedures.
   c. Routine and normal operating instructions.
   d. Regulation and control procedures.
   e. Control sequences.
   f. Safety procedures.
   g. Instructions on stopping.
   h. Normal shutdown instructions.
   i. Operating procedures for emergencies.
   j. Operating procedures for system, subsystem, or equipment failure.
   k. Seasonal and weekend operating instructions.
1. Required sequences for electric or electronic systems.
2. Special operating instructions and procedures.

5. Adjustments: Include the following:
   a. Alignments.
   b. Checking adjustments.
   c. Noise and vibration adjustments.
   d. Economy and efficiency adjustments.

6. Troubleshooting: Include the following:
   a. Diagnostic instructions.
   b. Test and inspection procedures.

7. Maintenance: Include the following:
   a. Inspection procedures.
   b. Types of cleaning agents to be used and methods of cleaning.
   c. List of cleaning agents and methods of cleaning detrimental to product.
   d. Procedures for routine cleaning
   e. Procedures for preventive maintenance.
   f. Procedures for routine maintenance.
   g. Instruction on use of special tools.

8. Repairs: Include the following:
   a. Diagnosis instructions.
   b. Repair instructions.
   c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
   d. Instructions for identifying parts and components.
   e. Review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.1 PREPARATION

A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a combined training manual.

B. Set up instructional equipment at instruction location.

3.2 INSTRUCTION
A. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

1. Architect will describe basis of system design, operational requirements, criteria, and regulatory requirements.
2. Owner will furnish Contractor with names and positions of participants.

B. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.

1. Schedule training with Owner with at least seven days’ advance notice.

C. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of a demonstration performance-based test.

D. Demonstration and Training Videotape: Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.

E. Cleanup: Collect used and leftover educational materials and Owner. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

F. Contractor shall prepare meeting minutes for each demonstration and training session.

END OF SECTION 01 82 00
SECTION 024119 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Demolition and removal of selected portions of building or structure.

1.2 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.

B. Remove and Salvage: Detach items from existing construction and deliver them to Owner.

C. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.

D. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.3 SUBMITTALS

A. Schedule of Selective Demolition Activities: Indicate detailed sequence of selective demolition and removal work, with starting and ending dates for each activity, interruption of utility services, use of elevator and stairs, and locations of temporary partitions and means of egress.

B. Predemolition Photographs: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by selective demolition operations. Comply with Division 01 Section "Photographic Documentation." Submit before Work begins.

1.4 QUALITY ASSURANCE

A. Demolition Firm Qualifications: An experienced firm that has specialized in demolition work similar in material and extent to that indicated for this Project.

B. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

C. Standards: Comply with ANSI A10.6 and NFPA 241.
D. Predemolition Conference: Conduct conference at Project site.

1.5 PROJECT CONDITIONS

A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.

B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
   1. Before selective demolition, Owner will remove the following items:
      a. None.

C. Notify Owner of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
   1. Hazardous materials will be removed by Owner before start of the Work.
   2. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Owner. Owner will remove hazardous materials under a separate contract.

E. Storage or sale of removed items or materials on-site is not permitted.

F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
   1. Maintain fire-protection facilities in service during selective demolition operations.

1.6 WARRANTY

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped.
B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

C. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.

D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Owner.

E. Survey of Existing Conditions: Record existing conditions by use of measured drawings.
   1. Comply with requirements specified in Division 01 Section "Photographic Documentation."

F. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems: Maintain services/systems indicated to remain and protect them against damage during selective demolition operations.

3.3 PREPARATION

A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
   1. Comply with requirements for access and protection specified in Division 01 Section "Temporary Facilities and Controls."

B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

3.4 SELECTIVE DEMOLITION

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
   1. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
2. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.

3. Do not use cutting torches.

4. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.

5. Dispose of demolished items and materials promptly. Comply with requirements in Appendix H "Waste Management Plan."

B. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.5 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an approved landfill.

B. Burning: Do not burn demolished materials.

C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.6 CLEANING

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

END OF SECTION
SECTION 230513 - COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

PART 1 - GENERAL

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

1.2 SUMMARY
   A. Section includes general requirements for single-phase and polyphase, general-purpose, horizontal, small and medium, squirrel-cage induction motors for use on ac power systems up to 600 V and installed at equipment manufacturer's factory or shipped separately by equipment manufacturer for field installation.

1.3 COORDINATION
   A. Coordinate features of motors, installed units, and accessory devices to be compatible with the following:
      1. Motor controllers.
      2. Torque, speed, and horsepower requirements of the load.
      3. Ratings and characteristics of supply circuit and required control sequence.
      4. Ambient and environmental conditions of installation location.

PART 2 - PRODUCTS

2.1 GENERAL MOTOR REQUIREMENTS
   A. Comply with requirements in this Section except when stricter requirements are specified in HVAC equipment schedules or Sections.

   B. Comply with NEMA MG 1 unless otherwise indicated.

2.2 MOTOR CHARACTERISTICS
   A. Duty: Continuous duty at ambient temperature of 40 deg C and at altitude of 700 feet above sea level.
B. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.

2.3 POLYPHASE MOTORS

A. Description: NEMA MG 1, Design B, medium induction motor.

B. Efficiency: Energy efficient, as defined in NEMA MG 1.

C. Service Factor: 1.15.

D. Multispeed Motors: Variable torque.
   1. For motors with 2:1 speed ratio, consequent pole, single winding.
   2. For motors with other than 2:1 speed ratio, separate winding for each speed.

E. Multispeed Motors: Separate winding for each speed.

F. Rotor: Random-wound, squirrel cage.

G. Bearings: Regreasable, shielded, antifriction ball bearings suitable for radial and thrust loading.

H. Temperature Rise: Match insulation rating.

I. Insulation: Class F.

J. Code Letter Designation:
   1. Motors 15 HP and Larger: NEMA starting Code F or Code G.
   2. Motors Smaller than 15 HP: Manufacturer's standard starting characteristic.

K. Enclosure Material: Cast iron for motor frame sizes 324T and larger; rolled steel for motor frame sizes smaller than 324T.

2.4 POLYPHASE MOTORS WITH ADDITIONAL REQUIREMENTS

A. Motors Used with Reduced-Voltage and Multispeed Controllers: Match wiring connection requirements for controller with required motor leads. Provide terminals in motor terminal box, suited to control method.

B. Motors Used with Variable Frequency Controllers: Ratings, characteristics, and features coordinated with and approved by controller manufacturer.
   1. Windings: Copper magnet wire with moisture-resistant insulation varnish, designed and tested to resist transient spikes, high frequencies, and short time rise pulses produced by pulse-width modulated inverters.
   2. Energy- and Premium-Efficient Motors: Class B temperature rise; Class F insulation.
3. Inverter-Duty Motors: Class F temperature rise; Class H insulation.
4. Thermal Protection: Comply with NEMA MG 1 requirements for thermally protected motors.

2.5 SINGLE-PHASE MOTORS

A. Motors larger than 1/20 hp shall be one of the following, to suit starting torque and requirements of specific motor application:

1. Permanent-split capacitor.
2. Split phase.
3. Capacitor start, inductor run.
4. Capacitor start, capacitor run.

B. Multispeed Motors: Variable-torque, permanent-split-capacitor type.

C. Bearings: Prelubricated, antifriction ball bearings or sleeve bearings suitable for radial and thrust loading.

D. Motors 1/20 HP and Smaller: Shaded-pole type.

E. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device shall automatically reset when motor temperature returns to normal range.

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 230513
SECTION 230519 - METERS AND GAGES FOR HVAC PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Bimetallic-actuated thermometers.
   2. Liquid-in-glass thermometers.
   3. Thermowells.
   4. Dial-type pressure gages.
   5. Gage attachments.
   6. Test plugs.
   7. Test-plug kits.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Wiring Diagrams: For power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of meter and gage, from manufacturer.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For meters and gages to include in operation and maintenance manuals.
PART 2 - PRODUCTS

2.1 BIMETALLIC-ACTUATED THERMOMETERS


B. Case: Liquid-filled and sealed type(s); stainless steel with 3-inch nominal diameter.

C. Dial: Nonreflective aluminum with permanently etched scale markings and scales in deg F.

D. Connector Type(s): Union joint, adjustable angle, with unified-inch screw threads.

E. Connector Size: 1/2 inch, with ASME B1.1 screw threads.

F. Stem: 0.25 or 0.375 inch in diameter; stainless steel.

G. Window: Plain glass.

H. Ring: Stainless steel.

I. Element: Bimetal coil.

J. Pointer: Dark-colored metal.

K. Accuracy: Plus or minus 1 percent of scale range.

2.2 LIQUID-IN-GLASS THERMOMETERS

A. Metal-Case, Compact-Style, Liquid-in-Glass Thermometers:
   2. Case: Cast aluminum; 6-inch nominal size.
   3. Case Form: Back angle unless otherwise indicated.
   4. Tube: Glass with magnifying lens and blue or red organic liquid.
   5. Tube Background: Nonreflective aluminum with permanently etched scale markings graduated in deg F.
   6. Window: Glass or plastic.
   7. Stem: Aluminum or brass and of length to suit installation.
      b. Design for Thermowell Installation: Bare stem.
   9. Accuracy: Plus or minus 1 percent of scale range or one scale division, to a maximum of 1.5 percent of scale range.
2.3 THERMOWELLS

A. Thermowells:
   1. **Standard:** ASME B40.200.
   2. **Description:** Pressure-tight, socket-type fitting made for insertion into piping tee fitting.
   3. **Material for Use with Copper Tubing:** CNR or CUNI.
   4. **Material for Use with Steel Piping:** CRES.
   5. **Type:** Stepped shank unless straight or tapered shank is indicated.
   6. **External Threads:** NPS 1/2, NPS 3/4, or NPS 1, ASME B1.20.1 pipe threads.
   7. **Internal Threads:** 1/2, 3/4, and 1 inch, with ASME B1.1 screw threads.
   8. **Bore:** Diameter required to match thermometer bulb or stem.
   9. **Insertion Length:** Length required to match thermometer bulb or stem.
   10. **Lagging Extension:** Include on thermowells for insulated piping and tubing.
   11. **Bushings:** For converting size of thermowell's internal screw thread to size of thermometer connection.

B. **Heat-Transfer Medium:** Mixture of graphite and glycerin.

2.4 PRESSURE GAGES

A. Direct-Mounted, Metal-Case, Dial-Type Pressure Gages:
   1. **Standard:** ASME B40.100.
   2. **Case:** Liquid-filled type(s); cast aluminum or drawn steel; 4-1/2-inch nominal diameter.
   3. **Pressure-Element Assembly:** Bourdon tube unless otherwise indicated.
   4. **Pressure Connection:** Brass, with NPS 1/4 or NPS 1/2, ASME B1.20.1 pipe threads and bottom-outlet type unless back-outlet type is indicated.
   5. **Movement:** Mechanical, with link to pressure element and connection to pointer.
   6. **Dial:** Nonreflective aluminum with permanently etched scale markings graduated in psi.
   7. **Pointer:** Dark-colored metal.
   8. **Window:** Glass.
   9. **Ring:** Stainless steel.
   10. **Accuracy:** Grade B, plus or minus 2 percent of middle half of scale range.

2.5 GAGE ATTACHMENTS

A. **Snubbers:** ASME B40.100, brass; with NPS 1/4 or NPS 1/2, ASME B1.20.1 pipe threads and piston-type surge-dampening device. Include extension for use on insulated piping.

B. **Siphons:** Loop-shaped section of stainless-steel pipe with NPS 1/4 or NPS 1/2 pipe threads.

C. **Valves:** Brass or stainless-steel needle, with NPS 1/4 or NPS 1/2, ASME B1.20.1 pipe threads.
2.6 TEST PLUGS

A. Description: Test-station fitting made for insertion into piping tee fitting.

B. Body: Brass or stainless steel with core inserts and gasketed and threaded cap. Include extended stem on units to be installed in insulated piping.

C. Thread Size: NPS 1/4 or NPS 1/2, ASME B1.20.1 pipe thread.

D. Minimum Pressure and Temperature Rating: 500 psig at 200 deg F.

E. Core Inserts: Chlorosulfonated polyethylene synthetic and EPDM self-sealing rubber.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install thermowells with socket extending one-third of pipe diameter to center of pipe and in vertical position in piping tees.

B. Install thermowells of sizes required to match thermometer connectors. Include bushings if required to match sizes.

C. Install thermowells with extension on insulated piping.

D. Fill thermowells with heat-transfer medium.

E. Install direct-mounted thermometers in thermowells and adjust vertical and tilted positions.

F. Install duct-thermometer mounting brackets in walls of ducts. Attach to duct with screws.

G. Install direct-mounted pressure gages in piping tees with pressure gage located on pipe at the most readable position.

H. Install valve and snubber in piping for each pressure gage for fluids (except steam).

I. Install valve and syphon fitting in piping for each pressure gage for steam.

J. Install test plugs in piping tees.

K. Install flow indicators in piping systems in accessible positions for easy viewing.

L. Assemble and install connections, tubing, and accessories between flow-measuring elements and flowmeters according to manufacturer's written instructions.

M. Install permanent indicators on walls or brackets in accessible and readable positions.
N. Install connection fittings in accessible locations for attachment to portable indicators.

O. Install thermometers in the following locations:
   1. Inlet and outlet of each hydronic boiler.
   2. Inlet and outlet of each thermal-storage tank.

P. Install pressure gages in the following locations:
   1. Suction and discharge of each pump.

3.2 CONNECTIONS

A. Install meters and gages adjacent to machines and equipment to allow service and maintenance of meters, gages, machines, and equipment.

3.3 ADJUSTING

A. After installation, calibrate meters according to manufacturer's written instructions.

B. Adjust faces of meters and gages to proper angle for best visibility.

3.4 THERMOMETER SCHEDULE

A. Thermometers at inlet and outlet of each hydronic boiler and water heater shall be the following:
   1. Liquid-filled, bimetallic-actuated type.

B. Thermometers at inlet and outlet of each thermal-storage tank shall be the following:
   1. Liquid-filled, bimetallic-actuated type.

C. Thermometer stems shall be of length to match thermowell insertion length.

3.5 THERMOMETER SCALE-RANGE SCHEDULE

A. Scale Range for Heating, Hot-Water Piping: 20 to 240 deg F.

B. Scale Range for Steam and Steam-Condensate Piping: 20 to 240 deg F.

C. Scale Range for Air Ducts: Minus 40 to plus 110 deg F.

3.6 PRESSURE-GAGE SCHEDULE

A. Pressure gages at discharge of each pressure-reducing valve shall be the following:
1. Liquid-filled, direct-mounted, metal case.

B. Pressure gages at suction and discharge of each pump shall be the following:
   1. Liquid-filled, direct-mounted, metal case.

3.7 PRESSURE-GAGE SCALE-RANGE SCHEDULE
   
   A. Scale Range for Heating, Hot-Water Piping: 0 to 30 psi.
   B. Scale Range for Steam Piping: 0 to 30 psi.

END OF SECTION 230519
SECTION 220523 - GENERAL-DUTY VALVES FOR HVAC PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Bronze angle valves.
2. Bronze ball valves.
3. Iron ball valves.
5. Bronze lift check valves.
8. Iron gate valves.

B. Related Sections:
1. Section 230553 - Identification for Plumbing Piping and Equipment for valve tags and schedules.

1.3 DEFINITIONS

A. CWP: Cold working pressure.
B. EPDM: Ethylene propylene copolymer rubber.
C. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.
D. NRS: Nonrising stem.
E. OS&Y: Outside screw and yoke.
F. RS: Rising stem.
G. SWP: Steam working pressure.
1.4 SUBMITTALS
   A. Product Data: For each type of valve indicated.

1.5 QUALITY ASSURANCE
   A. Source Limitations for Valves: Obtain each type of valve from single source from single
      manufacturer.
   B. ASME Compliance:
      1. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
      2. ASME B31.9 for building services piping valves.
   C. NSF Compliance: NSF 61 for valve materials for potable-water service.

1.6 DELIVERY, STORAGE, AND HANDLING
   A. Prepare valves for shipping as follows:
      1. Protect internal parts against rust and corrosion.
      2. Protect threads, flange faces, grooves, and weld ends.
      3. Set angle, gate, and globe valves closed to prevent rattling.
      4. Set ball and plug valves open to minimize exposure of functional surfaces.
      5. Set butterfly valves closed or slightly open.
      6. Block check valves in either closed or open position.
   B. Use the following precautions during storage:
      1. Maintain valve end protection.
      2. Store valves indoors and maintain at higher than ambient dew point temperature. If
         outdoor storage is necessary, store valves off the ground in watertight enclosures.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES
   A. Refer to valve schedule articles for applications of valves.
   B. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system
      pressures and temperatures.
   C. Valve Sizes: Same as upstream piping unless otherwise indicated.
   D. Valve Actuator Types:
      1. Handwheel: For valves other than quarter-turn types.
      2. Handlever: For quarter-turn valves NPS 6 and smaller.
E. Valves in Insulated Piping: With 2-inch stem extensions and the following features:

1. Ball Valves: With extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.

F. Valve-End Connections:

1. Flanged: With flanges according to ASME B16.1 for iron valves.
2. Grooved: With grooves according to AWWA C606.
4. Threaded: With threads according to ASME B1.20.1.

G. Valve Bypass and Drain Connections: MSS SP-45.

2.2 BRONZE ANGLE VALVES

A. Class 125, Bronze Angle Valves with Bronze Disc:

1. Manufacturers:
   a. Hammond Valve.
   b. Milwaukee Valve Company.

2.3 BRONZE BALL VALVES

A. Two-Piece, Full-Port, Bronze Ball Valves with Stainless-Steel Trim:

1. Manufacturers:
   b. Crane Co.; Crane Valve Group; Crane Valves.
   c. Hammond Valve.
   d. Milwaukee Valve Company.
   e. NIBCO INC.
   f. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

2.4 IRON BALL VALVES

A. Class 125, Iron Ball Valves:

1. Manufacturers:
   a. American Valve, Inc.
   b. Conbraco Industries, Inc.; Apollo Valves.
   c. Kitz Corporation.
d. Sure Flow Equipment Inc.
e. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

2.5 IRON, GROOVED-END BUTTERFLY VALVES

A. 175 CWP, Iron, Grooved-End Butterfly Valves:

1. Manufacturers:
   a. Kennedy Valve; a division of McWane, Inc.
   b. Shurjoint Piping Products.
   c. Tyco Fire Products LP; Grinnell Mechanical Products.
   d. Victaulic Company.

2.6 BRONZE LIFT CHECK VALVES

A. Class 125, Lift Check Valves with Nonmetallic Disc:

1. Manufacturers:
   a. Hammond Valve.
   b. Kitz Corporation.
   c. Milwaukee Valve Company.
   d. Mueller Steam Specialty; a division of SPX Corporation.
   e. NIBCO INC.
   f. Red-White Valve Corporation.
   g. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

2.7 IRON SWING CHECK VALVES

A. Class 125, Iron Swing Check Valves with Nonmetallic-to-Metal Seats:

1. Manufacturers:
   a. Crane Co.; Crane Valve Group; Crane Valves.
   b. Crane Co.; Crane Valve Group; Stockham Division.

2.8 IRON, GROOVED-END SWING CHECK VALVES

A. 300 CWP, Iron, Grooved-End Swing Check Valves:

1. Manufacturers:
   a. Anvil International, Inc.
   b. Shurjoint Piping Products.
   c. Tyco Fire Products LP; Grinnell Mechanical Products.
2.9 IRON GATE VALVES

A. Class 125, OS&Y, Iron Gate Valves:

1. Manufacturers:
   a. Crane Co.; Crane Valve Group; Crane Valves.
   b. Crane Co.; Crane Valve Group; Jenkins Valves.
   c. Crane Co.; Crane Valve Group; Stockham Division.
   d. Hammond Valve.
   e. Kitz Corporation.
   f. Legend Valve.
   g. Milwaukee Valve Company.
   h. NIBCO INC.
   i. Red-White Valve Corporation.
   j. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

B. Class 250, OS&Y, Iron Gate Valves:

1. Manufacturers:
   a. Crane Co.; Crane Valve Group; Crane Valves.
   b. Crane Co.; Crane Valve Group; Stockham Division.
   c. Hammond Valve.
   d. Milwaukee Valve Company.
   e. NIBCO INC.
   f. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.

B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.

C. Examine threads on valve and mating pipe for form and cleanliness.

D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.
E. Do not attempt to repair defective valves; replace with new valves.

3.2 VALVE INSTALLATION

A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

B. Locate valves for easy access and provide separate support where necessary.

C. Install valves in horizontal piping with stem at or above center of pipe.

D. Install valves in position to allow full stem movement.

E. Install check valves for proper direction of flow and as follows:

   1. Swing Check Valves: In horizontal position with hinge pin level.
   2. Lift Check Valves: With stem upright and plumb.

3.3 ADJUSTING

A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

3.4 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

A. If valve applications are not indicated, use the following:

   1. Shutoff Service: Ball, butterfly, or gate valves.
   3. Throttling Service: Globe, ball, or butterfly valves.
   4. Pump-Discharge Check Valves:

      a. NPS 2 and Smaller: Bronze lift check valves with nonmetallic disc.
      b. NPS 2-1/2 and Larger for Domestic Water: Iron swing check valves with lever and weight.

B. If valves with specified SWP classes or CWP ratings are not available, the same types of valves with higher SWP classes or CWP ratings may be substituted.

C. Select valves, except wafer types, with the following end connections:

   1. For Copper Tubing, NPS 2 and Smaller: Threaded ends except where solder-joint valve-end option is indicated in valve schedules below.
   2. For Copper Tubing, NPS 2-1/2 to NPS 4: Flanged ends except where threaded valve-end option is indicated in valve schedules below.
   3. For Steel Piping, NPS 2 and Smaller: Threaded ends.
   4. For Steel Piping, NPS 2-1/2 to NPS 4: Flanged ends except where threaded valve-end option is indicated in valve schedules below.
5. For Steel Piping, NPS 5 and Larger: Flanged ends.
6. For Grooved-End Copper Tubing and Steel Piping: Valve ends may be grooved.

3.5 DOMESTIC, HOT- AND COLD-WATER VALVE SCHEDULE

A. Pipe NPS 2 and Smaller:
   1. Bronze Valves: May be provided with solder-joint ends instead of threaded ends.
   2. Bronze Angle Valves: Class 125 nonmetallic disc.
   3. Ball Valves: Two piece, full port, bronze with stainless-steel trim.

B. Pipe NPS 2-1/2 and Larger:
   1. Iron Valves, NPS 2-1/2 to NPS 4: May be provided with threaded ends instead of flanged ends.
   2. Iron Ball Valves: Class 150.
   3. Iron, Grooved-End Butterfly Valves: 175 CWP.
   4. Iron Swing Check Valves: Class 125 nonmetallic-to-metal seats.
   5. Iron, Grooved-End Swing Check Valves: 300 CWP.
   6. Iron Gate Valves: Class 125 , OS&Y.

END OF SECTION 220523
SECTION 230529 - HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Metal pipe hangers and supports.
2. Trapeze pipe hangers.
3. Metal framing systems.
4. Thermal-hanger shield inserts.
5. Fastener systems.
6. Pipe stands.
7. Pipe positioning systems.
8. Equipment supports.

1.3 DEFINITIONS

A. MSS: Manufacturers Standardization Society of The Valve and Fittings Industry Inc.

1.4 PERFORMANCE REQUIREMENTS

A. Structural Performance: Hangers and supports for plumbing piping, ductwork, and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.6 INFORMATIONAL SUBMITTALS

A. Welding certificates.
1.7 QUALITY ASSURANCE

A. Structural Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

PART 2 - PRODUCTS

2.1 METAL PIPE HANGERS AND SUPPORTS

A. Carbon-Steel Pipe Hangers and Supports:
   1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
   2. Galvanized Metallic Coatings: Pregalvanized or hot dipped.
   3. Nonmetallic Coatings: Plastic coating, jacket, or liner.
   4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.

B. Stainless-Steel Pipe Hangers and Supports:
   1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
   2. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.

C. Copper Pipe Hangers:
   1. Description: MSS SP-58, Types 1 through 58, copper-coated-steel, factory-fabricated components.

2.2 TRAPEZE PIPE HANGERS

A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural carbon-steel shapes with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts.

2.3 METAL FRAMING SYSTEMS

A. MFMA Manufacturer Metal Framing Systems:
   1. Description: Shop- or field-fabricated pipe-support assembly for supporting multiple parallel pipes.
3. Channels: Continuous slotted steel channel with inturned lips.
4. Channel Nuts: Formed or stamped steel nuts or other devices designed to fit into channel slot and, when tightened, prevent slipping along channel.
8. Plastic Coating: PVC.

B. Non-MFMA Manufacturer Metal Framing Systems:
1. Description: Shop- or field-fabricated pipe-support assembly made of steel channels, accessories, fittings, and other components for supporting multiple parallel pipes.
3. Channels: Continuous slotted steel channel with inturned lips.
4. Channel Nuts: Formed or stamped steel nuts or other devices designed to fit into channel slot and, when tightened, prevent slipping along channel.

2.4 THERMAL-HANGER SHIELD INSERTS

A. Insulation-Insert Material for Cold Piping: ASTM C 552, Type II cellular glass with 100-psig or ASTM C 591, Type VI, Grade 1 polyisocyanurate with 125-psig minimum compressive strength and vapor barrier.

B. Insulation-Insert Material for Hot Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate with 100-psig ASTM C 552, Type II cellular glass with 100-psig or ASTM C 591, Type VI, Grade 1 polyisocyanurate with 125-psig minimum compressive strength.

C. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.

D. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.

E. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.5 FASTENER SYSTEMS

A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

B. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel anchors, for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
2.6 PIPE STANDS

A. General Requirements for Pipe Stands: Shop- or field-fabricated assemblies made of manufactured corrosion-resistant components to support roof-mounted piping.

B. Compact Pipe Stand: One-piece plastic unit with integral-rod roller, pipe clamps, or V-shaped cradle to support pipe, for roof installation without membrane penetration.

C. Low-Type, Single-Pipe Stand: One-piece stainless-steel base unit with plastic roller, for roof installation without membrane penetration.

D. High-Type, Single-Pipe Stand:
   1. Description: Assembly of base, vertical and horizontal members, and pipe support, for roof installation without membrane penetration.
   3. Vertical Members: Two or more cadmium-plated-steel or stainless-steel, continuous-thread rods.
   4. Horizontal Member: Cadmium-plated-steel or stainless-steel rod with plastic or stainless-steel, roller-type pipe support.

E. High-Type, Multiple-Pipe Stand:
   1. Description: Assembly of bases, vertical and horizontal members, and pipe supports, for roof installation without membrane penetration.
   2. Bases: One or more; plastic.
   3. Vertical Members: Two or more protective-coated-steel channels.
   4. Horizontal Member: Protective-coated-steel channel.
   5. Pipe Supports: Galvanized-steel, clevis-type pipe hangers.

F. Curb-Mounting-Type Pipe Stands: Shop- or field-fabricated pipe supports made from structural-steel shapes, continuous-thread rods, and rollers, for mounting on permanent stationary roof curb.

2.7 PIPE POSITIONING SYSTEMS

A. Description: IAPMO PS 42, positioning system of metal brackets, clips, and straps for positioning piping in pipe spaces; for plumbing fixtures in commercial applications.

2.8 EQUIPMENT SUPPORTS

A. Description: Welded, shop- or field-fabricated equipment support made from structural carbon-steel shapes.
2.9 MISCELLANEOUS MATERIALS

A. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.

B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.
   2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT INSTALLATION

A. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.

B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.
   1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.
   2. Field fabricate from ASTM A 36/A 36M, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.

C. Metal Framing System Installation: Arrange for grouping of parallel runs of piping, and support together on field-assembled metal framing systems.

D. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.

E. Fastener System Installation:
   1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches thick in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
   2. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

F. Pipe Stand Installation:
   1. Pipe Stand Types except Curb-Mounted Type: Assemble components and mount on smooth roof surface. Do not penetrate roof membrane.
2. Curb-Mounted-Type Pipe Stands: Assemble components or fabricate pipe stand and mount on permanent, stationary roof curb. See Section 077200 "Roof Accessories" for curbs.

G. Pipe Positioning-System Installation: Install support devices to make rigid supply and waste piping connections to each plumbing fixture.

H. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.


J. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

K. Install lateral bracing with pipe hangers and supports to prevent swaying.

L. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

M. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

N. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.

O. Insulated Piping:
   1. Attach clamps and spacers to piping.
      a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
      b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
      c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.
   2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
      a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.
   3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.
a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.

4. Shield Dimensions for Pipe: Not less than the following:
   a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
   b. NPS 4: 12 inches long and 0.06 inch thick.
   c. NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.
   d. NPS 8 to NPS 14: 24 inches long and 0.075 inch thick.
   e. NPS 16 to NPS 24: 24 inches long and 0.105 inch thick.

5. Pipes NPS 8 and Larger: Include wood or reinforced calcium-silicate-insulation inserts of length at least as long as protective shield.

6. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.2 EQUIPMENT SUPPORTS

   A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.
   
   B. Grouting: Place grout under supports for equipment and make bearing surface smooth.
   
   C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.3 METAL FABRICATIONS

   A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.
   
   B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.
   
   C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:
      1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
      2. Obtain fusion without undercut or overlap.
      3. Remove welding flux immediately.
      4. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.
3.4 ADJUSTING
A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.
B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.5 PAINTING
A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
   1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils.
B. Touchup: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Section 099113 "Exterior Painting."
C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

3.6 HANGER AND SUPPORT SCHEDULE
A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.
B. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in piping system Sections.
C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.
D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.
E. Use carbon-steel pipe hangers and supports and attachments for general service applications.
F. Use stainless-steel pipe hangers and stainless-steel attachments for hostile environment applications.
G. Use copper-plated pipe hangers and stainless-steel attachments for copper piping and tubing.
H. Use padded hangers for piping that is subject to scratching.
I. Use thermal-hanger shield inserts for insulated piping and tubing.
J. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. **Adjustable, Steel Clevis Hangers (MSS Type 1):** For suspension of noninsulated or insulated, stationary pipes NPS 1/2 to NPS 30.
2. **Yoke-Type Pipe Clamps (MSS Type 2):** For suspension of up to 1050 deg F, pipes NPS 4 to NPS 24, requiring up to 4 inches of insulation.
3. **Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3):** For suspension of pipes NPS 3/4 to NPS 36, requiring clamp flexibility and up to 4 inches of insulation.
4. **Steel Pipe Clamps (MSS Type 4):** For suspension of cold and hot pipes NPS 1/2 to NPS 24 if little or no insulation is required.
5. **Pipe Hangers (MSS Type 5):** For suspension of pipes NPS 1/2 to NPS 4, to allow off-center closure for hanger installation before pipe erection.
6. **Adjustable, Swivel Split- or Solid-Ring Hangers (MSS Type 6):** For suspension of noninsulated, stationary pipes NPS 3/4 to NPS 8.
7. **Adjustable, Steel Band Hangers (MSS Type 7):** For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
8. **Adjustable Band Hangers (MSS Type 9):** For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
9. **Adjustable, Swivel-Ring Band Hangers (MSS Type 10):** For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
10. **Split Pipe Ring with or without Turnbuckle Hangers (MSS Type 11):** For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 8.
11. **Extension Hinged or Two-Bolt Split Pipe Clamps (MSS Type 12):** For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 3.
12. **U-Bolts (MSS Type 24):** For support of heavy pipes NPS 1/2 to NPS 30.
13. **Clips (MSS Type 26):** For support of insulated pipes not subject to expansion or contraction.
14. **Pipe Saddle Supports (MSS Type 36):** For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate.
15. **Pipe Stanchion Saddles (MSS Type 37):** For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate, and with U-bolt to retain pipe.
16. **Adjustable Pipe Saddle Supports (MSS Type 38):** For stanchion-type support for pipes NPS 2-1/2 to NPS 36 if vertical adjustment is required, with steel-pipe base stanchion support and cast-iron floor flange.
17. **Single-Pipe Rolls (MSS Type 41):** For suspension of pipes NPS 1 to NPS 30, from two rods if longitudinal movement caused by expansion and contraction might occur.
18. **Adjustable Roller Hangers (MSS Type 43):** For suspension of pipes NPS 2-1/2 to NPS 24, from single rod if horizontal movement caused by expansion and contraction might occur.
19. **Complete Pipe Rolls (MSS Type 44):** For support of pipes NPS 2 to NPS 42 if longitudinal movement caused by expansion and contraction might occur but vertical adjustment is not necessary.
20. **Pipe Roll and Plate Units (MSS Type 45):** For support of pipes NPS 2 to NPS 24 if small horizontal movement caused by expansion and contraction might occur and vertical adjustment is not necessary.
21. **Adjustable Pipe Roll and Base Units (MSS Type 46):** For support of pipes NPS 2 to NPS 30 if vertical and lateral adjustment during installation might be required in addition to expansion and contraction.
K. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to NPS 24.
2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers NPS 3/4 to NPS 24 if longer ends are required for riser clamps.

L. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.
3. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.
4. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
5. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F piping installations.

M. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction, to attach to top flange of structural shape.
3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
5. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
6. C-Clamps (MSS Type 23): For structural shapes.
7. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
8. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
9. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.
10. Linked-Steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom of steel I-beams for heavy loads, with link extensions.
11. Malleable-Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.
12. Welded-Steel Brackets: For support of pipes from below or for suspending from above by using clip and rod. Use one of the following for indicated loads:
   a. Light (MSS Type 31): 750 lb.
   b. Medium (MSS Type 32): 1500 lb.
   c. Heavy (MSS Type 33): 3000 lb.
13. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
14. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
15. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.

N. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
   1. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
   2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
   3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.

O. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
   1. Restraint-Control Devices (MSS Type 47): Where indicated to control piping movement.
   2. Spring Cushions (MSS Type 48): For light loads if vertical movement does not exceed 1-1/4 inches.
   3. Spring-Cushion Roll Hangers (MSS Type 49): For equipping Type 41, roll hanger with springs.
   4. Spring Sway Braces (MSS Type 50): To retard sway, shock, vibration, or thermal expansion in piping systems.
   5. Variable-Spring Hangers (MSS Type 51): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from hanger.
   6. Variable-Spring Base Supports (MSS Type 52): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from base support.
   7. Variable-Spring Trapeze Hangers (MSS Type 53): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from trapeze support.
   8. Constant Supports: For critical piping stress and if necessary to avoid transfer of stress from one support to another support, critical terminal, or connected equipment. Include auxiliary stops for erection, hydrostatic test, and load-adjustment capability. These supports include the following types:
      a. Horizontal (MSS Type 54): Mounted horizontally.
      b. Vertical (MSS Type 55): Mounted vertically.
      c. Trapeze (MSS Type 56): Two vertical-type supports and one trapeze member.

P. Comply with MSS SP-69 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.

Q. Comply with MFMA-103 for metal framing system selections and applications that are not specified in piping system Sections.

R. Use powder-actuated fasteners or mechanical-expansion anchors instead of building attachments where required in concrete construction.
S. Use pipe positioning systems in pipe spaces behind plumbing fixtures to support supply and waste piping for plumbing fixtures.

END OF SECTION 220529
SECTION 230548 - VIBRATION CONTROLS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Isolation pads.
2. Isolation mounts.
3. Freestanding and restrained spring isolators.
4. Housed spring mounts.
5. Elastomeric hangers.
7. Spring hangers with vertical-limit stops.
8. Freestanding and restrained air-mounting system.
10. Restraining braces and cables.

1.3 DEFINITIONS


1.4 SUBMITTALS

A. Product Data: For the following:

1. Include rated load, rated deflection, and overload capacity for each vibration isolation device.

B. Qualification Data: For testing agency.

C. Field quality-control test reports.
1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 VIBRATION ISOLATORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Isolation Technology, Inc.
3. Mason Industries.
4. Vibration Eliminator Co., Inc.
5. Vibration Mountings & Controls, Inc.

B. Mounts: Double-deflection type, with molded, oil-resistant rubber, hermetically sealed compressed fiberglass, or neoprene isolator elements with factory-drilled, encapsulated top plate for bolting to equipment and with baseplate for bolting to structure. Color-code or otherwise identify to indicate capacity range.

1. Materials: Cast-ductile-iron or welded steel housing containing two separate and opposing, oil-resistant rubber or neoprene elements that prevent central threaded element and attachment hardware from contacting the housing during normal operation.
2. Neoprene: Shock-absorbing materials compounded according to the standard for bridge-bearing neoprene as defined by AASHTO.

C. Restrained Mounts: All-directional mountings with seismic restraint.

1. Materials: Cast-ductile-iron or welded steel housing containing two separate and opposing, oil-resistant rubber or neoprene elements that prevent central threaded element and attachment hardware from contacting the housing during normal operation.
2. Neoprene: Shock-absorbing materials compounded according to the standard for bridge-bearing neoprene as defined by AASHTO.

D. Spring Isolators: Freestanding, laterally stable, open-spring isolators.

1. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
2. Minimum Additional Travel: 50 percent of the required deflection at rated load.
3. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
4. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
5. Baseplates: Factory drilled for bolting to structure and bonded to 1/4-inch- (6-mm-) thick, rubber isolator pad attached to baseplate underside. Baseplates shall limit floor load to 500 psig (3447 kPa).
6. Top Plate and Adjustment Bolt: Threaded top plate with adjustment bolt and cap screw to fasten and level equipment.

E. Restrained Spring Isolators: Freestanding, steel, open-spring isolators with seismic or limit-stop restraint.

1. Housing: Steel with resilient vertical-limit stops to prevent spring extension due to weight being removed; factory-drilled baseplate bonded to 1/4-inch- (6-mm-) thick, neoprene or rubber isolator pad attached to baseplate underside; and adjustable equipment mounting and leveling bolt that acts as blocking during installation.
2. Restraint: Seismic or limit stop as required for equipment and authorities having jurisdiction.
3. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
4. Minimum Additional Travel: 50 percent of the required deflection at rated load.
5. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
6. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.

F. Housed Spring Mounts: Housed spring isolator with integral seismic snubbers.

1. Housing: Ductile-iron or steel housing to provide all-directional seismic restraint.
2. Base: Factory drilled for bolting to structure.
3. Snubbers: Vertically adjustable to allow a maximum of 1/4-inch (6-mm) travel up or down before contacting a resilient collar.

G. Elastomeric Hangers: Single or double-deflection type, fitted with molded, oil-resistant elastomeric isolator elements bonded to steel housings with threaded connections for hanger rods. Color-code or otherwise identify to indicate capacity range.

H. Spring Hangers: Combination coil-spring and elastomeric-insert hanger with spring and insert in compression.

1. Frame: Steel, fabricated for connection to threaded hanger rods and to allow for a maximum of 30 degrees of angular hanger-rod misalignment without binding or reducing isolation efficiency.
2. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
4. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
6. Elastomeric Element: Molded, oil-resistant rubber or neoprene. Steel-washer-reinforced cup to support spring and bushing projecting through bottom of frame.
7. Self-centering hanger rod cap to ensure concentricity between hanger rod and support spring coil.
I. Spring Hangers with Vertical-Limit Stop: Combination coil-spring and elastomeric-insert hanger with spring and insert in compression and with a vertical-limit stop.

1. Frame: Steel, fabricated for connection to threaded hanger rods and to allow for a maximum of 30 degrees of angular hanger-rod misalignment without binding or reducing isolation efficiency.
2. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
4. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
6. Elastomeric Element: Molded, oil-resistant rubber or neoprene.
7. Adjustable Vertical Stop: Steel washer with neoprene washer "up-stop" on lower threaded rod.

2.2 FACTORY FINISHES

A. Finish: Manufacturer's standard prime-coat finish ready for field painting.

B. Finish: Manufacturer's standard paint applied to factory-assembled and -tested equipment before shipping.

1. Powder coating on springs and housings.
2. All hardware shall be galvanized. Hot-dip galvanize metal components for exterior use.
3. Baked enamel or powder coat for metal components on isolators for interior use.
4. Color-code or otherwise mark vibration isolation and seismic-control devices to indicate capacity range.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and equipment to receive vibration isolation and seismic-control devices for compliance with requirements for installation tolerances and other conditions affecting performance.

B. Examine roughing-in of reinforcement and cast-in-place anchors to verify actual locations before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.
3.2 APPLICATIONS

A. Hanger Rod Stiffeners: Install hanger rod stiffeners where indicated or scheduled on Drawings to receive them and where required to prevent buckling of hanger rods due to seismic forces.

B. Strength of Support and Seismic-Restraint Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static and seismic loads within specified loading limits.

3.3 VIBRATION-CONTROL DEVICE INSTALLATION

A. Comply with requirements in Division 07 Section "Roof Accessories" for installation of roof curbs, equipment supports, and roof penetrations.

B. Install cables so they do not bend across edges of adjacent equipment or building structure.

C. Install seismic-restraint devices using methods approved by an agency acceptable to authorities having jurisdiction providing required submittals for component.

D. Install bushing assemblies for anchor bolts for floor-mounted equipment, arranged to provide resilient media between anchor bolt and mounting hole in concrete base.

E. Install bushing assemblies for mounting bolts for wall-mounted equipment, arranged to provide resilient media where equipment or equipment-mounting channels are attached to wall.

F. Attachment to Structure: If specific attachment is not indicated, anchor bracing to structure at flanges of beams, at upper truss chords of bar joists, or at concrete members.

G. Drilled-in Anchors:
   1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcing or embedded items during coring or drilling. Notify the structural engineer if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.
   2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
   3. Wedge Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
   4. Adhesive Anchors: Clean holes to remove loose material and drilling dust prior to installation of adhesive. Place adhesive in holes proceeding from the bottom of the hole and progressing toward the surface in such a manner as to avoid introduction of air pockets in the adhesive.
   5. Set anchors to manufacturer's recommended torque, using a torque wrench.
   6. Install zinc-coated steel anchors for interior and stainless-steel anchors for exterior applications.
3.4 ADJUSTING

A. Adjust isolators after piping system is at operating weight.

B. Adjust limit stops on restrained spring isolators to mount equipment at normal operating height. After equipment installation is complete, adjust limit stops so they are out of contact during normal operation.

C. Adjust air-spring leveling mechanism.

D. Adjust active height of spring isolators.

E. Adjust restraints to permit free movement of equipment within normal mode of operation.

END OF SECTION 230548
SECTION 230553 -IDENTIFICATION FOR PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Pipe labels.
   2. Duct labels.
   3. Warning Tags
   4. Stencils.
   5. Valve tags.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.
B. Valve numbering scheme.
C. Valve Schedules: For each piping system to include in maintenance manuals.

PART 2 - PRODUCTS

2.1 PIPE LABELS

A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction according to ASME A13.1.
B. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to partially cover circumference of pipe and to attach to pipe without fasteners or adhesive.
C. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.
D. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings; also include pipe size and an arrow indicating flow direction.
   1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions or as separate unit on each pipe label to indicate flow direction.
2. Lettering Size: Size letters according to ASME A13.1 for piping.

2.2 DUCT LABELS

A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.

B. Letter Color: Black.

C. Background Color: White.

D. Maximum Temperature: Able to withstand temperatures up to 160 deg F.

E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.

F. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-quarters the size of principal lettering.


H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

I. Duct Label Contents: Include identification of duct service using same designations or abbreviations as used on Drawings; also include duct size and an arrow indicating flow direction.

1. Flow-Direction Arrows: Integral with duct system service lettering to accommodate both directions or as separate unit on each duct label to indicate flow direction.

2.3 STENCILS

A. Stencils for Piping:

1. Lettering Size: At least 1/2 inch for viewing distances up to 72 inches and proportionately larger lettering for greater viewing distances.

2. Stencil Material: Aluminum.

3. Stencil Paint: Exterior, gloss, alkyd enamel in colors complying with recommendations in ASME A13.1 unless otherwise indicated. Paint may be in pressurized spray-can form.

4. Identification Paint: Exterior, alkyd enamel in colors according to ASME A13.1 unless otherwise indicated. Paint may be in pressurized spray-can form.

B. Stencils for Ducts:

1. Lettering Size: Minimum letter height of 1-1/4 inches for viewing distances up to 15 feet and proportionately larger lettering for greater viewing distances.

2. Stencil Material: Aluminum.
4. Identification Paint: Exterior, alkyd enamel. Paint may be in pressurized spray-can form.

C. Stencils for Access Panels and Door Labels, Equipment Labels, and Similar Operational Instructions:
1. Lettering Size: Minimum letter height of 1/2 inch for viewing distances up to 72 inches and proportionately larger lettering for greater viewing distances.
2. Stencil Material: Aluminum.
4. Identification Paint: Exterior, alkyd enamel. Paint may be in pressurized spray-can form.

2.4 VALVE TAGS
A. Description: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers.
   1. Tag Material: stainless steel, 0.025-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
   2. Fasteners: Brass wire-link chain.

B. Valve Schedules: For each piping system, on 8-1/2-by-11-inch bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.
   1. Valve-tag schedule shall be included in operation and maintenance data.

2.5 WARNING TAGS
A. Description: Preprinted or partially preprinted accident-prevention tags of plasticized card stock with matte finish suitable for writing.
   1. Size: 3 by 5-1/4 inches minimum.
   2. Fasteners: Brass grommet and wire.
   3. Nomenclature: Large-size primary caption such as "DANGER," "CAUTION," or "DO NOT OPERATE."

PART 3 - EXECUTION

3.1 PREPARATION
A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.
3.2 GENERAL INSTALLATION REQUIREMENTS

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

B. Coordinate installation of identifying devices with locations of access panels and doors.

C. Install identifying devices before installing acoustical ceilings and similar concealment.

3.3 EQUIPMENT LABEL INSTALLATION

A. Install or permanently fasten labels on each major item of mechanical equipment.

B. Locate equipment labels where accessible and visible.

3.4 PIPE LABEL INSTALLATION

A. Stenciled Pipe Label Option: Stenciled labels may be provided instead of manufactured pipe labels, at Installer's option. Install stenciled pipe labels, complying with ASME A13.1, on each piping system.

1. Identification Paint: Use for contrasting background.

B. Pipe Label Locations: Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:

1. Near each valve and control device.
2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
3. Near penetrations and on both sides of through walls, floors, ceilings, and inaccessible enclosures.
4. At access doors, manholes, and similar access points that permit view of concealed piping.
5. Near major equipment items and other points of origination and termination.
6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.

C. Directional Flow Arrows: Arrows shall be used to indicate direction of flow in pipes, including pipes where flow is allowed in both directions.

D. Pipe Label Color Schedule:
2. Low-Pressure Steam Piping: Black letters on a safety-white background.
3.5 DUCT LABEL INSTALLATION

A. Install plastic-laminated duct labels with permanent adhesive on air ducts in the following color codes:

1. Blue: For cold-air supply ducts.
2. Yellow: For hot-air supply ducts.

B. Stenciled Duct Label Option: Stenciled labels showing service and flow direction may be provided instead of plastic-laminated duct labels, at Installer's option.

C. Locate labels near points where ducts enter into and exit from concealed spaces and at maximum intervals of 20 feet in each space where ducts are exposed or concealed by removable ceiling system.

3.6 VALVE-TAG INSTALLATION

A. Install tags on valves and control devices in piping systems, except check valves, valves within factory-fabricated equipment units, shutoff valves, faucets, convenience and lawn-watering hose connections, and HVAC terminal devices and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.

B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following subparagraphs:

1. Valve-Tag Size and Shape:
   a. Low-Pressure Steam: 1-1/2 inches, round.
   b. Steam Condensate: 1-1/2 inches, round.

2. Valve-Tag Colors:
   a. Defined by User: White letters on a safety-purple background, black letters on a safety-white background, white letters on a safety-gray background, and white letters on a safety-black background

3.7 WARNING-TAG INSTALLATION

A. Write required message on, and attach warning tags to, equipment and other items where required.

END OF SECTION 230553
SECTION 230593 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

1.1 SUMMARY
A. Section Includes:
   1. Balancing Hydronic Piping Systems:
      a. Constant-flow hydronic heating systems.

1.2 DEFINITIONS
C. TAB: Testing, adjusting, and balancing.
D. TABB: Testing, Adjusting, and Balancing Bureau.
E. TAB Specialist: An entity engaged to perform TAB Work.

1.3 INFORMATIONAL SUBMITTALS
A. Certified TAB reports.

1.4 QUALITY ASSURANCE
A. TAB Contractor Qualifications: Engage a TAB entity certified by AABC, NEBB or TABB.
   1. TAB Field Supervisor: Employee of the TAB contractor and certified by AABC, NEBB or TABB.
   2. TAB Technician: Employee of the TAB contractor and who is certified by AABC, NEBB or TABB as a TAB technician.
B. Certify TAB field data reports and perform the following:
   1. Review field data reports to validate accuracy of data and to prepare certified TAB reports.
   2. Certify that the TAB team complied with the approved TAB plan and the procedures specified and referenced in this Specification.

D. Instrumentation Type, Quantity, Accuracy, and Calibration: As described in ASHRAE 111, Section 5, "Instrumentation."

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems' designs that may preclude proper TAB of systems and equipment.

B. Examine systems for installed balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Verify that locations of these balancing devices are accessible.

C. Examine the approved submittals for HVAC systems and equipment.

D. Examine design data including HVAC system descriptions, statements of design assumptions for environmental conditions and systems' output, and statements of philosophies and assumptions about HVAC system and equipment controls.

E. Examine equipment performance data including fan and pump curves.

1. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.

F. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.

G. Examine test reports specified in individual system and equipment Sections.

H. Examine HVAC equipment and filters and verify that bearings are greased, belts are aligned and tight, and equipment with functioning controls is ready for operation.

I. Examine terminal units, such as variable-air-volume boxes, and verify that they are accessible and their controls are connected and functioning.

J. Examine strainers. Verify that startup screens are replaced by permanent screens with indicated perforations.

K. Examine three-way valves for proper installation for their intended function of diverting or mixing fluid flows.
L. Examine heat-transfer coils for correct piping connections and for clean and straight fins.

M. Examine system pumps to ensure absence of entrained air in the suction piping.

N. Examine operating safety interlocks and controls on HVAC equipment.

O. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

3.2 PREPARATION

A. Prepare a TAB plan that includes strategies and step-by-step procedures.

B. Complete system-readiness checks and prepare reports. Verify the following:

1. Permanent electrical-power wiring is complete.
2. Hydronic systems are filled, clean, and free of air.
3. Automatic temperature-control systems are operational.
4. Balance, smoke, and fire dampers are open.
5. Isolating and balancing valves are open and control valves are operational.

3.3 GENERAL PROCEDURES FOR TESTING AND BALANCING

A. Perform testing and balancing procedures on each system according to the procedures contained in SMACNA's "HVAC Systems - Testing, Adjusting, and Balancing" and in this Section.

B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary for TAB procedures.

1. After testing and balancing, patch probe holes in ducts with same material and thickness as used to construct ducts.
2. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish according to Section 230713 "Duct Insulation," AND Section 230719 "HVAC Piping Insulation."

C. Mark equipment and balancing devices, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.

D. Take and report testing and balancing measurements in inch-pound (IP) units.
3.4 GENERAL PROCEDURES FOR HYDRONIC SYSTEMS

A. Prepare test reports with pertinent design data, and number in sequence starting at pump to end of system. Check the sum of branch-circuit flows against the approved pump flow rate. Correct variations that exceed plus or minus 5 percent.

B. Prepare schematic diagrams of systems' "as-built" piping layouts.

C. Prepare hydronic systems for testing and balancing according to the following, in addition to the general preparation procedures specified above:

1. Open all manual valves for maximum flow.
2. Check liquid level in expansion tank.
3. Check makeup water-station pressure gage for adequate pressure for highest vent.
4. Check flow-control valves for specified sequence of operation, and set at indicated flow.
5. Set differential-pressure control valves at the specified differential pressure. Do not set at fully closed position when pump is positive-displacement type unless several terminal valves are kept open.
6. Set system controls so automatic valves are wide open to heat exchangers.
7. Check pump-motor load. If motor is overloaded, throttle main flow-balancing device so motor nameplate rating is not exceeded.
8. Check air vents for a forceful liquid flow exiting from vents when manually operated.

3.5 PROCEDURES FOR CONSTANT-FLOW HYDRONIC SYSTEMS

A. Measure water flow at pumps. Use the following procedures except for positive-displacement pumps:

1. Verify impeller size by operating the pump with the discharge valve closed. Read pressure differential across the pump. Convert pressure to head and correct for differences in gage heights. Note the point on manufacturer's pump curve at zero flow and verify that the pump has the intended impeller size.

   a. If impeller sizes must be adjusted to achieve pump performance, obtain approval from Owner and comply with requirements in Section 232123 "Hydronic Pumps."

2. Check system resistance. With all valves open, read pressure differential across the pump and mark pump manufacturer's head-capacity curve. Adjust pump discharge valve until indicated water flow is achieved.

   a. Monitor motor performance during procedures and do not operate motors in overload conditions.

3. Verify pump-motor brake horsepower. Calculate the intended brake horsepower for the system based on pump manufacturer's performance data. Compare calculated brake horsepower with nameplate data on the pump motor. Report conditions where actual amperage exceeds motor nameplate amperage.
4. Report flow rates that are not within plus or minus 10 percent of design.

B. Measure flow at all automatic flow control valves to verify that valves are functioning as designed.

C. Measure flow at all pressure-independent characterized control valves, with valves in fully open position, to verify that valves are functioning as designed.

D. Set calibrated balancing valves, if installed, at calculated presettings.

E. Measure flow at all stations and adjust, where necessary, to obtain first balance.
   1. System components that have Cv rating or an accurately cataloged flow-pressure-drop relationship may be used as a flow-indicating device.

F. Measure flow at main balancing station and set main balancing device to achieve flow that is 5 percent greater than indicated flow.

G. Adjust balancing stations to within specified tolerances of indicated flow rate as follows:
   1. Determine the balancing station with the highest percentage over indicated flow.
   2. Adjust each station in turn, beginning with the station with the highest percentage over indicated flow and proceeding to the station with the lowest percentage over indicated flow.
   3. Record settings and mark balancing devices.

H. Measure pump flow rate and make final measurements of pump amperage, voltage, rpm, pump heads, and systems' pressures and temperatures including outdoor-air temperature.

I. Measure the differential-pressure-control-valve settings existing at the conclusion of balancing.

J. Check settings and operation of each safety valve. Record settings.

3.6 PROCEDURES FOR MOTORS

A. Motors, 1/2 HP and Larger: Test at final balanced conditions and record the following data:
   1. Manufacturer's name, model number, and serial number.
   4. Efficiency rating.
   5. Nameplate and measured voltage, each phase.
   6. Nameplate and measured amperage, each phase.
   7. Starter thermal-protection-element rating.

B. Motors Driven by Variable-Frequency Controllers: Test for proper operation at speeds varying from minimum to maximum. Test the manual bypass of the controller to prove proper
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operation. Record observations including name of controller manufacturer, model number, serial number, and nameplate data.

3.7 REPORTING

A. Initial Construction-Phase Report: Based on examination of the Contract Documents as specified in "Examination" Article, prepare a report on the adequacy of design for systems' balancing devices. Recommend changes and additions to systems' balancing devices to facilitate proper performance measuring and balancing. Recommend changes and additions to HVAC systems and general construction to allow access for performance measuring and balancing devices.

3.8 FINAL REPORT

A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.

1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer.
2. Include a list of instruments used for procedures, along with proof of calibration.

B. Final Report Contents: In addition to certified field-report data, include the following:

1. Pump curves.
2. Fan curves.
3. Manufacturers' test data.
4. Field test reports prepared by system and equipment installers.
5. Other information relative to equipment performance; do not include Shop Drawings and product data.

C. General Report Data: In addition to form titles and entries, include the following data:

1. Title page.
2. Name and address of the TAB contractor.
3. Project name.
4. Project location.
5. Architect's name and address.
6. Engineer's name and address.
7. Contractor's name and address.
9. Signature of TAB supervisor who certifies the report.
10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
11. Summary of contents including the following:

   a. Indicated versus final performance.
b. Notable characteristics of systems.
c. Description of system operation sequence if it varies from the Contract Documents.

12. Nomenclature sheets for each item of equipment.
13. Notes to explain why certain final data in the body of reports vary from indicated values.
14. Test conditions for pump performance forms including the following:
   a. Cooling coil, wet- and dry-bulb conditions.
   b. Other system operating conditions that affect performance.

D. System Diagrams: Include schematic layouts of hydronic distribution systems. Present each system with single-line diagram and include the following:
   1. Water flow rates.
   2. Pipe and valve sizes and locations.

3.9 ADDITIONAL TESTS

A. Within 90 days of completing TAB, perform additional TAB to verify that balanced conditions are being maintained throughout and to correct unusual conditions.

B. Seasonal Periods: If initial TAB procedures were not performed during near-peak summer and winter conditions, perform additional TAB during near-peak summer and winter conditions.

END OF SECTION 230593
SECTION 230719 - HVAC PIPING INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes insulating the following HVAC piping systems:
   1. Heating hot-water piping.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory and field applied if any).

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.

C. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.

B. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.
1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

1.6 DELIVERY, STORAGE, AND HANDLING
A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.7 COORDINATION
A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Section 230529 "Hangers and Supports for HVAC Piping and Equipment."

1.8 SCHEDULING
A. Schedule insulation application after pressure testing systems. Insulation application may begin on segments that have satisfactory test results.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS
A. Comply with requirements in "Piping Insulation Schedule, General," articles for where insulating materials shall be applied.
B. Products shall not contain asbestos, lead, mercury, or mercury compounds.
C. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.
D. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II and ASTM C 1290, Type II with factory-applied vinyl jacket. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. CertainTeed Corp.; SoftTouch Duct Wrap.
   b. Johns Manville; Microlite.
   c. Knauf Insulation; Friendly Feel Duct Wrap.
   d. Manson Insulation Inc.; Alley Wrap.
   e. Owens Corning; SOFTR All-Service Duct Wrap.

E. Mineral-Fiber, Preformed Pipe Insulation:
1. Products: Subject to compliance with requirements, provide one of the following:
   a. Fibrex Insulations Inc.; Coreplus 1200.
   b. Johns Manville; Micro-Lok.
   c. Knauf Insulation; 1000-Degree Pipe Insulation.
   d. Manson Insulation Inc.; Alley-K.
   e. Owens Corning; Fiberglas Pipe Insulation.

2. Type II, 1200 deg F Materials: Mineral or glass fibers bonded with a thermosetting resin.
   Comply with ASTM C 547, Type II, Grade A, with factory-applied ASJ. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

2.2 INSULATING CEMENTS


B. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.

C. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.
   1. For indoor applications, adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
   2. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

   1. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
   2. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

E. PVC Jacket Adhesive: Compatible with PVC jacket.
   1. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
   2. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.3 MASTICS

A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.
1. For indoor applications, use mastics that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Vapor-Barrier Mastic: Water based; suitable for indoor use on below-ambient services.

1. Products: Subject to compliance with requirements, provide one of the following:
   b. Vimasco Corporation; 749.

2. Water-Vapor Permeance: ASTM E 96/E 96M, Procedure B, 0.013 perm at 43-mildry film thickness.
3. Service Temperature Range: Minus 20 to plus 180 deg F.
4. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.

2.4 LAGGING ADHESIVES

A. Description: Comply with MIL-A-3316C, Class I, Grade A and shall be compatible with insulation materials, jackets, and substrates.

1. For indoor applications, use lagging adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Products: Subject to compliance with requirements, provide one of the following:
   c. Vimasco Corporation; 713 and 714.

3. Fire-resistant, water-based lagging adhesive and coating for use indoors to adhere fire-resistant lagging cloths over pipe insulation.
4. Service Temperature Range: 0 to plus 180 deg F.

2.5 SEALANTS

A. Joint Sealants:

1. Joint Sealants for Cellular-Glass, Products: Subject to compliance with requirements, provide one of the following:
   b. Eagle Bridges - Marathon Industries; 405.
d. Mon-Eco Industries, Inc.; 44-05.
e. Pittsburgh Corning Corporation; Pittseal 444.

2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Permanently flexible, elastomeric sealant.
4. Service Temperature Range: Minus 100 to plus 300 deg F.
5. Color: White or gray.
6. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Metal Jacket Flashing Sealants:
1. Materials shall be compatible with insulation materials, jackets, and substrates.
2. Fire- and water-resistant, flexible, elastomeric sealant.
3. Service Temperature Range: Minus 40 to plus 250 deg F.
5. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
6. Sealants shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. ASJ Flashing Sealants:
1. Products: Subject to compliance with requirements, provide the following:
2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250 deg F.
6. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.6 FACTORY-APPLIED JACKETS

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:

1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.
2.7 FIELD-APPLIED JACKETS

A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.

B. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.
   1. Adhesive: As recommended by jacket material manufacturer.
   3. Factory-fabricated fitting covers to match jacket if available; otherwise, field fabricate.
      a. Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, unions, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories.

C. Metal Jacket:
      a. Sheet and roll stock ready for shop or field sizing.
      b. Finish and thickness are indicated in field-applied jacket schedules.
      d. Moisture Barrier for Outdoor Applications: 3-mil-thick, heat-bonded polyethylene and kraft paper.
      e. Factory-Fabricated Fitting Covers:
         1) Same material, finish, and thickness as jacket.
         2) Preformed 2-piece or gore, 45- and 90-degree, short- and long-radius elbows.
         3) Tee covers.
         4) Flange and union covers.
         5) End caps.
         6) Beveled collars.
         7) Valve covers.
         8) Field fabricate fitting covers only if factory-fabricated fitting covers are not available.

2.8 TAPES

A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. ABI, Ideal Tape Division; 428 AWF ASJ.
      b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0836.
      c. Compac Corporation; 104 and 105.
d. Venture Tape; 1540 CW Plus, 1542 CW Plus, and 1542 CW Plus/SQ.

2. Width: 3 inches.
3. Thickness: 11.5 mils.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch width.
7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

B. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive; suitable for indoor and outdoor applications.
   1. Width: 2 inches.
   2. Thickness: 6 mils.
   3. Adhesion: 64 ounces force/inch in width.
   4. Elongation: 500 percent.
   5. Tensile Strength: 18 lbf/inch in width.

C. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive.
   1. Width: 2 inches.
   2. Thickness: 3.7 mils.
   3. Adhesion: 100 ounces force/inch in width.
   4. Elongation: 5 percent.
   5. Tensile Strength: 34 lbf/inch in width.

2.9 SECUREMENTS

A. Bands:
   1. Stainless Steel: ASTM A 167 or ASTM A 240/A 240M, Type 304; 0.015 inch thick, 1/2 inch wide with wing seal or closed seal.

B. Staples: Outward-clinching insulation staples, nominal 3/4-inch-wide, stainless steel or Monel.

C. Wire: 0.062-inch soft-annealed, stainless steel.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.

1. Verify that systems to be insulated have been tested and are free of defects.
2. Verify that surfaces to be insulated are clean and dry.
3. Proceed with installation only after unsatisfactory conditions have been corrected.
3.2 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.3 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping including fittings, valves, and specialties.

B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of pipe system as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

G. Keep insulation materials dry during application and finishing.

H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

I. Install insulation with least number of joints practical.

J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

   1. Install insulation continuously through hangers and around anchor attachments.
   2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
   3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
   4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.
L. Install insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth.
2. Cover circumferential joints with 3-inch-wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 4 inches o.c.
4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.

M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

P. For above-ambient services, do not install insulation to the following:

1. Vibration-control devices.
2. Testing agency labels and stamps.
3. Nameplates and data plates.
5. Handholes.
6. Cleanouts.

3.4 GENERAL PIPE INSULATION INSTALLATION

A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.

B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:

1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.
2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.

4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.

5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below-ambient services, provide a design that maintains vapor barrier.

6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.

7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below-ambient services and a breather mastic for above-ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.

8. For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.

9. Stencil or label the outside insulation jacket of each union with the word "union." Match size and color of pipe labels.

C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

D. Install removable insulation covers at locations indicated. Installation shall conform to the following:

1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.

2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.

3. Construct removable valve insulation covers in same manner as for flanges, except divide the two-part section on the vertical center line of valve body.
4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless-steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.

5. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.

3.5 INSTALLATION OF MINERAL-FIBER INSULATION

A. Insulation Installation on Straight Pipes and Tubes:
   1. Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
   2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
   3. For insulation with factory-applied jackets on above-ambient surfaces, secure laps with outward-clinched staples at 6 inches o.c.
   4. For insulation with factory-applied jackets on below-ambient surfaces, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:
   1. Install preformed pipe insulation to outer diameter of pipe flange.
   2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
   3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with mineral-fiber blanket insulation.
   4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:
   1. Install preformed sections of same material as straight segments of pipe insulation when available.
   2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:
   1. Install preformed sections of same material as straight segments of pipe insulation when available.
   2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
4. Install insulation to flanges as specified for flange insulation application.

3.6 PIPING INSULATION SCHEDULE, GENERAL

A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.

3.7 PIPING INSULATION SCHEDULE

A. Heating-Hot-Water Supply and Return, indoor, 200 Deg F and Below:

1. NPS 4 and Smaller: Insulation shall be the following:
   a. Mineral-Fiber, Preformed Pipe, Type I: 1 inches thick.

END OF SECTION 230719
SECTION 230913 - INSTRUMENTATION AND CONTROL DEVICES FOR HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Control devices as required to connect new equipment provided under this contract (pumps, air handlers, boilers, control valves, etc.) to existing Building Automation Systems in each building. Existing control system (BAS) for the three buildings is Trane Tracer. The contractor shall supply and install all necessary equipment, materials, software, and logic to incorporate the new and replacement equipment into the existing building control systems.
2. Electric controls devices.

B. Related Sections include the following:

1. Division 23 Section "Meters and Gages for HVAC Piping" for measuring equipment that relates to this Section.

1.3 SUBMITTALS

A. Shop Drawings: Include performance data, components and accessories, wiring diagrams, dimensions, weights and loadings, field connections, and required clearances.

B. Field quality-control test reports.

C. Operation and Maintenance Data: For HVAC instrumentation and control system to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:

1. Maintenance instructions and lists of spare parts for each type of control.
2. Interconnection wiring diagrams with identified and numbered system components and devices.
4. Inspection period, cleaning methods, cleaning materials recommended, and calibration tolerances.
5. Calibration records and list of set points.
1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Factory-Mounted Components: Where control devices specified in this Section are indicated to be factory mounted on equipment, arrange for shipping of control devices to equipment manufacturer.

1.6 COORDINATION

A. Coordinate location of thermostats, humidistats, and other exposed control sensors with plans and room details before installation.

B. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03 Section "Cast-in-Place Concrete."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with requirements, compatibility with existing control systems, and approval of the Engineer, products shall be provided by any one of the following:

1. Honeywell.
2. Johnson Controls.
3. Siemens.
4. Trane.

2.2 ELECTRICAL AND INTERLOCKS

A. Control Contractor shall furnish and mount electrical relays, switches, solenoids, transformers, etc., that are part of the control contract, and Electrical Contractor shall make the electrical interconnections as shown on control drawings. Electrical interconnections between controls and items of equipment shall be made by Electrical Contractor.

2.3 RELAYS AND SWITCHES

A. Accessory pneumatic and electric relays and switches shall be furnished as required to complete the control functions. Relays shall energize control system on equipment start, interface
between pneumatic and electrical system, modify control air pressures, or increase system capacity of controllers. Switches shall provide high or low temperature or pressure safety limits or alarms, or change proportional to two position control. Input and output ports shall have suitable pressure gauges. P.E. switches shall be furnished with neon pilot lamps.

B. Fire alarm and trouble relays shall be wired to a normally closed set of contacts for reporting of status to the Energy Management Control System cabinet where applicable.

2.4 AIR TEMPERATURE SENSORS

A. Thermistor Outdoor Air Temperature Sensors:
   1. Temperature Range: Minus 50 to 275 deg F
   2. Probe: Single-point sensor with a stainless-steel sheath.
   4. Enclosure: NEMA 250, Type 4 or 4X junction box or combination conduit and outlet box with removable cover and gasket.
   5. Conduit Connection: 1/2-inch trade size.

B. Space Air Temperature Sensors for Use with DDC Controllers Controlling Terminal Units:
   1. 100- or 1000-ohm platinum RTD or thermistor.
   2. Thermistor:
      a. Pre-aged, burned in, and coated with glass; inserted in a metal sleeve; and entire unit encased in epoxy.
      b. Thermistor drift shall be less than plus or minus 0.5 deg F over 10 years.
   3. Temperature Transmitter Requirements:
      a. Mating transmitter required with each 100-ohm RTD.
      b. Mating transmitters optional for 1000-ohm RTD and thermistor, contingent on compliance with end-to-end control accuracy.
   4. Provide digital display of sensed temperature.
   5. Provide sensor with local control.
      a. Local override to turn HVAC on.
      b. Local adjustment of temperature set point.
      c. Both features shall be capable of manual override through control system operator.

2.5 CONTROL DAMPERS

A. AMCA-rated, multiple opposed blade style constructed of either extruded aluminum or minimum 16 gauge galvanized steel with reinforced, rigid frames. Complete with all necessary mounting hardware, linkage, jackshafts and supports. Integral damper/operator assemblies are
not acceptable. Damper operators shall be accessible from the exterior of the unit when possible.

B. Blade edge and end gasketing: Closed cell neoprene or stainless steel wiper style with optional blade end overlap on frame, oilite bronze bearings.

C. Leakage: No more than one half of one percent (0.5%), measured at 4 inches W.G. differential pressure.

2.6 ACTUATORS

A. Electric Motors: Size to operate with sufficient reserve power to provide smooth modulating action or two-position action.

B. Electronic Actuators: Direct-coupled type designed for minimum 60,000 full-stroke cycles at rated torque.

1. Manufacturers: Subject to compliance with the requirements, provide products by one of the following:
   a. Belimo Aircontrols (USA), Inc.
   b. Siemens

2. Valves: Size for torque required for valve close off at maximum pump differential pressure.


4. Overload Protection: Electronic overload or digital rotation-sensing circuitry.

5. Fail-Safe Operation: Mechanical, spring-return mechanism. Provide external, manual gear release on nonspring-return actuators.

2.7 CONTROL VALVES

A. Factory fabricated, of type, body material, and pressure class based on maximum pressure and temperature rating of piping system, unless otherwise indicated.

B. Fluid control valves shall be single seated, straight through, globe with renewable hardened seats and high lift contoured stainless steel plugs and seats, allowing tight shutoff. Valves shall have equal percentage characteristic for water service. Valves 2 inches and smaller shall have threaded bronze bodies, and valves 2-1/2 inches and larger in size shall have flanged cast iron bodies. Stem packing shall be spring loaded, self adjusting Teflon cones. Valve operators shall be rolling neoprene diaphragm style, either normally open or normally closed as required. Electronic valve operators will be allowed.

C. Valves shall have metal actuators rather than plastic, and copper tubing pneumatic connections.

D. Hydronic system globe valves shall have the following characteristics:
1. **NPS 2 and Smaller:** Single seated, straight through, Class 125 threaded bronze body.
2. **NPS 2-1/2 and Larger:** Single seated, straight through, globe, Class 125 flanged bronze body.
3. **Internal Construction:** Renewable hardened seats and high lift contoured stainless steel plugs and seats allowing tight shutoff, spring loaded stem packing with self adjusting Teflon cones.
4. **Flow Characteristics:** Two-way valves shall have equal percentage characteristics; three-way valves shall have linear characteristics.
5. **Close-Off (Differential) Pressure Rating:** Combination of actuator and trim shall provide minimum close-off pressure rating of 150 percent of total system (pump) head for two-way valves and 100 percent of pressure differential across valve or 100 percent of total system (pump) head.

**E. Butterfly Valves:**

1. Butterfly valves used as automatic isolation valves on heating hot water and chilled water systems shall be provided with 24 VAC electric actuator, with 2 limit switches for valve position feedback, and operator wheel for manual override of valve position in NEMA 4 enclosure.

**2.8 DUCT SMOKE DETECTORS**

**A.** Duct smoke detectors shall be National Time and Signal DDP-2 or Simplex 2098-9649 photoelectric type. Sampling tubes shall extend the full width of the duct. The exact length shall be determined in field. Duct smoke detectors shall have two sets of SPDT contacts rated at 10 Amps, 125 VAC to provide additional switching capabilities and one set of SPDT contacts rated at 5 amps for trouble alarm. Manual reset shall be connected into the motor control circuit in a manner that will not permit the motor to run when the device is activated. This applies to hand as well as automatic position of the selector switch.

**B.** Refer to Division 26 for power supply and reset station.

**2.9 FREEZE STATS**

**A.** A 20' capillary tube sensing element shall be serpentinized from side to side and from top to bottom in the fan housing. The capillary tube shall sense the coldest one foot section and open the fan motor control circuit and stop the fan when the sensed temperature falls below 35 °F. The sensing element shall be installed with chafe protection at attachment points. Provide manual reset button. Multiple freezestats shall be used in large outdoor air ducts as necessary for adequate coverage.

**2.10 FLOW MEASURING STATIONS**

**A.** Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. EBTRON, Inc.

B. Sensors: Vortex shedding or thermal mass flow, temperature and pressure compensating type.

C. Accessories: Include probe mounted transmitter junction box, transmitter and system electronic enclosure with a velocity profiler with digital display.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: The existing control system (BAS) for each of the three buildings is Trane Tracer Summit. The contractor shall supply and install all necessary equipment, materials, software, and logic to incorporate the new and replacement equipment into the existing building control systems. The Contractor shall:

1. Use only copper control tubing to connect to hot water control valves.
2. Verify location of thermostats, humidistats, and other exposed control sensors with Drawings and room details before installation.
3. Prior to bidding - Verify on site and with the Owner available existing controls equipment and interfaces required to connect, monitor, and control equipment supplied under this Contract (including but not limited to boilers, air handlers, pumps, and control valves).

B. Control Devices:

1. Low temperature freeze protection thermostats shall be installed downstream of the heating coils in HVAC units.
2. All thermostats shall be field calibrated and verified.
3. Outdoor air sensors shall be installed on the north or west walls/equipment, and provided with sun and damage guards.
4. Immersion sensors shall be provided with immersion wells.
5. Install averaging elements in ducts and plenums in crossing or zigzag pattern.

C. Special Equipment: Install in accordance with manufacturer's instructions and recommendations. All control instruments, valves, etc., shall be carefully adjusted and set for proper operating of the equipment served as noted herein or as required by the equipment manufacturer's instructions and recommendations.

D. Install automatic dampers according to Division 23 Section "Air Duct Accessories."

E. Install damper motors on outside of duct in warm areas, not in locations exposed to outdoor temperatures.

F. Install hydronic instrument wells, valves, and other accessories according to Division 23 Section "Hydronic Piping."
G. Install labels and nameplates to identify control components according to Division 23 Section "Identification for HVAC Piping and Equipment."

3.2 FIELD QUALITY CONTROL

A. Provide field supervision, and calibration and start up service.

B. Upon completion of the work, the Contractor shall instruct the Owner's Operating Engineer and acquaint him with all of the operating characteristics of all equipment installed by him including the TCS and all other systems, at the same time operating each and every system individually for a period of two days, unless otherwise specified. During this two day period the building's Operations Manual shall be used for reference.

3.3 ADJUSTING

A. Calibrating and Adjusting:

1. Provide diagnostic and test instruments for calibration and adjustment of system.
2. Provide written description of procedures and equipment for calibrating each type of instrument. Submit procedures review and approval before initiating startup procedures.

B. Adjust initial temperature and humidity set points (if applicable).

END OF SECTION 230913
SECTION 231123 - FACILITY NATURAL-GAS PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Natural gas piping is required to connect existing gas supply piping to new boilers and air handlers, if required. The Section Includes:

1. Pipes, tubes, and fittings.
2. Piping specialties.
3. Piping and tubing joining materials.
4. Valves.
5. Pressure regulators.

1.3 DEFINITIONS

A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspace, and tunnels.

B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

1.4 PERFORMANCE REQUIREMENTS

A. Minimum Operating-Pressure Ratings:

1. Piping and Valves: 100 psig minimum unless otherwise indicated.
2. Service Regulators: 65 psig minimum unless otherwise indicated.

B. Natural-Gas System Pressure within Buildings: More than 0.5 psig but not more than 2 psig.
1.5 SUBMITTALS

A. Product Data: For each type of the following:
   1. Piping specialties.
   2. Corrugated, stainless-steel tubing with associated components.
   3. Valves. Include pressure rating, capacity, settings, and electrical connection data of selected models.
   4. Pressure regulators. Indicate pressure ratings and capacities.
   5. Dielectric fittings.
   6. Mechanical sleeve seals.
   7. Escutcheons.

B. Qualification Data: For qualified professional engineer.

C. Welding certificates.

D. Field quality-control reports.

E. Operation and Maintenance Data: For pressure regulators to include in emergency, operation, and maintenance manuals.

1.6 QUALITY ASSURANCE

A. Steel Support Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Handling Flammable Liquids: Remove and dispose of liquids from existing natural-gas piping according to requirements of authorities having jurisdiction.

B. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

C. Store and handle pipes and tubes having factory-applied protective coatings to avoid damaging coating, and protect from direct sunlight.

D. Protect stored PE pipes and valves from direct sunlight.
1.8 PROJECT CONDITIONS

A. Perform site survey, research public utility records, and verify existing utility locations. Contact utility-locating service for area where Project is located.

1.9 COORDINATION

A. Coordinate requirements for access panels and doors for valves installed concealed behind finished surfaces. Comply with requirements in Division 08 Section "Access Doors and Frames."

PART 2 - PRODUCTS

2.1 PIPES, TUBES, AND FITTINGS

A. Steel Pipe: ASTM A 53/A 53M, black steel, Schedule 40, Type E or S, Grade B.

4. Forged-Steel Flanges and Flanged Fittings: ASME B16.5, minimum Class 150, including bolts, nuts, and gaskets of the following material group, end connections, and facings:
   b. End Connections: Threaded or butt welding to match pipe.
   c. Lapped Face: Not permitted underground.
   e. Bolts and Nuts: ASME B18.2.1, carbon steel aboveground and stainless steel underground.

5. Protective Coating for Underground Piping: Factory-applied, three-layer coating of epoxy, adhesive, and PE.
   a. Joint Cover Kits: Epoxy paint, adhesive, and heat-shrink PE sleeves.

6. Mechanical Couplings:
   a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      1) Dresser Piping Specialties; Division of Dresser, Inc.
      2) Smith-Blair, Inc.
b. Steel flanges and tube with epoxy finish.
c. Buna-nitrile seals.
d. Steel bolts, washers, and nuts.
e. Coupling shall be capable of joining PE pipe to PE pipe, steel pipe to PE pipe, or steel pipe to steel pipe.
f. Steel body couplings installed underground on plastic pipe shall be factory equipped with anode.

2.2 PIPING SPECIALTIES

A. Appliance Flexible Connectors:
   3. Corrugated stainless-steel tubing with polymer coating.
   4. Operating-Pressure Rating: 0.5 psig.
   5. End Fittings: Zinc-coated steel.
   7. Maximum Length: 72 inches.

B. Weatherproof Vent Cap: Cast- or malleable-iron increaser fitting with corrosion-resistant wire screen, with free area at least equal to cross-sectional area of connecting pipe and threaded-end connection.

2.3 JOINING MATERIALS

A. Joint Compound and Tape: Suitable for natural gas.


2.4 MANUAL GAS SHUTOFF VALVES

A. See "Aboveground Manual Gas Shutoff Valve Schedule" Article for where each valve type is applied in various services.

B. General Requirements for Metallic Valves, NPS 2 and Smaller: Comply with ASME B16.33.
   1. CWP Rating: 125 psig.
   3. Dryseal Threads on Flare Ends: Comply with ASME B1.20.3.
   5. Listing: Listed and labeled by an NRTL acceptable to authorities having jurisdiction for valves 1 inch and smaller.
6. Service Mark: Valves 1-1/4 inches to NPS 2 shall have initials "WOG" permanently marked on valve body.

C. General Requirements for Metallic Valves, NPS 2-1/2 and Larger: Comply with ASME B16.38.

1. CWP Rating: 125 psig.
2. Flanged Ends: Comply with ASME B16.5 for steel flanges.
4. Service Mark: Initials "WOG" shall be permanently marked on valve body.

D. One-Piece, Bronze Ball Valve with Bronze Trim: MSS SP-110.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. BrassCraft Manufacturing Company; a Masco company.
   c. Lyall, R. W. & Company, Inc.
   e. Perfection Corporation; a subsidiary of American Meter Company.
3. Ball: Chrome-plated brass.
4. Stem: Bronze; blowout proof.
5. Seats: Reinforced TFE; blowout proof.
6. Packing: Separate packnut with adjustable-stem packing threaded ends.
8. CWP Rating: 600 psig.
9. Listing: Valves NPS 1 and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
10. Service: Suitable for natural-gas service with "WOG" indicated on valve body.

E. Two-Piece, Full-Port, Bronze Ball Valves with Bronze Trim: MSS SP-110.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. BrassCraft Manufacturing Company; a Masco company.
   c. Lyall, R. W. & Company, Inc.
   e. Perfection Corporation; a subsidiary of American Meter Company.
3. Ball: Chrome-plated bronze.
4. Stem: Bronze; blowout proof.
5. Seats: Reinforced TFE; blowout proof.
6. Packing: Threaded-body packnut design with adjustable-stem packing.
8. CWP Rating: 600 psig.
9. Listing: Valves NPS 1 and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
10. Service: Suitable for natural-gas service with "WOG" indicated on valve body.

F. Bronze Plug Valves: MSS SP-78.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Lee Brass Company.
   5. Operator: Square head or lug type with tamperproof feature where indicated.
   6. Pressure Class: 125 psig.
   7. Listing: Valves NPS 1 and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
   8. Service: Suitable for natural-gas service with "WOG" indicated on valve body.

G. Cast-Iron, Nonlubricated Plug Valves: MSS SP-78.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      c. Xomox Corporation; a Crane company.
   2. Body: Cast iron, complying with ASTM A 126, Class B.
   3. Plug: Bronze or nickel-plated cast iron.
   4. Seat: Coated with thermoplastic.
   5. Stem Seal: Compatible with natural gas.
   7. Operator: Square head or lug type with tamperproof feature where indicated.
   8. Pressure Class: 125 psig.
   9. Listing: Valves NPS 1 and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
   10. Service: Suitable for natural-gas service with "WOG" indicated on valve body.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Flowserve.
   b. Homestead Valve; a division of Olson Technologies, Inc.
   d. Milliken Valve Company.
   e. Mueller Co.; Gas Products Div.

2. Body: Cast iron, complying with ASTM A 126, Class B.
3. Plug: Bronze or nickel-plated cast iron.
4. Seat: Coated with thermoplastic.
5. Stem Seal: Compatible with natural gas.
7. Operator: Square head or lug type with tamperproof feature where indicated.
8. Pressure Class: 125 psig.
9. Listing: Valves NPS 1 and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
10. Service: Suitable for natural-gas service with "WOG" indicated on valve body.

2.5 PRESSURE REGULATORS

A. General Requirements:
   1. Single stage and suitable for natural gas.
   2. Steel jacket and corrosion-resistant components.
   3. Elevation compensator.
   4. End Connections: Threaded for regulators NPS 2 and smaller; flanged for regulators NPS 2-1/2 and larger.

B. Service Pressure Regulators: Comply with ANSI Z21.80.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. American Meter Company.
      b. Fisher Control Valves and Regulators; Division of Emerson Process Management.
      c. Invensys.

   2. Body and Diaphragm Case: Cast iron or die-cast aluminum.
   5. Seat Disc: Nitrile rubber resistant to gas impurities, abrasion, and deformation at the valve port.
   6. Orifice: Aluminum; interchangeable.
8. Single-port, self-contained regulator with orifice no larger than required at maximum pressure inlet, and no pressure sensing piping external to the regulator.
9. Pressure regulator shall maintain discharge pressure setting downstream, and not exceed 150 percent of design discharge pressure at shutoff.
11. Atmospheric Vent: Factory- or field-installed, stainless-steel screen in opening if not connected to vent piping.
12. Maximum Inlet Pressure: 100 psig.

   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. American Meter Company.
      b. Fisher Control Valves and Regulators; Division of Emerson Process Management.
      c. Invensys.
      d. Maxitrol Company.

   2. Body and Diaphragm Case: Cast iron or die-cast aluminum.
   5. Seat Disc: Nitrile rubber resistant to gas impurities, abrasion, and deformation at the valve port.
   6. Orifice: Aluminum; interchangeable.
   8. Single-port, self-contained regulator with orifice no larger than required at maximum pressure inlet, and no pressure sensing piping external to the regulator.
   9. Pressure regulator shall maintain discharge pressure setting downstream, and not exceed 150 percent of design discharge pressure at shutoff.
   11. Atmospheric Vent: Factory- or field-installed, stainless-steel screen in opening if not connected to vent piping.

   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Canadian Meter Company Inc.
      b. Eaton Corporation; Controls Div.
      c. Harper Wyman Co.
      d. Maxitrol Company.
      e. SCP, Inc.

   5. Seat Disc: Nitrile rubber.
8. Regulator may include vent limiting device, instead of vent connection, if approved by authorities having jurisdiction.

2.6 DIELECTRIC FITTINGS

A. Dielectric Unions:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      b. Central Plastics Company.
      e. Watts Regulator Co.; Division of Watts Water Technologies, Inc.
      f. Wilkins; Zurn Plumbing Products Group.
   3. Combination fitting of copper alloy and ferrous materials.
   4. Insulating materials suitable for natural gas.
   5. Combination fitting of copper alloy and ferrous materials with threaded, brazed-joint, plain, or welded end connections that match piping system materials.

B. Dielectric Flanges:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      b. Central Plastics Company.
      c. Watts Regulator Co.; Division of Watts Water Technologies, Inc.
      d. Wilkins; Zurn Plumbing Products Group.
   3. Combination fitting of copper alloy and ferrous materials.
   4. Insulating materials suitable for natural gas.
   5. Combination fitting of copper alloy and ferrous materials with threaded, brazed-joint, plain, or welded end connections that match piping system materials.

C. Dielectric-Flange Kits:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Advance Products & Systems, Inc.
3. Companion-flange assembly for field assembly.
4. Include flanges, full-face- or ring-type neoprene or phenolic gasket, phenolic or PE bolt sleeves, phenolic washers, and steel backing washers.
5. Insulating materials suitable for natural gas.
6. Combination fitting of copper alloy and ferrous materials with threaded, brazed-joint, plain, or welded end connections that match piping system materials.

2.7 LABELING AND IDENTIFYING

A. Detectable Warning Tape: Acid- and alkali-resistant, PE film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description of utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored yellow.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in for natural-gas piping system to verify actual locations of piping connections before equipment installation.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Close equipment shutoff valves before turning off natural gas to premises or piping section.

B. Inspect natural-gas piping according to NFPA 54 and the International Fuel Gas Code to determine that natural-gas utilization devices are turned off in piping section affected.

C. Comply with NFPA 54 and the International Fuel Gas Code requirements for prevention of accidental ignition.

3.3 OUTDOOR PIPING INSTALLATION

B. Install underground, natural-gas piping buried at least 36 inches below finished grade. Comply with requirements in Division 31 Section "Earth Moving" for excavating, trenching, and backfilling.

1. If natural-gas piping is installed less than 36 inches below finished grade, install it in containment conduit.

C. Steel Piping with Protective Coating:

1. Apply joint cover kits to pipe after joining to cover, seal, and protect joints.
2. Repair damage to PE coating on pipe as recommended in writing by protective coating manufacturer.
3. Replace pipe having damaged PE coating with new pipe.

D. Install fittings for changes in direction and branch connections.

E. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

1. Install steel pipe for sleeves smaller than 6 inches in diameter.
2. Install cast-iron "wall pipes" for sleeves 6 inches and larger in diameter.

F. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

G. Install pressure gage downstream from each service regulator. Pressure gages are specified in Division 23 Section "Meters and Gages for HVAC Piping."

3.4 INDOOR PIPING INSTALLATION


B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

C. Arrange for pipe spaces, chases, slots, sleeves, and openings in building structure during progress of construction, to allow for mechanical installations.

D. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.
E. Install piping at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

F. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

G. Locate valves for easy access.

H. Install natural-gas piping at uniform grade of 2 percent down toward drip and sediment traps.

I. Install piping free of sags and bends.

J. Install fittings for changes in direction and branch connections.

K. Install escutcheons at penetrations of interior walls, ceilings, and floors.

1. New Piping:
   a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
   b. Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, cast-brass type with polished chrome-plated finish.
   c. Piping at Ceiling Penetrations in Finished Spaces: One-piece or split-casting], cast-brass type with polished chrome-plated finish.
   d. Piping in Unfinished Service Spaces: One-piece, cast-brass type with rough-brass finish.
   e. Piping in Equipment Rooms: One-piece, cast-brass type.
   f. Piping at Floor Penetrations in Equipment Rooms: One-piece, floor-plate type.

L. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements in Division 07 Section "Penetration Firestopping."

M. Verify final equipment locations for roughing-in.

N. Comply with requirements in Sections specifying gas-fired appliances and equipment for roughing-in requirements.

O. Drips and Sediment Traps: Install drips at points where condensate may collect, including service-meter outlets. Locate where accessible to permit cleaning and emptying. Do not install where condensate is subject to freezing.

1. Construct drips and sediment traps using tee fitting with bottom outlet plugged or capped. Use nipple a minimum length of 3 pipe diameters, but not less than 3 inches long and same size as connected pipe. Install with space below bottom of drip to remove plug or cap.

P. Extend relief vent connections for service regulators, line regulators, and overpressure protection devices to outdoors and terminate with weatherproof vent cap.
Q. Conceal pipe installations in walls, pipe spaces, utility spaces, above ceilings, below grade or floors, and in floor channels unless indicated to be exposed to view.

R. Use eccentric reducer fittings to make reductions in pipe sizes. Install fittings with level side down.

S. Connect branch piping from top or side of horizontal piping.

T. Install unions in pipes NPS 2 and smaller, adjacent to each valve, at final connection to each piece of equipment. Unions are not required at flanged connections.

U. Do not use natural-gas piping as grounding electrode.

V. Install pressure gage downstream from each line regulator. Pressure gages are specified in Division 23 Section "Meters and Gages for HVAC Piping."

3.5 VALVE INSTALLATION

A. Install manual gas shutoff valve for each gas appliance ahead of corrugated stainless-steel tubing connector.

B. Install regulators and overpressure protection devices with maintenance access space adequate for servicing and testing.

3.6 PIPING JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs.

B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

C. Threaded Joints:

1. Thread pipe with tapered pipe threads complying with ASME B1.20.1.
2. Cut threads full and clean using sharp dies.
3. Ream threaded pipe ends to remove burrs and restore full inside diameter of pipe.
4. Apply appropriate tape or thread compound to external pipe threads unless dryseal threading is specified.
5. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

D. Welded Joints:

2. Bevel plain ends of steel pipe.
3. Patch factory-applied protective coating as recommended by manufacturer at field welds and where damage to coating occurs during construction.

E. Flanged Joints: Install gasket material, size, type, and thickness appropriate for natural-gas service. Install gasket concentrically positioned.

F. Flared Joints: Cut tubing with roll cutting tool. Flare tube end with tool to result in flare dimensions complying with SAE J513. Tighten finger tight, then use wrench. Do not overtightly.

3.7 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements for pipe hangers and supports specified in Division 23 Section "Hangers and Supports for HVAC Piping and Equipment."

B. Install hangers for horizontal steel piping with the following maximum spacing and minimum rod sizes:
   1. NPS 1 and Smaller: Maximum span, 96 inches; minimum rod size, 3/8 inch.
   2. NPS 1-1/4: Maximum span, 108 inches; minimum rod size, 3/8 inch.
   3. NPS 1-1/2 and NPS 2: Maximum span, 108 inches; minimum rod size, 3/8 inch.
   4. NPS 2-1/2 to NPS 3-1/2: Maximum span, 10 feet; minimum rod size, 1/2 inch.
   5. NPS 4 and Larger: Maximum span, 10 feet; minimum rod size, 5/8 inch.

3.8 CONNECTIONS

A. Connect to utility's gas main according to utility's procedures and requirements.

B. Install natural-gas piping electrically continuous, and bonded to gas appliance equipment grounding conductor of the circuit powering the appliance according to NFPA 70.

C. Install piping adjacent to appliances to allow service and maintenance of appliances.

D. Connect piping to appliances using manual gas shutoff valves and unions. Install valve within 72 inches of each gas-fired appliance and equipment. Install union between valve and appliances or equipment.

E. Sediment Traps: Install tee fitting with capped nipple in bottom to form drip, as close as practical to inlet of each appliance.

3.9 LABELING AND IDENTIFYING

A. Comply with requirements in Division 23 Section "Identification for HVAC Piping and Equipment" for piping and valve identification.
B. Install detectable warning tape directly above gas piping, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.10 PAINTING

A. Comply with requirements in Division 09 painting Sections for painting interior and exterior natural-gas piping.

B. Paint exposed, exterior metal piping, valves, and piping specialties, except components, with factory-applied paint or protective coating.

1. Alkyd System: MPI EXT 5.1D.
   c. Topcoat: Exterior alkyd enamel (semigloss).
   d. Color: Gray.

C. Paint exposed, interior metal piping, valves, and piping specialties, except components, with factory-applied paint or protective coating.

1. Latex Over Alkyd Primer System: MPI INT 5.1Q.
   c. Topcoat: Interior latex (semigloss).
   d. Color: Gray.

D. Damage and Touchup: Repair marred and damaged factory-applied finishes with materials and by procedures to match original factory finish.

3.11 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

1. Test, inspect, and purge natural gas according to NFPA 54 and the International Fuel Gas Code and authorities having jurisdiction.

C. Natural-gas piping will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports and submit to Architect.

3.12 OUTDOOR PIPING SCHEDULE

A. Aboveground natural-gas piping shall be one of the following:
1. Steel pipe with malleable-iron fittings and threaded joints.
2. Steel pipe with wrought-steel fittings and welded joints.

3.13 INDOOR PIPING SCHEDULE FOR SYSTEM PRESSURES LESS THAN, EQUAL TO 0.5 PSIG

A. Aboveground, branch piping NPS 1 and smaller shall be the following:
   1. Steel pipe with malleable-iron fittings and threaded joints.

B. Aboveground, distribution piping shall be one of the following:
   1. Steel pipe with malleable-iron fittings and threaded joints.
   2. Steel pipe with wrought-steel fittings and welded joints.

3.14 INDOOR PIPING SCHEDULE FOR SYSTEM PRESSURES MORE THAN 0.5 PSIG AND LESS THAN 5 PSIG

A. Aboveground, branch piping NPS 1 and smaller shall be the following:
   1. Steel pipe with malleable-iron fittings and threaded joints.

B. Aboveground, distribution piping shall be one of the following:
   1. Steel pipe with malleable-iron fittings and threaded joints.
   2. Steel pipe with metal welding fittings and welded joints.

3.15 ABOVEGROUND MANUAL GAS SHUTOFF VALVE SCHEDULE

A. Valves for pipe sizes NPS 2 and smaller at service meter shall be one of the following:
   1. One-piece, bronze ball valve with bronze trim.
   2. Two-piece, full-port, bronze ball valves with bronze trim.

B. Valves for pipe sizes NPS 2-1/2 and larger at service meter shall be one of the following:
   1. Two-piece, full-port, bronze ball valves with bronze trim.
   2. Bronze plug valve.
   3. Cast-iron, nonlubricated plug valve.

C. Distribution piping valves for pipe sizes NPS 2 and smaller shall be one of the following:
   1. One-piece, bronze ball valve with bronze trim.
   2. Two-piece, full-port, bronze ball valves with bronze trim.
D. Distribution piping valves for pipe sizes NPS 2-1/2 and larger shall be one of the following:

1. Two-piece, full-port, bronze ball valves with bronze trim.
2. Bronze plug valve.
3. Cast-iron, lubricated plug valve.

E. Valves in branch piping for single appliance shall be one of the following:

1. One-piece, bronze ball valve with bronze trim.
2. Two-piece, full-port, bronze ball valves with bronze trim.

END OF SECTION 231123
SECTION 232113 - HYDRONIC PIPING

PART 1 - GENERAL

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

1.2 SUMMARY
   A. Section includes pipe and fitting materials and joining methods for the following:
      1. Hot-water heating piping.

1.3 INFORMATIONAL SUBMITTALS
   A. Qualification Data: For Installer.
   B. Welding certificates.
   C. Field quality-control reports.

1.4 QUALITY ASSURANCE
   A. Steel Support Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
   B. Pipe Welding: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code: Section IX.
      2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS
   A. Hydronic piping components and installation shall be capable of withstanding the following minimum working pressure and temperature unless otherwise indicated:
1. Hot-Water Heating Piping: 125 psig at 200 deg F.

2.2 COPPER TUBE AND FITTINGS

A. Drawn-Temper Copper Tubing: ASTM B 88, Type L.

   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Anvil International.
      b. Victaulic Company.
   2. Grooved-End Copper Fittings: ASTM B 75 (ASTM B 75M), copper tube or ASTM B 584, bronze casting.
   3. Grooved-End-Tube Couplings: Rigid pattern unless otherwise indicated; gasketed fitting. Ductile-iron housing with keys matching pipe and fitting grooves, [prelubricated] EPDM gasket rated for minimum 230 deg F (110 deg C) for use with housing, and steel bolts and nuts.

C. Copper or Bronze Pressure-Seal Fittings:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. NIBCO INC.
      b. Viega LLC.
   2. Housing: Copper.
   3. O-Rings and Pipe Stops: EPDM.
   4. Tools: Manufacturer's special tools.
   5. Minimum 200-psig (1379-kPa) working-pressure rating at 250 deg F (121 deg C).

D. Copper, Mechanically Formed Tee Option: For forming T-branch on copper water tube.
   1. Manufacturers: Subject to compliance with requirements, provide products by the following:
      a. T-DRILL Industries Inc.

2.3 STEEL PIPE AND FITTINGS

A. Steel Pipe: ASTM A 53/A 53M, black steel with plain ends; welded and seamless, Grade B, and wall thickness as indicated in "Piping Applications" Article.
B. Wrought-Steel Fittings: ASTM A 234/A 234M, wall thickness to match adjoining pipe.

C. Grooved Mechanical-Joint Fittings and Couplings:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Anvil International.
      b. Victaulic Company.
   2. Joint Fittings: ASTM A 536, Grade 65-45-12 ductile iron; ASTM A 47/A 47M, Grade 32510 malleable iron; ASTM A 53/A 53M, Type F, E, or S, Grade B fabricated steel; or ASTM A 106/A 106M, Grade B steel fittings with grooves or shoulders constructed to accept grooved-end couplings; with nuts, bolts, locking pin, locking toggle, or lugs to secure grooved pipe and fittings.
   3. Couplings: Ductile- or malleable-iron housing and EPDM gasket of central cavity pressure-responsive design; with nuts, bolts, locking pin, locking toggle, or lugs to secure grooved pipe and fittings.

D. Steel Pipe Nipples: ASTM A 733, made of same materials and wall thicknesses as pipe in which they are installed.

2.4 JOINING MATERIALS

A. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.
   1. ASME B16.21, nonmetallic, flat, asbestos free, 1/8-inch maximum thickness unless otherwise indicated.
      a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.

B. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

C. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS

A. Hot-water heating piping, above ground shall be the following:
   1. Piping NTS 2 and smaller: Type L drawn-temper copper tubing, wrought-copper fittings, and soldered joints.
2. Piping NTS 2½ and larger: Schedule 40, Grade B, Type 96 steel pipe; Class 150, malleable-iron fittings; cast-iron flanges and flange fittings; and threaded joints.

B. Safety-Valve-Inlet and -Outlet Piping for Hot-Water Piping: Same materials and joining methods as for piping specified for the service in which safety valve is installed with metal-to-plastic transition fittings for plastic piping systems according to piping manufacturer's written instructions.

3.2 PIPING INSTALLATIONS

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

B. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

C. Install piping to permit valve servicing.

D. Install piping free of sags and bends.

E. Install fittings for changes in direction and branch connections.

F. Install piping to allow application of insulation.

G. Select system components with pressure rating equal to or greater than system operating pressure.

H. Install groups of pipes parallel to each other, spaced to permit applying insulation and servicing of valves.

I. Reduce pipe sizes using eccentric reducer fitting installed with level side up.

J. Install valves according to Section 230523 "General-Duty Valves for HVAC Piping."

K. Install unions in piping adjacent to valves, at final connections of equipment, and elsewhere as indicated.

3.3 HANGERS AND SUPPORTS

A. Comply with requirements in Section 230529 "Hangers and Supports for HVAC Piping and Equipment" for hanger, support, and anchor devices. Comply with the following requirements for maximum spacing of supports.

B. Install the following pipe attachments:

1. Adjustable steel clevis hangers for individual horizontal piping less than 20 feet long.
2. Provide copper-clad hangers and supports for hangers and supports in direct contact with copper pipe.

3.4 PIPE JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

C. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.

D. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
   1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
   2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

E. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

3.5 TERMINAL EQUIPMENT CONNECTIONS

A. Sizes for supply and return piping connections shall be the same as or larger than equipment connections.

3.6 FIELD QUALITY CONTROL

A. Prepare hydronic piping according to ASME B31.9 and as follows:
   1. Leave joints, including welds, uninsulated and exposed for examination during test.
   2. Isolate equipment from piping. If a valve is used to isolate equipment, its closure shall be capable of sealing against test pressure without damage to valve. Install blinds in flanged joints to isolate equipment.
   3. Install safety valve, set at a pressure no more than one-third higher than test pressure, to protect against damage by expanding liquid or other source of overpressure during test.

B. Perform the following tests on hydronic piping:

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1. Use ambient temperature water as a testing medium unless there is risk of damage due to freezing. Another liquid that is safe for workers and compatible with piping may be used.

2. While filling system, use vents installed at high points of system to release air. Use drains installed at low points for complete draining of test liquid.

3. Isolate expansion tanks and determine that hydronic system is full of water.

4. Subject piping system to hydrostatic test pressure that is not less than 1.5 times the system's working pressure. Test pressure shall not exceed maximum pressure for any vessel, pump, valve, or other component in system under test. Verify that stress due to pressure at bottom of vertical runs does not exceed 90 percent of specified minimum yield strength or 1.7 times the "SE" value in Appendix A in ASME B31.9, "Building Services Piping."

5. After hydrostatic test pressure has been applied for at least 10 minutes, examine piping, joints, and connections for leakage. Eliminate leaks by tightening, repairing, or replacing components, and repeat hydrostatic test until there are no leaks.

6. Prepare written report of testing.

END OF SECTION 232113
SECTION 232116 - HYDRONIC PIPING SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes special-duty valves and specialties for the following:
   1. Hot-water heating piping.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of the following:
   1. Valves: Include flow and pressure drop curves based on manufacturer's testing for calibrated-orifice balancing valves and automatic flow-control valves.
   2. Air-control devices.
   3. Hydronic specialties.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For air-control devices, hydronic specialties, and special-duty valves to include in emergency, operation, and maintenance manuals.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Differential Pressure Meter: For each type of balancing valve and automatic flow control valve, include flowmeter, probes, hoses, flow charts, and carrying case.

1.6 QUALITY ASSURANCE

A. Pipe Welding: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code: Section IX.

   1. Safety valves and pressure vessels shall bear the appropriate ASME label. Fabricate and stamp air separators and expansion tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Hydronic piping components and installation shall be capable of withstanding the following minimum working pressure and temperature unless otherwise indicated:
1. Hot-Water Heating Piping: 120 psig at 180 deg F.
2. Air-Vent Piping: 180 deg F.
3. Safety-Valve-Inlet and -Outlet Piping: Equal to the pressure of the piping system to which it is attached.

2.2 VALVES

A. Gate, Globe, Check, Ball, and Butterfly Valves: Comply with requirements specified in Section 230523 "General-Duty Valves for HVAC Piping."

B. Stainless-Steel Bellow, Flexible Connectors:
   2. End Connections: Threaded or flanged to match equipment connected.
   4. CWP Rating: 150 psig.
   5. Maximum Operating Temperature: 250 deg F.

2.3 AIR CONTROL DEVICES

A. Automatic Air Vents:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. AMTROL, Inc.
      b. Armstrong Pumps, Inc.
      c. Bell & Gossett; a Xylem brand.
      d. Nexus Valve, Inc.
      e. Taco, Inc.
   2. Body: Bronze or cast iron.
   3. Internal Parts: Nonferrous.
   5. Inlet Connection: NPS 1/2 (DN 15).
   7. CWP Rating: 150 psig (1035 kPa).
2.4 HYDRONIC PIPING SPECIALTIES

A. Y-Pattern Strainers:
   1. Body: ASTM A 126, Class B, cast iron with bolted cover and bottom drain connection.
   2. End Connections: Threaded ends for NPS 2 (DN 50) and smaller; flanged ends for NPS 2-1/2 (DN 65) and larger.
   3. Strainer Screen: Stainless-steel, 60-mesh strainer, or perforated stainless-steel basket.

PART 3 - EXECUTION

3.1 VALVE APPLICATIONS

A. Install shutoff-duty valves at each branch connection to supply mains and at supply connection to each piece of equipment.

B. Install check valves at each pump discharge and elsewhere as required to control flow direction.

C. Install safety valves at hot-water generators and elsewhere as required by ASME Boiler and Pressure Vessel Code. Install drip-pan elbow on safety-valve outlet and pipe without valves to the outdoors; pipe drain to nearest floor drain or as indicated on Drawings. Comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1, for installation requirements.

D. Install pressure-reducing valves at makeup-water connection to regulate system fill pressure.

3.2 HYDRONIC SPECIALTIES INSTALLATION

A. Install piping from boiler air outlet, air separator, to expansion tank with a 2 percent upward slope toward tank.

B. Install automatic air vents at high points of system piping in mechanical equipment rooms only. Install manual vents at heat-transfer coils and elsewhere as required for air venting.

C. Install tangential air separator in pump suction.

D. Install expansion tanks on the floor. Vent and purge air from hydronic system, and ensure that tank is properly charged with air to suit system Project requirements.

END OF SECTION 232116
SECTION 235216 - CONDENSING BOILERS

PART 1 - GENERAL

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

1.2 SUMMARY
   A. Condensing boilers are required as replacement for boilers at both the Human Services Building and the Youth Center. Section includes gas-fired, high efficiency condensing water tube boilers, trim, and accessories for generating hot water.

1.3 ACTION SUBMITTALS
   A. Product Data: For each type of product.
      1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for boilers.
      2. Include rated capacities, operating characteristics, and furnished specialties and accessories.

1.4 INFORMATIONAL SUBMITTALS
   A. Source quality-control reports.
   B. Field quality-control reports.
   C. Sample Warranty: For special warranty.
   D. Other Informational Submittals:
      1. ASME Stamp Certification and Report: Submit "A," "S," or "PP" stamp certificate of authorization, as required by authorities having jurisdiction, and document hydrostatic testing of piping external to boiler.
      2. CSA B51 pressure vessel Canadian Registration Number (CRN).

1.5 CLOSEOUT SUBMITTALS
   A. Operation and Maintenance Data: For boilers to include in emergency, operation, and maintenance manuals.
1.6 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace components of boilers that fail in materials or workmanship within specified warranty period.

1. Warranty Period for Water-Tube Condensing Boilers: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. ASME Compliance: Fabricate and label boilers to comply with 2010 ASME Boiler and Pressure Vessel Code.

C. ASHRAE/IES 90.1 Compliance: Boilers shall have minimum efficiency according to "Gas and Oil Fired Boilers - Minimum Efficiency Requirements."

D. DOE Compliance: Minimum efficiency shall comply with 10 CFR 430, Subpart B, Appendix N.

E. UL Compliance: Test boilers for compliance with UL 795. Boilers shall be listed and labeled by a testing agency acceptable to authorities having jurisdiction.

F. CSA Compliance: Test boilers for compliance with CSA B51.

2.2 WATER-TUBE CONDENSING BOILERS

A. Basis-of-Design: high efficiency water tube condensing boiler shall be Lochinvar Knight XL (Human Services Building) and Lochinvar Crest (Youth Center) heating boiler as scheduled on the drawings and as specified below, or an equal approved product meeting the following criteria as manufactured by:

1. Weil McLain
2. Buderus
3. Burnham

B. Description: Factory-fabricated, -assembled, and -tested, copper-finned, water-tube condensing boiler with heat exchanger sealed pressure tight, built on a steel base, including insulated jacket; flue-gas vent; combustion-air intake connections; water supply, return, and condensate drain connections; and controls. Water-heating service only.

D. Combustion Chamber: Stainless steel, sealed.

E. Burner: Natural gas, forced draft drawing from gas premixing valve.

F. Blower: Centrifugal fan to operate during each burner firing sequence and to prepurge and postpurge the combustion chamber.
   1. Motors: Comply with NEMA designation, temperature rating, service factor, and efficiency requirements for motors specified in Section 230513 "Common Motor Requirements for HVAC Equipment."
      a. Motor Sizes: Minimum size as indicated; if not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.

G. Gas Train: Combination gas valve with manual shutoff and pressure regulator.

H. Ignition: Silicone carbide hot-surface ignition that includes flame safety supervision and 100 percent main-valve shutoff.

I. Integral Circulator: Cast-iron body and stainless-steel impeller sized for minimum flow required in heat exchanger.

J. Casing:
   1. Jacket: Sheet metal, with snap-in or interlocking closures.
   2. Control Compartment Enclosures: NEMA 250, Type 1A.
   4. Insulation: Minimum 1-inch-thick, mineral-fiber insulation surrounding the heat exchanger.

K. Capacities and Characteristics: Refer to Drawing Equipment Schedules.

2.3 TRIM

A. Aquastat Controllers: Operating, firing rate, and high limit.

B. Safety Relief Valve: ASME rated.

C. Pressure and Temperature Gage: Minimum 3-1/2-inch-diameter, combination water-pressure and -temperature gage. Gages shall have operating-pressure and -temperature ranges, so normal operating range is about 50 percent of full range.

D. Boiler Air Vent: Automatic.

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F. Circulation Pump: Nonoverloading, in-line pump with split-capacitor motor having thermal-overload protection and lubricated bearings; designed to operate at specified boiler pressures and temperatures.

2.4 CONTROLS

A. Boiler operating controls shall include the following devices and features:

1. Control transformer.
2. Set-Point Adjust: Set points shall be adjustable.
3. Operating Pressure Control: Factory wired and mounted to cycle burner.
4. Sequence of Operation: Electric, factory-fabricated and field-installed panel to control burner firing rate to maintain space temperature in response to thermostat with heat anticipator located in heated space.
   a. Include automatic, alternating-firing sequence for multiple boilers to ensure maximum system efficiency throughout the load range and to provide equal runtime for boilers.

5. Sequence of Operation: Electric, factory-fabricated and field-installed panel to control burner firing rate to reset supply-water temperature inversely with outside-air temperature. At 0 deg F outside-air temperature, set supply-water temperature at 180 deg F; at 60 deg F outside-air temperature, set supply-water temperature at 140 deg F.
   a. Include automatic, alternating-firing sequence for multiple boilers to ensure maximum system efficiency throughout the load range and to provide equal runtime for boilers.

B. Burner Operating Controls: To maintain safe operating conditions, burner safety controls limit burner operation.

1. High Cutoff: Manual reset stops burner if operating conditions rise above maximum boiler design temperature.
2. Low-Water Cutoff Switch: Electronic probe shall prevent burner operation on low water. Cutoff switch shall be manual-reset type.
4. Audible Alarm: Factory mounted on control panel with silence switch; shall sound alarm for above conditions.

C. Building Automation System (BAS) Interface: Factory install hardware and software to enable building automation system to monitor, control, and display boiler status and alarms. Existing BAS for both buildings is Trane Tracer. The Contractor shall provide all required equipment, software, wiring, and logic to connect and control boilers and pumps supplied under this contract with the existing BAS.

1. Hardwired Points:
b. Control: On/off operation, hot-water-supply temperature set-point adjustment.
c. Primary and Secondary Heating Pumps – monitor on/off operation with control by the boiler on-board controller.

2. A communication interface with building automation system shall enable building automation system operator to remotely control and monitor each boiler from an existing operator workstation. Control features available, and monitoring points displayed, locally at boiler control panel shall be available through the BAS.

2.5 ELECTRICAL POWER

A. Controllers, Electrical Devices, and Wiring: Electrical devices and connections are specified in electrical Sections.

B. Single-Point Field Power Connection: Factory-installed and -wired switches, motor controllers, transformers, and other electrical devices necessary shall provide a single-point field power connection to boiler.

2. Wiring shall be numbered and color coded to match wiring diagram.
3. Install factory wiring outside of an enclosure in a metal raceway.
4. Field power interface shall be to nonfused disconnect switch.
5. Provide branch power circuit to each motor and to controls.
6. Provide each motor with overcurrent protection.

2.6 VENTING KITS

A. Kit: Complete system, ASTM A 959, Type 29-4C stainless steel, pipe, vent terminal, thimble, indoor plate, vent adapter, condensate trap and dilution tank, and sealant.

B. Combustion-Air Intake: Complete system, stainless steel, pipe, vent terminal with screen, inlet air coupling, and sealant.

2.7 SOURCE QUALITY CONTROL

A. Burner and Hydrostatic Test: Factory adjust burner to eliminate excess oxygen, carbon dioxide, oxides of nitrogen emissions, and carbon monoxide in flue gas and to achieve combustion efficiency; perform hydrostatic test.

B. Test and inspect factory-assembled boilers, before shipping, according to 2010 ASME Boiler and Pressure Vessel Code.

C. Allow Owner access to source quality-control testing of boilers. Notify Architect 14 days in advance of testing.
PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in for concrete equipment bases, anchor-bolt sizes and locations, and piping and electrical connections to verify actual locations, sizes, and other conditions affecting performance of the Work.

1. Final boiler locations indicated on Drawings are approximate. Determine exact locations before roughing-in for piping and electrical connections.

B. Examine mechanical spaces for suitable conditions where boilers will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 BOILER INSTALLATION

A. Equipment Mounting:

1. Install boilers on cast-in-place concrete equipment base(s). Comply with requirements for equipment bases and foundations specified in Section 033000 "Cast-in-Place Concrete."
2. Comply with requirements for vibration isolation and seismic-restraint devices specified in Section 230548 "Vibration and Seismic Controls for HVAC."
3. Comply with requirements for vibration isolation devices specified in Section 230548.13 "Vibration Controls for HVAC."

B. Install gas-fired boilers according to NFPA 54.

C. Assemble and install boiler trim.

D. Install electrical devices furnished with boiler but not specified to be factory mounted.

E. Install control wiring to field-mounted electrical devices.

3.3 CONNECTIONS

A. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to boiler to allow service and maintenance.

C. Install piping from equipment drain connection to nearest floor drain. Piping shall be at least full size of connection. Provide an isolation valve if required.

D. Connect piping to boilers, except safety relief valve connections, with flexible connectors of materials suitable for service. Flexible connectors and their installation are specified in Section 232116 "Hydronic Piping Specialties."
E. Connect gas piping to boiler gas-train inlet with union. Piping shall be at least full size of gas-train connection. Provide a reducer if required.

F. Connect hot-water piping to supply- and return-boiler tappings with shutoff valve and union or flange at each connection.

G. Connect steam and condensate piping to supply-, return-, and blowdown-boiler tappings with shutoff valve and union or flange at each connection.

H. Install piping from safety relief valves to nearest floor drain.

I. Install piping from safety valves to drip-pan elbow and to nearest floor drain.

J. Boiler Venting:
   1. Install flue venting kit and combustion-air intake.
   2. Connect full size to boiler connections.

K. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

L. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

3.4 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

C. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
   1. Perform installation and startup checks according to manufacturer's written instructions.
   2. Leak Test: Hydrostatic test. Repair leaks and retest until no leaks exist.
   3. Operational Test: Start units to confirm proper motor rotation and unit operation. Adjust air-fuel ratio and combustion.
   4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
      a. Check and adjust initial operating set points and high- and low-limit safety set points of fuel supply, water level, and water temperature.
      b. Set field-adjustable switches and circuit-breaker trip ranges as indicated.

D. Boiler will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.
F. Performance Tests:

1. Engage a factory-authorized service representative to inspect component assemblies and equipment installations, including connections, and to conduct performance testing.
2. Boilers shall comply with performance requirements indicated, as determined by field performance tests. Adjust, modify, or replace equipment to comply.
3. Perform field performance tests to determine capacity and efficiency of boilers.
   a. Test for full capacity.
   b. Test for boiler efficiency at low fire 20, 40, 60, 80, 100, 80, 60, 40, and 20 percent of full capacity. Determine efficiency at each test point.
4. Repeat tests until results comply with requirements indicated.
5. Provide analysis equipment required to determine performance.
6. Provide temporary equipment and system modifications necessary to dissipate the heat produced during tests if building systems are inadequate.
7. Notify Architect 24 hours minimum in advance of test dates.

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain boilers.

END OF SECTION 235216
SECTION 237413.1 – PACKAGED ROOF TOP AIR HANDLING UNITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Description: Packaged, rooftop 25-Ton air handling units are required for replacement of two rooftop cooling-only air handlers (AHU-1 and AHU-4) at the Forest Health Building. The Work further includes removal of the original air handlers, adaptation of piping, duct, and equipment curbs, and rework of existing controls as required for installation and operation of the replacement units.

B. This Section includes packaged rooftop, outdoor air handling with the following components and accessories:

1. Direct-expansion cooling (R410).
2. 100% Economizer outdoor- and return-air damper section.
3. Integral temperature controls.
4. VFD supply and return/exhaust fans.
5. Roof curbs and adapters.

1.3 DEFINITIONS

A. DDC: Direct-digital controls.

B. BAS: Building Automation System

C. ECM: Electrically commutated motor.

D. Outdoor-Air Refrigerant Coil: Refrigerant coil in the outdoor-air stream to reject heat during cooling operations and to absorb heat during heating operations. "Outdoor air" is defined as the air outside the building or taken from outdoors and not previously circulated through the system.

E. Outdoor-Air: The outdoor-air refrigerant-coil fan in RTUs. "Outdoor air" is defined as the air outside the building or taken from outdoors and not previously circulated through the system.

F. RTU: Rooftop unit. As used in this Section, this abbreviation means packaged, outdoor, central-station air-handling units capable of 100% outdoor air (economizer) and cooling.
G. Supply-Air Fan: The fan providing supply air to conditioned space. "Supply air" is defined as the air entering a space from air-conditioning, heating, or ventilating apparatus.

H. Supply-Air Refrigerant Coil: Refrigerant coil in the supply-air stream to absorb heat (provide cooling) during cooling operations and to reject heat (provide heating) during heating operations. "Supply air" is defined as the air entering a space from air-conditioning, heating, or ventilating apparatus.

1.4 PERFORMANCE REQUIREMENTS

A. Wind-Restraint Performance:
   1. Basic Wind Speed: 90 mph
   2. Building Classification Category: III.
   3. Minimum 10 lb/sq. ft multiplied by the maximum area of the mechanical component projected on a vertical plane that is normal to the wind direction, and 45 degrees either side of normal.

1.5 ACTION SUBMITTALS

A. Product Data: Include manufacturer's technical data for each RTU, including rated capacities, dimensions, required clearances, characteristics, furnished specialties, and accessories.

B. Shop Drawings: Unit drawings shall be provided that indicate assembly, unit dimensions, construction details, clearances and connection details. Computer generated fan curves for each fan shall be submitted with specific design operation point noted. Wiring diagram shall be provided with details for both power and control systems and differentiate between factory installed and field installed wiring.

C. Warranty: Special warranty specified in this Section.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For RTUs to include in emergency, operation, and maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Fan Belts: One set for each belt-driven fan.
   2. Filters: One set of filters for each unit.
1.8 QUALITY ASSURANCE

A. ARI Compliance:
   1. Comply with ARI 203/110 and ARI 303/110 for testing and rating energy efficiencies for RTUs.
   2. Comply with ARI 270 for testing and rating sound performance for RTUs.

B. ASHRAE Compliance:
   1. Comply with ASHRAE 15 for refrigeration system safety.
   2. Comply with ASHRAE 33 for methods of testing cooling and heating coils.

C. NFPA Compliance: Comply with NFPA 90A and NFPA 90B.

D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.9 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to replace components of RTUs that fail in materials or workmanship within specified warranty period.
   1. Warranty Period for Compressors: Manufacturer's standard, but not less than five years from date of Substantial Completion.
   2. Warranty Period for Control Boards: Manufacturer's standard, but not less than three years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Basis of Design is Trane. Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following. Non-basis of design equipment shall be supplied with all necessary adapters, fittings, and equipment to connect and operate with the existing building systems and structures.
   1. Carrier Corporation.
   2. Aaon.

2.2 GENERAL

A. UNIT DESCRIPTION
   1. Packaged rooftop unit shall include compressors, evaporator coils, filters, supply fans, exhaust/return fans, dampers, air-cooled condenser coils, condenser fans, economizer,
and unit controls.

2. Unit shall be factory assembled and tested including leak testing of the DX coils, pressure testing of the refrigeration circuit, and run testing of the completed unit. Run test report shall be supplied with the unit in the service compartment’s literature pocket.

3. Unit shall have decals and tags to indicate lifting and rigging, service areas and caution areas for safety and to assist service personnel.

4. Unit components shall be labeled, including refrigeration system components and electrical and controls components.

5. Estimated sound power levels (dB) shall be shown on the unit ratings sheet.

6. Installation, Operation, and Maintenance manual shall be supplied within the unit.

7. Laminated color-coded wiring diagram shall match factory installed wiring and shall be affixed to the interior of the control compartment’s hinged access door.

8. Unit nameplate shall be provided in two locations on the unit, affixed to the exterior of the unit and affixed to the interior of the control compartment’s hinged access door.

B. Unit(s) shall be ASHRAE 90.1 Compliant

2.3 CONSTRUCTION

1. All cabinet walls, access doors, and roof shall be fabricated of double wall, impact resistant, rigid polyurethane foam panels.

2. Unit insulation shall have a minimum thermal resistance R-value of 13. Foam insulation shall have a minimum density of 2 pounds/cubic foot and shall be tested in accordance with ASTM D1929-11 for a minimum flash ignition temperature of 610°F.

3. Unit construction shall be double wall with G90 galvanized steel on both sides and a thermal break. Double wall construction with a thermal break prevents moisture accumulation on the insulation, provides a cleanable interior, prevents heat transfer through the panel, and prevents exterior condensation on the panel.

4. Unit shall be designed to reduce air leakage and infiltration through the cabinet. Cabinet leakage shall not exceed 1% of total airflow when tested at 3 times the minimum external static pressure provided in AHRI Standard 340/360. Panel deflection shall not exceed L/240 ratio at 125% of design static pressure, at a maximum 8 inches of positive or negative static pressure, to reduce air leakage. Deflection shall be measured at the midpoint of the panel height and width. Continuous sealing shall be included between panels and between access doors and openings to reduce air leakage. Piping and electrical conduit through cabinet panels shall include sealing to reduce air leakage.

5. Roof of the air tunnel shall be sloped to provide complete drainage. Cabinet shall have rain break overhangs above access doors.
6. Access to filters, dampers, cooling coils, heaters, compressors, and electrical and controls components shall be through hinged access doors with quarter turn, zinc cast, lockable handles. Full length stainless steel piano hinges shall be included on the doors.

7. Exterior paint finish shall be capable of withstanding at least 2,500 hours, with no visible corrosive effects, when tested in a salt spray and fog atmosphere in accordance with ASTM B 117-95 test procedure.

8. Units with cooling coils shall include double sloped 304 stainless steel drain pans.

9. Unit shall be provided with base discharge and return air openings. All openings through the base pan of the unit shall have upturned flanges of at least 1/2 inch in height around the opening.

10. Unit shall include lifting lugs on the top of the unit.

11. Unit shall include factory installed, painted galvanized steel condenser coil guards on the face of the condenser coil.

2.4 ELECTRICAL POWER CONNECTIONS

A. Single point power supply to the unit shall be 3 phase. Unit shall be provided with internal transformer(s) as required for low voltage control operations.

B. Unit shall be provided with factory installed and factory wired, non-fused disconnect switch.

C. Unit shall be provided with a factory installed and factory wired 115V, 13 amp GFI outlet disconnect switch in the unit control panel.

D. Unit shall be provided with phase and brown out protection which shuts down all motors in the unit if the electrical phases are more than 10% out of balance on voltage, the voltage is more than 10% under design voltage or on phase reversal.

2.5 AIR FILTERS

A. Air Filters: Filters shall mount integrally within unit and be accessible through hinged access panels. Unit shall include 2 inch thick, pleated panel filters with an ASHRAE efficiency of 30% and MERV rating of 8, upstream of the cooling coil.

2.6 FANS – SUPPLY AND RETURN/EXHAUST

A. Unit shall include belt-driven, unhoused, forward-curved, centrifugal supply and return fans.

B. Provide shafts constructed of solid hot rolled steel, ground and polished, with key-way, and protectively coated with lubricating oil.

C. Blowers and motors shall be dynamically balance and mounted on rubber isolators.
D. Motors shall be premium efficiency ODP with ball bearings rated for 200,000 hours service with external lubrication points. Variable frequency drives shall be factory wired and mounted in the unit. Fan motors shall be premium efficiency.

2.7 EVAPORATOR COILS

A. Coils shall be designed for use with R-410A refrigerant and constructed of copper tubes with aluminum fins mechanically bonded to the tubes and galvanized steel end casings. Fin design shall be sine wave rippled.

B. Coils shall have interlaced circuitry and shall be standard capacity. Coils shall be hydrogen or helium leak tested.

C. Coils shall be furnished with factory installed expansion valves.

2.8 CONDENSER SECTION

A. Air-Cooled Condenser:
   1. Condenser fans shall be a vertical discharge, axial flow, direct drive fans.
   2. Coils shall be designed for use with R-410A refrigerant. Coils shall be multi-pass and fabricated from aluminum microchannel tubes or coils shall be constructed of copper tubes with aluminum (copper) fins mechanically bonded to the tubes and aluminum end casings. Fin design of copper tube coils shall be sine wave rippled.
   3. Coils shall be designed for a minimum of 10°F of refrigerant sub-cooling.
   4. Coils shall be hydrogen or helium leak tested.
   5. Condenser fans shall be high efficiency electrically commutated motor driven with factory installed head pressure control module. Condenser airflow shall continuously modulate based on head pressure and cooling operation shall be allowed down to 35°F with adjustable compressor lockout.

2.9 REFRIGERATION SYSTEM

A. Unit shall be factory charged with R-410A refrigerant.

B. Compressors shall be scroll type with thermal overload protection and carry a 5 year non-prorated warranty, from the date of original equipment shipment from the factory.

C. Compressors shall be mounted in an isolated service compartment which can be accessed without affecting unit operation. Lockable hinged compressor access doors shall be fabricated of double wall, rigid polyurethane foam injected panels to prevent the transmission of noise outside the cabinet.

D. Compressors shall be isolated from the base pan with the compressor manufacturer’s recommended rubber vibration isolators, to reduce any transmission of noise from the compressors into the building area.
E. Each refrigeration circuit shall be equipped with expansion valve type refrigerant flow control.

F. Each refrigeration circuit shall be equipped with automatic reset low pressure and manual reset high pressure refrigerant safety controls, Schrader type service fittings on both the high pressure and low pressure sides and a factory installed replaceable core liquid line filter driers.

G. Unit shall include a variable capacity scroll compressor on the lead refrigeration circuit which shall be capable of modulation from 10-100% of its capacity.

2.10 EXHAUST / RETURN SECTION

A. Provide a factory-supplied power exhaust assembly that shall assist the barometric relief damper in the economizer in relieving building pressurization.

2.11 OUTDOOR AIR/ECONOMIZER SECTION

A. Provide a fully integrated field-installed 100% modulating outside air economizer with unit return and barometric relief air dampers (downflow only), minimum position setting, preset linkage, wiring harness with plug. Unit operation is through primary temperature controls that automatically modulate dampers to maintain space temperature conditions. Economizer dampers shall be interlocked with space fume hood exhaust fan to modulate full open during exhaust fan operation.

B. Provide economizer with dry bulb control.

C. Provide adjustable minimum position control located remotely in the space.

D. Provide spring return motor for outside air damper closure during unit shutdown or power interruption.

2.12 DAMPERS

A. Provide dampers with a leakage rate not to exceed 2.5% of nominal airflow. Leakage rates shall be based on one inch W.C. static pressure.

B. Leakage rate shall be determined in accordance with AMCA Standard 575.

2.13 UNIT CONTROLS

A. Factory Installed and Factory Provided Controller:
   1. Unit controller shall be capable of controlling all features and options of the unit. Controller shall be factory installed in the unit controls compartment and factory tested. Controller shall be capable of standalone operation with unit configuration, setpoint adjustment, sensor status viewing, unit alarm viewing, and occupancy scheduling available without dependence on a building management system.
2. Controller shall have an onboard clock and calendar functions that allow for occupancy scheduling.
3. Controller shall include non-volatile memory to retain all programmed values without the use of a battery, in the event of a power failure.
4. Constant Volume Controller
   a. Unit shall modulate cooling with constant airflow to meet space temperature cooling loads.
   b. Unit shall modulate heating with constant airflow to meet space temperature heating loads. Modulating heating capacity shall modulate based on supply air temperature.

2.14 BUILDING AUTOMATION SYSTEM INTERFACE

A. Interface unit controls to existing building BAS (BACNET compatible). Provide programming and startup. Existing control system is Trane Tracer. Confirm existing unit controls and software prior to the bid. Provide all necessary components, software, and programming to connect and interface with the existing controls system to monitor and control the replacement air handlers.

2.15 CONTROLS

A. DDC Controller:

1. Controller shall have volatile-memory backup.
2. Safety Control Operation:
   a. Smoke Detectors: Stop fan and close outdoor-air damper if smoke is detected. Provide additional contacts for alarm interface to fire alarm control panel.
   b. Low-Discharge Temperature: Stop fan and close outdoor-air damper if supply air temperature is less than 40 deg F.
3. Scheduled Operation: Occupied and unoccupied periods on 365-day clock with a minimum of four programmable periods per day.
4. Unoccupied Period:
   b. Override Operation: Two (adjustable) hours.
5. Supply and Return Fan Operation:
   a. Occupied Periods: Run fan continuously.
   b. Unoccupied Periods: Cycle fan to maintain setback temperature.
6. Refrigerant Circuit Operation:
   a. Occupied Periods: Cycle or stage compressors to match compressor output to cooling load to maintain temperature and humidity. Cycle condenser fans to
maintain maximum hot-gas pressure. Operate low-ambient control kit to maintain minimum hot-gas pressure.

b. Unoccupied Periods: Cycle compressors and condenser fans to maintain setback temperature.
c. Switch reversing valve for heating or cooling mode on air-to-air heat pump.

7. Economizer Outdoor-Air Damper Operation:

a. Occupied Periods: Open to 10 to 25 percent fixed minimum intake, and maximum 100 percent of the fan capacity to comply with ASHRAE Cycle II. Controller shall permit air-side economizer operation when outdoor air is less than 60 deg F. Use outdoor-air enthalpy to adjust mixing dampers. Start relief-air fan with end switch on outdoor-air damper. During economizer cycle operation, lock out cooling.
b. Unoccupied Periods: Close outdoor-air damper and open return-air damper.

B. Interface Requirements for HVAC Instrumentation and Control System:

1. Interface relay for scheduled operation.
2. Interface relay to provide indication of fault at the central workstation and diagnostic code storage.
3. Provide BACNET compatible interface for central HVAC control workstation for the following:

   a. Adjusting set points.
   b. Monitoring supply fan start, stop, and operation.
   c. Inquiring data to include outdoor-air damper position, supply- and room-air temperature and humidity.
   d. Monitoring occupied and unoccupied operations.

2.16 ACCESSORIES

A. Duplex, 115-V, ground-fault-interrupter outlet and light fixture with lamp with 15-A overcurrent protection. Include transformer if required. Outlet shall be energized even if the unit main disconnect is open.

B. Filter differential pressure switch with sensor tubing on either side of filter. Set for final filter pressure loss.

C. Coil guards of painted, galvanized-steel wire.

2.17 ROOF CURBS

A. Contractor shall reuse existing roof curb if applicable, or supply a curb adapter to utilize the existing openings and supports. Materials: Galvanized steel with corrosion-protection coating, watertight gaskets, and factory-installed wood nailer; complying with NRCA standards. Unit curbs shall be factory-modified to adapt to existing unit roof curbs.
1. Curb Insulation and Adhesive: Comply with NFPA 90A or NFPA 90B.
   a. Materials: ASTM C 1071, Type I or II.
   b. Thickness: 1-1/2 inches.

2. Application: Factory applied with adhesive and mechanical fasteners to the internal surface of curb.
   a. Liner Adhesive: Comply with ASTM C 916, Type I.
   b. Mechanical Fasteners: Galvanized steel, suitable for adhesive attachment, mechanical attachment, or welding attachment to duct without damaging liner when applied as recommended by manufacturer and without causing leakage in cabinet.
   c. Liner materials applied in this location shall have air-stream surface coated with a temperature-resistant coating or faced with a plain or coated fibrous mat or fabric depending on service air velocity.
   d. Liner Adhesive: Comply with ASTM C 916, Type I.

B. Wind and Seismic Restraints: Metal brackets compatible with the curb and casing, painted to match RTU, used to anchor unit to the curb, and designed for loads at Project site. Comply with wind-load requirements.

C. Provide structural curb adaptor for setting new RTU in place if applicable.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of RTUs.

B. Examine roughing-in for RTUs to verify actual locations of piping and duct connections before equipment installation.

C. Examine roofs for suitable conditions where RTUs will be installed.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Roof Curb: Install on roof structure. Secure RTUs to upper curb rail, and secure curb base to roof framing or concrete base with anchor bolts.

B. Unit Support: Install unit level on structural curb. RTUs to structural support with anchor bolts.
3.3 CONNECTIONS

A. Install condensate drain, minimum connection size, with trap and indirect connection to nearest roof drain.

B. Install piping adjacent to RTUs to allow service and maintenance.

C. Duct installation requirements are specified in other HVAC Sections. Drawings indicate the general arrangement of ducts. The following are specific connection requirements:
   1. Install ducts to termination at roof curb.
   2. Connect supply ducts to RTUs with flexible duct connectors.
   3. Install return-air duct continuously through roof structure.

3.4 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections. Report results in writing.

B. Perform tests and inspections and prepare test reports.
   1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing. Report results in writing.

C. Tests and Inspections:
   1. After installing RTUs and after electrical circuitry has been energized, test units for compliance with requirements.
   2. Inspect for and remove shipping bolts, blocks, and tie-down straps.
   3. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
   4. Test and adjust controls and safety systems. Replace damaged and malfunctioning controls and equipment.
   5. Verify that unit can be controlled remotely through LSD Tridium system at physical plant.

D. Remove and replace malfunctioning units and retest as specified above.

3.5 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

B. Complete installation and startup checks according to manufacturer's written instructions and do the following:
1. Inspect for visible damage to unit casing.
2. Inspect for visible damage to compressor, coils, and fans.
3. Inspect internal insulation.
4. Verify that labels are clearly visible.
5. Verify that clearances have been provided for servicing.
6. Verify that controls are connected and operable.
7. Verify that filters are installed.
8. Clean condenser coil and inspect for construction debris.
9. Remove packing from vibration isolators.
10. Verify lubrication on fan and motor bearings.
11. Inspect fan-wheel rotation for movement in correct direction without vibration and binding.
12. Adjust fan belts to proper alignment and tension.
13. Start unit according to manufacturer's written instructions.
   a. Start refrigeration system.
   b. Do not operate below recommended low-ambient temperature.
   c. Complete startup sheets and attach copy with Contractor's startup report.
15. Operate unit for an initial period as recommended or required by manufacturer.
17. Adjust and inspect high-temperature limits.
18. Inspect outdoor-air dampers for proper stroke and interlock with return-air dampers.
19. Start refrigeration system and measure and record the following when ambient is a minimum of 15 deg F above return-air temperature:
   a. Coil leaving-air, dry- and wet-bulb temperatures.
   b. Coil entering-air, dry- and wet-bulb temperatures.
   c. Outdoor-air, dry-bulb temperature.
   d. Outdoor-air-coil, discharge-air, dry-bulb temperature.
20. Inspect controls for correct sequencing of heating, mixing dampers, refrigeration, and normal and emergency shutdown.
21. Measure and record the following minimum and maximum airflows. Plot fan volumes on fan curve.
   a. Supply-air volume.
   b. Return-air volume.
   c. Outdoor-air intake volume.
22. Simulate maximum cooling demand and inspect the following:
   a. Compressor refrigerant suction and hot-gas pressures.
   b. Short circuiting of air through condenser coil or from condenser fans to outdoor-air intake.
23. Verify operation of remote panel including pilot-light operation and failure modes. Inspect the following:
24. After startup and performance testing and prior to Substantial Completion, replace existing filters with new filters.

3.6 CLEANING AND ADJUSTING

A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to site during other-than-normal occupancy hours for this purpose.

B. After completing system installation and testing, adjusting, and balancing RTU and air-distribution systems, clean filter housings and install new filters.

3.7 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain RTUs.