Addendum #1
Avon-Washington Township Public Library
Addition and Furniture Project

Date: July 23, 2025
Project: Avon-Washington Township Public Library – Addition and Furniture Project
Project #: 24029
Pages: 29
Bid Dates: **THURSDAY, August 14, 2025 at 2:00 pm (prevailing local time)**

General Note:

The original Specifications and Drawings dated July 11, 2025 for the project referenced above are amended as noted in this Addendum No. 1. Receipt of this Addendum and any subsequent Addenda must be acknowledged on the Bid Form. Items changed or added by this addendum are to take precedence over the items or descriptions of the work in the project manual and the drawings. Items not mentioned in this addendum are to remain as described in the original plans and specifications.

A pre-bid walkthrough will be held on Tuesday July 29, 2025 at 2:00 pm.

Specifications Items:

Section 00 00 02 Table of Contents

1. Add section 23 81 46 Water-Source Unitary Heat Pumps

Section 00 01 02 Project Information

1. REVISE item 1.05-E to read
   E. Pre-Award Interview: Week of August 18 at a time agreed upon by all parties, virtually.

Section 00 21 14 Supplementary Instructions to Bidders

As indicated in the attached reissued specification,
1. REVISE paragraph 1.10.
2. REVISE paragraph 1.11.
3. REVISE paragraph 1.14.

Section 00 72 26 Supplementary General Conditions

As indicated in the attached reissued specification,
1. REVISE item 1.02.F.
2. REVISE item 1.04.E.

Section 10 90 00 Automated Airfoil Sun Control Devices

1. ADD item 2.01-C as follows:
   C. Basis of Design: Linel, division of Mestek, Inc; located in Mooresville, Indiana; www.linel.com: Automated Airfoil Sunshade System. Contact: Bruce Gardner, (317) 584-0507, bgardner@linel.com.

Section 232113.33 Ground-Loop Heat-Pump Piping

1. Delete and replace the entire section 232113.33 with attached.

Section 232513 Water Treatment for Closed-Loop Hydronic Systems

1. Revise Glycol Percentage reference in Sub-paragraph 2.1, C., and 2.2, A. as follows:
   a. Glycol Percentage shall be 15%.
2. Revise sub-paragraph 2.5, A. as follows:
   a. A. Dowfrost or OneGuard 15% pre-mixed.

Section 238146 Water-Source Unitary Heat Pumps

1. Add section 238146 in its entirety, attached.

Drawing Set Items:

Sheet A10-1 Interior Elevations & Casework Details

1. REVISE the dedication plaque copy size to be ½", and the verbiage as follows:

In the loving memory of
Benjamin Abbott Huron and Katherine Harding Huron,
who settled in Washington Township,
Hendricks County, Indiana, in the 1830s
and of
Seth Thomas Huron and Mary Etta Farmer Huron,
All of whom resided in Washington Township until their respective deaths.

A memorial gift was received by this library
From Joyce Marie Huron Trent

In loving memory of her great-grandparents and her grandparents.

Sheet E1-1 Electrical Plan

1. Add one duplex GFI outlet 20 amp above the counter +44". Circuit A2-2. Column line L, 2.3.
2. Add one 4 plex 20 amp outlet next to data rack & switch. Column line 2.1, L.
3. The motorized blinds are to be powered by circuits 2-9 & 2-10, Split the motorized blinds circuits in half, 2-9 to take the west half the bldg. & 2-10 to take the east half of the bldg.

4. Add 1, 50 amp, 3 pole breaker for future 18 kw boiler to panel A2-11,13,15.
5. Add for baseboard heaters 2,120v contactors to be controlled by the owner's controls contractor. Install next to electrical panels A1 & A2.
   1 contactor, 9 pole, to control in Program Room 275 circuits, 1-1,1-2,1-3,1-4,1-5,1-6,1-7,1-8, 1-35.
   Meeting Room 274, 2 pole, circuits1-9,1-10.
6. Add a junction box a the south end of both automated airfoil runs. Include note, "NEMA 3R RATED ELECTRICAL CONNECTION FOR AUTOMATED AIRFOIL. COORDINATE EXACT LOCATION WITH MANUFACTURER." See 8.5 x 11 sketch included.
   Circuit 2-12.

Attachments:

1. Specification Section 00 21 14 Supplementary Instructions to Bidders
2. Specification Section 00 72 26 Supplementary General Conditions
3. Specification Section 232113.33 Ground-Loop Heat-Pump Piping
4. Specification Section 238146 Water-Source Unitary Heat Pumps
5. Sketch of Airfoil electrical connection

END

SECTION 00 21 14

SUPPLEMENTARY INSTRUCTIONS TO BIDDERS

GENERAL INSTRUCTIONS

1.01 SEALED BIDS WILL BE RECEIVED AS PUBLISHED IN THE ADVERTISEMENT FOR BIDS.

1.02 A PRE-BID MEETING IS SCHEDULED FOR THE DATE LISTED IN THE ADVERTISEMENT TO BIDDERS.

1.03 BIDDER'S REPRESENTATION

A. Each bidder, by making his bid, represents that he has read and understands the bidding documents and the specification manual.

B. Each bidder by making his bid represents that he had visited the site and familiarized himself with the local conditions under which the work is to be performed. He fully has analyzed the complex structural demolition and all other aspects of this project.

C. No additional costs of any type will be allowed by the failure of the Bidder to avail himself of the privilege of a complete and thorough on-site inspection.

1.04 SCOPE OF WORK

A. It is the intention of these Specifications and the drawings to coordinate and produce a complete and useable building. Any items not specifically mentioned but required to achieve same shall be included. See other sections in this manual for additional descriptions of the work.

B. Many of the items indicated in the plans and specifications are general in nature to describe the scope of the work performed. It is the responsibility of The Contractors to supply all incidental material items and labor required to provide a complete, properly functioning installation of each component and/or system of the work described.

1.05 PRIME CONTRACTORS

A. Contract Award shall be to a single prime bidder for the work described in the advertisement for bids and in the scope of the work for each Bid Group.

B. Bidders are offered the opportunity to bid a combination bid for both projects combined.

1.06 COMMENCEMENT OF WORK

A. The Contractor shall commence work immediately upon the issuance of the Notice to Proceed from the Owner.

1.07 PRE-APPROVAL BY INDIANA DEPARTMENT OF ADMINISTRATION (IDOA)

A. All bidders are required to be pre-authorized through the IDOA and verifiable on the IDA website. This also applies to sub-contractors that exceed any thresholds required by IDOA. All bidders to be responsible for understanding and complying with IDOA requirements and any other Indiana Bidding rules.

1.08 BIDDING PROCEDURES

A. The term “specifications”, “specification manual”, and “project manual” all refer to this booklet.
   1. PRE-BID CONFERENCE
      a. A pre-bid conference will be held as described in the advertisement to bidders. All bidding contractors, sub-contractors and suppliers are encouraged to attend this conference. Bidders are not required to attend this conference, but are held responsible for any site conditions, or existing building conditions, that are apparent to a site visit and for any matters discussed at this meeting. Meeting minutes will be issued via addendum.

B. SUBSTITUTIONS AND APPROVALS DURING BIDDING
   1. Whenever products or materials are specified as "Standards" or they are otherwise named, approval of other equal quality products shall be obtained by requesting in writing and presenting for evaluation, no later than seven (7) days prior to the date set for receipt

of bids. Conform to process outlined in section 01 63 10 of these specifications. There will be no substitutions “as equal” after the bidding.
2. If approval is granted, product or material will be added by Addendum.
3. No direct reply will be made to any requests for changes, but any requested changes approved by the Designer will be stated in an Addendum issued to all prime bidders.
4. All decisions of the Architect are final.

C. BID FORMS
1. Bid proposals shall be submitted on the bid Form in section 00 41 00.
2. Bidders are required to submit various forms with their bid.
3. Each bid proposal shall be accompanied by a Bid Bond or certified check in the monetary amount of not less than five percent (5%) of the total bid submitted made payable to the Avon-Washington Township Public Library.
   a. Bond forms will be A.I.A. Document A312, Performance Bond and Labor and Material Payment Bond or the Bonding Companies standard form complying with the provisions of the A.I.A. document.
4. Omission of any of the required forms may be cause for bid disqualification.

D. SUBMISSION OF SUPPLIERS AND SUB-CONTRACTORS
1. In addition to the information to be provided on the bid form, within 24 hours after the bid, the low bidders are to submit to the Architect a complete list of sub-contractors, supplier and all products. This includes the list provided in the mechanical and electrical section of these specification manuals. This list shall not be varied from during the project except due to rejection or approval by the owner.

E. BID TERMS OR TIME PERIOD
1. The bids submitted shall be binding and valid for a period of not less than sixty (60) days past the date of bid submission and opening.

F. QUESTIONS AND INTERPRETATIONS OF BID DOCUMENTS
1. Interpretation or explanation of Contract Documents will not be made by the Owner. All such inquiries shall be made to the Architect's office.
2. Bidders shall promptly notify the architect of any ambiguity, inconsistency or error which they may discover upon examination of the Bidding Documents or of site and local conditions.
3. No oral, telephone or telegraphic instruction for information shall be binding on the Owner, Architect, or Bidder unless confirmed by Addendum.

G. PRE-AWARD MEETING
1. Minutes from the mandatory pre-award meeting will be included as an exhibit to the contract.

1.09 ADDENDA

A. Any additional information required by the Bidders, revisions in the Work, changes or additions, discrepancies in the Bidding Documents, or clarifications will be in the form of Addenda written and issued by the Architect to all Prime Bidders of Record as of the date of such Addenda.

B. All Addenda issued prior to the time and date set for termination of bidding shall become a part of the Bidding Documents and Bidders shall list by number and date on the form or proposal, all Addenda which have been received by him prior to submittal of his bid. The lump sum proposal amount shall include all work described by all such Addenda. It shall be the Bidder's responsibility to determine that he has received all Addenda, since no extra costs will be allowed by failure of the Bidder to do so.

1.10 BID GUARANTY AND BOND

A. GUARANTY
1. The Contractor shall guaranty all of his workmanship and materials referred to in these Specifications and shall correct all defects discovered within two (2) years after Date of Substantial Completion, or longer if specifications require longer terms. Various components may require significantly longer guarantees. If conflicting warranty information

is found notify architects office prior to bidding. The more extended period of warranty should be followed unless changed in writing by the architect's office. This includes all equipment and work related to any MEP scope of the project. In cases where suppliers include a warranty period of longer than two (2) years this shall continue after expiration of contractor's period and will be coordinated directly between Owner and manufacture.

1.11 FINAL ACCEPTANCE

A. All documents, guarantees, final waivers, operating instructions (O&M Manuals), record drawings, etc., called for in the Specifications and/or Contract, shall be submitted to the Architect for review and approval and will then be turned over to the Owner. All items needing correcting shall also be complete and found acceptable.

B. The Architect's signature on the final pay application will constitute final acceptance of the above items.

1.12 VALUE OF CLOSE OUT DOCUMENTS

A. The value of the O&M manuals, as built drawings and other close out documents shall constitute 40% of the retainage or 2% of the value of the contract. None of the final 2% will be released until all final closeout documents have been submitted reviewed and accepted.

1.13 INDIANA STATE SALES TAX

A. Materials and supplies purchased for this project are not subject to sales tax

1.14 TERMS OF PAYMENT

A. The Contractor shall prepare his requisition for payment as of the last day of the month and submit it, with the required number of copies, to the Architect for approval. The amount of the payment due the Contractor shall be determined by adding to the total value of work completed to date, the value of materials properly stored on the site and deducting six percent (6%) of the total amount to be retained until the project is 50% complete, and three percent (3%) of the total amount to be retained until the project is substantially complete. Material being billed for if not on project site will need to be accounted for by invoices, location material stored, and/or photographs as requested by architect's office. The total value of work completed to date shall be based on the estimated quantities of work completed to date on each item and the unit prices established in the COST BREAKDOWN and adjusted in accordance with the value of work completed to date on approved change orders.

B. Monthly or partial payments made by the Owner to the Contractor are monies advanced for the purpose of assisting the Contractor to expedite the work of construction. The Contractor shall be responsible for the care and protection of all materials and work upon which payments have been made until final acceptance of such work and materials by the Owner. Such payments shall not constitute a waiver of the right of the Owner to require the fulfillment of all terms of the Contract and the delivery of all improvements embraced in this Contract complete and satisfactory to the Owner in all details.

C. The Contractor will be paid the balance of retainage withheld sixty-one (61) days after the Date of Substantial Completion, if everything is 100% complete. If within sixty-one (61) days after the Date of Substantial Completion there remain uncompleted minor items, and amount equal to two hundred percent (200%) of the value of each item as determined by the Architect shall be withheld until the item is completed.

1.15 PERMITS

A. The GC shall obtain all building permits. The Contractors or appropriate sub-contractors are responsible for paying and securing other permits that may be required to complete to work of each sub-contractors work. All inspection fees, tap fees, or other incidental costs required by utility companies or the town/city shall be paid by the Contractor.

1.16 NO DAMAGES FOR DELAYS

A. If performance of work is delayed by the acts or omissions of the Owner, Architect, Engineer, or by separate contractors, or by other causes not within the contractors control, Contractor shall be limited to an extension of the Contract Time, which shall constitute the Contractor's sole and

exclusive remedy by reason of such delay and contractor shall have no right to receive any additional compensation or damages as a result of any delays whatsoever.

1.17 CONTRACT TERMINATION

A. The Owner reserves the right to terminate the contract and withhold an amount of payment it deems necessary if the contractor refuses to comply with the terms, conditions and specifications of this contract and/or if found to be in violation of any Federal, State or local law and/or ordinance.

1.18 LIQUIDATED DAMAGES

A. The Contractor acknowledges that the Owner will suffer damages if the Contractor fails to achieve Final Completion of the work by 06-29-2026 and that the actual damages that the Owner will incur if the Contractor does not achieve Final Completion on or before the aforementioned date will be difficult if not impossible to ascertain. Therefore, Owner and Contractor agree that the Contractor shall pay to Owner as liquidated damages and not as a penalty, the amount of one-thousand-five-hundred dollars ($1,500) per calendar day beyond the date that the Contractor fails to achieve Final Completion of the entire work; as determined solely by the Owner/Architect of record; subject to any extensions of time to which the Contractor is entitled under the contract documents. Contractor and Owner agree that one-thousand-five-hundred dollars ($1,500) per calendar day in liquidated damages is a fair and reasonable estimate for the Owner's expected damages.

B. Alternate #1 shall be an add or deduct for construction cost premiums required by the contractor to achieve Final Completion by 06-29-2026. Acceptance of Alternate #1 by the Owner establishes the liquidated damages of $1,500 per calendar day past Final Completion date, as defined by the General Conditions to the Contract, AIA form 201, Article 9.10, Final Completion and Final Payment. Review and acceptance/rejection of Alternate #1 shall be determined after Pre-Award Conference. The Contractor shall provide added calendar days commensurate with an added cost. The Owner reserves the right to adjust final completion by commensurate calendar days at which Liquidated Damages would then apply.

1.19 BEHAVIOR ON WORK SITE

A. No smoking anywhere on the work site

B. No cursing or derogatory comments

C. No alcohol consumption anywhere

D. No substance abuse anywhere

E. Keep all areas clean and presentable

F. When interacting with public or visitors be professional and polite

1.20 COMPLIANCE WITH INDIANA E-VERIFY

A. All workers on site shall be checked and verified through the Indiana E-Verify System prior to working on-site.

END OF SECTION

SECTION 00 72 26

SUPPLEMENTARY GENERAL CONDITIONS

GENERAL

1.01 THE FOLLOWING PROVISIONS MODIFY, CHANGE, DELETE FROM OR ADD TO THE GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION, AIA FORM 201 AND A101- 2017. THE CHANGES BELOW SUPERSEDE THE ORIGINAL DOCUMENT WHERE THERE IS A CONFLICT.

A. The numbers below do not correlate with any specific sections or numbers in the A201 2017 document.

1.02 A101 STANDARD FORM OF THE CONTRACT - ADDITIONAL INFORMATION

A. Article 3.1 – Commencement of the work shall start upon the publication of a “Notice To Proceed” Issued by the Architect.

B. Article 3.3 – Substantial Completion Work to be completed by 05-15-2026; Final Completion Work shall be completed no later than 06-29-2026, or 45 calendar days from the Date of Substantial Completion.

C. Article 3.3.3 - Liquidated damages shall be assessed if the Contractor fails to acheive Final Completion by date of Final Completion.

D. Article 5.1.1 - Applications for Payment shall be submitted to the Architect and Owner.

E. Article 5.1.3 – Applications for Payment shall be received by the Architect and Owner. The Owner may take up to 60 days for payment from the time of payment submitted.

F. Article 5.1.7.1 - Retainage is to be 6% until 50% completion, then 3% for the remaining portion of construction. See section 01 20 00.

G. Article 5.2.2 - The Owner may take up to 60 days for final payment.

H. Article 6.2 – Arbitration is to be selected

I. Article 8.2 – Kramer Companies is to be listed as the Owner’s Representative

J. Article 9.1.8 - Other Exhibits shall include the Pre-Award Meeting Minutes.

1.03 A201 – GENERAL CONDITIONS OF THE CONTRACT – THE SPECIFIC ITEMS TO BE CHANGED ARE LISTED BELOW.

A. Article 3.10.1 - The Contractor's Construction Schedule shall denote the Critical Path.

B. Add Article 3.10.4 - Contractor shall submit (for review and consideration) any proposed deviations from the approved Critical Path Schedule. At any time when progress has delayed critical path items, the contractor shall submit corrective action within 5 calendar days to bring the critical path schedule back into compliance with what was approved. Contractor shall be responsible for all professional services fees related to the Contractor’s failure to achieve the approved project schedule and contract milestone dates.

C. Article 3.15.2 - Owner shall provide 48-hour notice of self-performed cleaning. Owner reimbursement shall include Owner Rep Services (oversight).

D. Add Article 4.2.4.1 - Communications protocol shall be strictly enforced as follows: Owner's Representative will initiate 1st email under the established communication protocol. Contractor may communicate verbally with those identified under the established communication protocol when absolutely necessary (Owner, Architect and Owner's Representative). However, record of said communication shall be followed up by the Contractor in writing (email) to all parties under the communication protocol. The Contractor is advised that failure to do so may result in “at risk” circumstances for action taken by the Contractor resulting from said communication.

E. Article 8.2.3 - Substantial and Final Completion must be acheived within the Contract Time, as established in the A101, article 3.3.

F. Add Article 9.10.6 - The date of Final Completion is defined as the date the Architect signs the final Certificate for Payment.

G. Article 15.1.2 - The time limits for claims shall be upon the date of Final Completion, not Substantial Completion.

H. Replace Article 15.1.7 as follows: The Contractor waives Claims againt the Owner for consequential damages arising out of or relating to this Contract.
   1. This waiver includes 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.
   2. This waiver is applicable, without limitation, to all consequential damages due to the Contractor's termination in accordance with Article 14. Nothing contained in this Section 15.1.7 shall be deemed to preclude assessment of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

I. Article 15.2.2 - The Initial Decision Maker may take up to 21 days to take action.

J. Article 15.3.2 For Mediation, if both parties agree then a mediator not listed by the American Arbitration Association may be used.

K. Article 15.4.1 - For Arbitration, if both parties agree then a mediator not listed by the American Arbitration Association may be used.

1.04 MISCELLANEOUS ADDTIONAL GENERAL PROVISIONS OF THE CONTRACT

A. No radios will be allowed on the site except in the field office. The volume is to always be low.

B. There shall be no substance abuse such as drugs or alcohol tolerated in relationship to this project. If substance abuse is known or found during this project, the Contractor shall immediately remove the offender from the project with no opportunity to return.

C. Smoking shall not be permitted on the project property.

D. Regarding decisions by the Architect: In all cases where the Architect is listed as the decision maker, this shall be modified to the Owner and Owner’s Representative, as well as, the Architect, acting together.

E. The Owner may occupy the space at Substantial Completion, at which point, project warranties begin. Warranties and the like for any systems completed after Substantial Completion will begin at the point of acceptance for that item.

F. Contractor shall be responsible for all work (labor and materials) until Final Completion.

G. Bidders shall include winter conditions in their price.

H. Contractor shall coordinate with all local governing agencies as may be required.

I. Claims for weather delays must be made within the month that they occur. Weather delays shall be measured against typical weather conditions that are expected at the project site. The number of weather days that the Contractor shall consider typical are as follows. Weather delays that extend the Contract Duration may only be claimed after these baseline days are fulfilled.
   1. Prohibitively snowy days: include 5 days
   2. Prohibitively rainy days: include 7 days
   3. Prohibitively cold days: include 7 days

1.05 HAZARDOUS MATERIAL

A. If hazardous materials such as asbestos or PCB's are encountered that are not anticipated in the contract, the Contractor shall notify the Architect and Owner immediately and stop work in the area of the hazardous material discovery. No additional cost shall be claimed due to this stoppage.

1.06 CHANGES IN THE WORK

A. The allowance for overhead, General Conditions, Bond and profit combined, included in the total cost to the Owner, shall be based on the following schedule:

B. For the Contractor, for any work performed by his own forces, fifteen percent (15%) of the cost.

C. For the Contractor, for work performed by his sub-contractor, five percent (5%) of the amount due the Subcontractor.

D. For each Subcontractor involved, for any work performed by his own forces, fifteen percent (15%) of the cost.

E. Cost shall be limited to the following:
   1. Invoiced cost of materials, including cost of delivery, cost of labor, wages, fringes, payroll taxes and insurance, rental value of power tools and equipment and bond premiums.

F. Overhead shall include the following:
   1. Small tools, incidentals, supervision, general office expense and all other expenses not included in "cost."
   2. If the net value of a change results in a credit from the Contractor, the credit shall be the net cost, without overhead or profit. The cost as used herein shall include all items of labor, materials, and equipment.

G. 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 breakdown of costs including labor, material and subcontracts. Labor and material shall be marked up in the manner prescribed above. Where major cost items are subcontracts they shall be broken down also. In no case will a change involving over $600 be approved without such a breakdown.

1.07 ADMINISTRATION OF THE CONTRACT

A. Should discrepancies appear among Contract documents contractor shall request interpretation in writing before proceeding with the work. If contractor fails to make such request, no excuse will thereafter be entertained for failure to carry out work in satisfactory manner. Should conflict occur in or between drawings and specifications, Contractor is deemed to have included the more expensive and stringent way of doing work in contractors bid unless Contractor shall have asked for and obtained written decision before submission of Contractor bid Proposal as to which method or material will be required.

B. When there is a conflict or discrepancy between a reference standard and the specifications, the more stringent requirements shall apply.
   1. 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.

C. Regarding decisions by the Architect: In all cases where the Architect is listed as the decision maker, this shall be modified to the Owner and Owner Rep as well as the Architect acting together.

1.08 PROGRESS PAYMENTS

A. The progress payments to the contractor are made to facilitate the purchase and installation of the work. The contractor is responsible to secure and protect the work until turned over to the Owner at Substantial Completion. Any damage or vandalism that occurs during construction is the responsibility of the Contractor to repair and replace. The exception is Acts of God that would trigger a property damage event."

1.09 INSURANCE

A. Contractor's Liability Insurance. The Contractors shall purchase and maintain such insurance as will protect him from the claims set forth below, any or all of which may arise out of or result from the operations of the Contractor, his Subcontractors, and anyone directly or indirectly employed by any of them or by anyone for whose acts any of them may be liable, whether on or adjacent to the Project or elsewhere:
   1. claims under Worker's Compensation and Occupational Diseases Acts and any other employee benefits acts applicable to the performance of the Work;
   2. claims for damages because of bodily injury and personal injury, including death; and claims for damage to property.

B. The Contractor's general liability insurance shall also provide coverage for the following and will name as an additional named insured the Owner.
   1. contractual liability insurance as applicable to any held harmless agreements in the Contract:
      a. completed operations
      b. broad form property coverage for property in the care, custody, or control of the Contractor.

C. Commercial General Liability (Occurrence Form)

1.	General Aggregate (other than Prod/Comp Ops Liability)	$2,000,000
2.	Products/Completed Operations Aggregate	$2,000,000
3.	Personal & Advertising Injury Liability	$1,000,000
4.	Each Occurrence	$1,000,000
5.	Medical Payments	$ 5,000

D. Other Requirments
   1. Owner to be named as Additional Insureds using CG 2010 10 01 and CG 2037 10 01 or its equivalent endorsement acceptable to the Owner
   2. Contractual Liability Included
   3. Coverage shall be Primary and Non-Contributory
   4. Employees, Independent Contractors and Volunteers as Additional Insureds
   5. Include Waiver of Subrogation in favor of Owner
   6. 30 Day Notice of Cancellation
   7. CG 2053 endorsement stating that “limits apply per project”

E. Commercial Automobile Liability
   1. Combined Single Limit – Each Accident $1,000,000
   2. Owned, Non-owned, and Hired Autos
   3. Owner Named as Additional Insureds
   4. 30 Day Notice of Cancellation

F. Workers Compensation and Employer’s Liability
   1. Workers Compensation
      State Statutory Limits
   2. Employer’s Liability
      a. Bodily Injury by Accident $500,000 each accident
         1) Bodily Injury by Disease $500,000 policy limit
         2) Bodily Injury by Disease $500,000 each employee
   3. Include Waiver of Subrogation in favor of Owner
   4. 30 Day Notice of Cancellation

G. Umbrella Liability
   1. Each Occurrence and Aggregate $10,000,000

H. Qualifications
   1. The above coverages must be placed with an insurance company with an A.M. Best rating of A-:VII or better.

I. Certificates of Insurance shall be filed with the Owner prior to commencement of the Work. These certificates shall contain a provision that coverages afforded under the policies will not be canceled until at least fifteen (15) days after prior written notice has been given to the Owner.

J. Property Insurancepurchase:
   1. The Owner is to provide and pay for builders risk insurance for the Work

K. The Contractors and Subcontractors shall provide their own insurance for their materials, equipment, and tools.

L. The Owner and Contractor waive all rights against each other for damages caused by fire or other perils to the extent covered by insurance provided under Article. The Contractor shall require similar waivers from Subcontractors.

1.10 PRODUCTS

A. Not Applicable.

1.11 EXECUTION

A. Not Applicable.

END OF SECTION

SECTION 23 21 13.33

GROUND-LOOP HEAT-PUMP PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Pipes and fittings.
2. Borehole backfill.
3. Antifreeze solution.
4. Accessories.

B. Contractor shall provide a complete GLHE as shown on the Drawings and in the Specifications. The GLHE shall couple with the Building's internal hydronic system provided by the Mechanical Contractor.

C. Work assigned to the Geothermal Contractor includes the GLHE, including but not limited to:
1. Vertical Loop System consisting of:
   a. Drilling of vertical bore holes.
   b. Installation of vertical loop pipe.
   c. Mixing and placement of thermal grout.
   d. Other materials and operations as noted in the drawings and specifications.
2. Horizontal Pipe Tie-in consisting of:
   a. Excavation for tie-in.
   b. Installation of all horizontal piping connecting the vertical loops to the building.
   c. Installation of main loop supply and return lines connecting the distribution to the building.
   d. Cleaning and flushing the entire system. Exterior loop only.
   e. Backfilling and compaction of all excavations.
   f. Other materials and operations as noted in the drawings and specifications.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Pipes and fittings.
2. Joining method and equipment.

1.3 INFORMATIONAL SUBMITTALS

A. Field Quality-Control Reports:

1. Piping tests.
2. Hydrostatic tests.

B. Borehole backfilling, grout sample reports and drilling operations reports.

C. Dimensioned site layout surveyed by a licensed surveyor.

1.4 SPECIFIC ITEMS TO BE FURNISHED BY THE CONTRACTOR

A. The contractor shall furnish all labor, supervision, proper equipment in good working condition, supplies, tools, and materials required to complete the Work as specified and as defined in the contract documents.

B. The contractor shall, as a minimum, provide all safety equipment to meet the requirements of all applicable State and Federal codes and standards. Contractor shall meet all requirements of the Occupational Safety and Health Act of 1970 (OSHA), including all amendments.

C. Contractor shall provide all HDPE pipe, fittings and grout submittals for engineer's approval prior to start of ground loop installation.

1.5 DELIVERY, STORAGE AND HANDLING

A. All pipe and fittings are to be sealed, to the satisfaction of the Engineer, to prevent debris, rodents and other foreign material from entering the piping system. All u-bend coils shall be delivered under pressure with test caps in place from manufacturer, and verified for positive pressure test (example, Centennial CenFuse pressurized coils) to validate integrity of pipe prior to installation.

B. Contractor shall individually test each circuit for pressure integrity prior to loading in boreholes and again after borehole has been grouted.

C. Palletized thermal grout. Grouting materials are to be protected from the weather with a protective covering, to the satisfaction of the Engineer.

1.6 WATER SUPPLY

A. Potable water will be required for the performance of this work. This potable water will be supplied by the Contractor as required. All equipment necessary to handle this water including pumps, water trucks or trailers, storage tanks and all other items necessary to handle and transport this water will be provided by the Contractor. Contractor to obtain water service and meter from the local Water Utility Company.

1.7 WARRANTY

A. Manufacturer's Warranty: Minimum 50-year warranty for polyethylene piping.

B. Installation Warranty: Provide in writing a one (1) year warranty for socket and butt fusion welds in polyethylene piping against leakage. Any leaks during that time period shall be repaired at no charge to the Owner.

1.8 MATERIALS AND WORKMANSHIP

A. The contractor shall maintain adequate quality control to assure compliance with all items detailed in this specification.

B. All materials shall be new and of the type and quality specified and free from all defects of materials or workmanship which would adversely affect performance or service life of the installed Work, or which would cause unsightly or unworkmanlike appearance.

C. The Engineer shall have the right to inspect material at any time after delivery to the site. Any material, which is damaged, defective, or does not meet requirements of this contract may be rejected and shall be corrected or replaced at the contractor's expense.

1.9 SITE RESTORATION AND CLEANUP

A. The contractor shall keep the premises clean and orderly at all times during the Work. Upon completion of the Work, the contractor shall coordinate with Client representative to return surface to required conditions.

B. For mud rotary drilling a vacuum truck or equivalent for removing drill cuttings and fluid is required. All fluids and cuttings shall be contained and hauled off site on a regular basis. The adjacent parking lot will be active during construction and therefore no drill cuttings or fluids shall spill into the active parking area.

1.10 ACCEPTABLE INSTALLERS WITH QUALIFIED DRILLING SUBCONTRACTOR

A. Ground Loop Solutions

B. Bertram Drilling

C. Ortman Drilling and Water Services

D. Crabtree Drilling

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. HDPE PRODUCTS
      a. High Density Polyethylene Pipe:
         1) Centennial Plastics, Inc. – CenFuse Geothermal
         2) Duraline – Geoguard Geothermal
         3) Pre-approved NSF-14 Geothermal pipe manufacturers.
      b. High Density Polyethylene Fittings:
         1) GF Central Plastics
         2) Viega

3) Nupi
4) Friatec
5) Pre-approved HDPE fitting manufacturers.

c. Transition Fittings
1) Chevron-Phillips Performance Pipe Fittings
2) GF Central Plastics
3) Poly-Cam
4) Viega
5) Nupi
6) Friatec
7) Pre-approved HDPE transition fitting manufacturers.

2.2 THERMAL AND SEALING GROUT - (Conditional to the Thermal Conductivity and permeability requirements.)

A. Thermally Enhanced Grout:
1. GeoPro Inc.
2. Baroid

2.3 PIPING

A. Piping shall be constructed of high-density polyethylene (HDPE) with the material having a Hydrostatic Design Basis of 1600 psi at 73°F per ASTM D2837. The U-bend material shall be listed in PPI TR4 as PE 4710 piping formulation. The material shall have a minimum cell classification of PE345464C per ASTM D3350 with a UV stabilizer. Extruded pipe sizes and dimensions used in vertical boreholes shall conform to the specifications of ASTM D3035 and be DR-11. Only HDPE pipe, as specified in the International Ground Source Heat Pump Association (IGSHPA) Design and Installation Standards (2017), is acceptable. Unless otherwise approved, pipe shall be NSF 14 and the identifying line shall have one of the following labels: NSF 14, NSF-PW, or NSF Geothermal.
1. Two-inch and smaller HDPE piping used to carry ground-loop fluid shall conform to the above specifications and shall be SDR-11. SDR-15.5 is not acceptable.
2. Three-inch and larger HDPE piping used to carry ground-loop fluid shall conform to the above specifications and shall be DR-15.5 or DR-11.

B. Pipe fittings that are molded shall be manufactured to the dimensional specifications and requirements of ASTM D2683 (for socket fusion fittings), ASTM D3261 (for butt/saddle fusion fittings), or ASTM F1055 for electro-fusion fittings. All fittings below ground level shall be made by IGSHPA approved thermal fusion.

C. Vertical sections of pipe shall be one piece except for "U" tube fitting(s) at the base of the loop (U-tube assembly). The U-tube sections shall come from the manufacturer with the U-tube assembly factory fused to the vertical section.

D. Two-inch HDPE piping used for the vault conduits shall be from a continuous roll. No fittings shall be used unless absolutely necessary. If a fitting is required to connect 2 sections of pipe together the only allowable fitting is an electrofusion coupling.

2.4 BOREHOLE BACKFILL AND GROUT

A. Seal Material: Bentonite clay with thermal conductivity greater than 1.07 Btu/h x sq. ft. x deg F in accordance with ASTM D5334.

B. The specific type of grout designated is Thermal Grout Lite/Select – PowerTEC (or equivalent) yielding a minimum thermal conductivity of 1.20 Btu/hr-ft-Fo. This is a thermally enhanced grout with a thermal enhancement other than sand or granular rock. The basis of design is GeoPro Inc. PowerTEC . It is the D/L Contractor's responsibility to supply the correct pumping equipment for the grout specified and be able to complete each grouted borehole in a timely manner. Thermal grout must be NSF approved and meet all Utah State permeability minimums, as well as any other requirements as listed in federal, state, or local codes.

C. All grout additives (e.g. graphite) must be approved by the grout manufacturer as meeting their requirements for the specific thermal conductivity specified.

D. Portland or cement based grouts are not acceptable.

2.5 METALLIC MARKING TAPE AND TRACER WIRE

A. Underground metallic marking tape shall have a 2" minimum width, with a minimum 5.0 mil overall thickness. Tape shall be manufactured using clear virgin polypropylene film, reverse printed and laminated to a solid aluminum foil core, and then laminated to a clear virgin polyethylene film. Tape shall be printed using a diagonally striped design for maximum visibility, and meet the APWA Color-Code standard for identification of buried utilities. Print line shall include an indication of “Caution GEOTHERMAL lines below”. Pro-Line Safety Products is the basis of desine

B. Install a #10 AWG tracer wire from penetration alongside of each horizontal pipe. One for each circuit.

2.6 ANTIFREEZE SOLUTION (Furnished by the Water Treatment Contractor)

A. Inhibited Propylene Glycol:

1. Propylene glycol with inhibitor additive, to provide freeze protection for heat-transfer fluid and corrosion protection for carbon steel, brass, copper, stainless steel, and cast-iron piping and fittings.
2. Inhibitor creates a passive layer on all surfaces that contact propylene glycol to prevent corrosion and stabilizes fluid pH, to compensate for acids formed from glycol degradation.
3. Concentrated inhibited propylene glycol is to be 95.5 percent propylene glycol by weight and 4.5 percent performance additives.
4. Concentrated inhibited propylene glycol is mixed with water in proper proportion specified by manufacturer to provide freeze protection to 20 degrees F. Premixed heat-transfer fluid may be used, or glycol/water mixture may be prepared at the time of installation. Use only deionized water for mixing.
5. Provide only propylene glycol that is specifically blended for HVAC application. Automotive-type antifreeze is unacceptable.

2.7 MECHANICAL SEALING DEVICES

A. Use a modular, mechanical seal, consisting of rubber links shaped to continuously fill the annular space between the pipe and the penetration opening. Link-Seal is the basis of design.

PART 3 - EXECUTION

3.1 FLUSHING AND PURGING THE SYSTEM

A. General: Before backfilling the trenches, all systems shall be flushed and purged of air and dirt; and pneumatic tested. A portable temporary purging unit shall be utilized and shall consist of the following: purge pump-high volume and high head; open reservoir; filter assembly with bypass; connecting piping, and connection hoses. A pneumatic test shall be conducted prior to backfill and a hydrostatic test shall be conducted after backfilling.

B. Using the purging unit described above, flush and purge GLHE until free of air, dirt and debris. A velocity of 3 ft./sec. is required in all pipe sections to remove the air. Flush, dump and drain until water runs clear. This flushing and purging operation should be conducted with the water source heat pump piping isolated with shut off valves. The loop contractor is only responsible for flushing the exterior loop, MC is responsible for interior pipe. After the GLHE is completely flushed of air and debris, open the isolation valves and permit circulation through the heat pump portion of the system until the entire system is flushed and purged. Refill the system with clean water. The hoses to each pump unit are to be joined together to form a loop. Do not flush and purge through the heat pump unit.

C. Do not allow the acid solution used to purge and flush the indoor metal pipe system to the heat pump units to become mixed with the solution in the GLHE.

D. Utilizing the purging unit conduct a pressure and flow test on the GLHE to ensure the system is free of blockage. If the flow test indicated blockage, locate the blockage systematically clamping off loops with a pinch-off tool, remove the blockage, then re-purge and conduct the pressure and flow test again until all portions of the system are flowing.

3.2 EARTHWORK

A. Excavating, trenching, warning tape, and backfilling are specified in Section 31 20 00 "Earth Moving."

3.3 INSTALLATION OF HORIZONTAL PIPING

A. Install HDPE piping in trenches in accordance with ASTM D2774 or ASTM F645.

1. Clean HDPE pipe and fittings and make heat-fusion joints in accordance with ASTM D2657. Minimize number of joints.

B. Install the header piping with minimum 48” of cover.

C. Extend the horizontal piping and route the piping into the building and terminate.

D. Purge, flush, and pressure test all piping before backfilling trenches.

1. Pressure test piping in accordance with ASTM F2164.

E. Backfill all horizontal piping and header trenches.

1. Install sand in trench and 6” below and 6” above pipe to protect pipe from damage by sharply edged rocks and similar material.
2. Install continuous detectable underground warning tape prior to backfilling of trenches for underground piping. Locate tape a minimum of 24 inches below finished grade, directly over piping.

F. Seal penetrations through building walls.

G. Wall sleeves are specified in Section 23 05 00 "Common Work Results for HVAC."

H. Mechanical sleeve seals are specified in Section 23 05 00 "Common Work Results for HVAC."

3.4 INSTALLATION OF VERTICAL PIPING

A. Excavating, trenching, warning tape, and backfilling are specified in another section.

B. Install HDPE piping in boreholes in accordance with ASTM D2774 or ASTM F645.

1. Clean HDPE pipe and fittings and make heat-fusion joints in accordance with ASTM D2657. Minimize number of joints.
2. Provide factory fabricated U-bend assembly at base of vertical piping.

C. Purge, flush, and pressure test all piping before backfilling boreholes.

1. Pressure test in accordance with ASTM F2164.

D. Completely fill the borehole from bottom to top with backfill material.

E. Install the header piping 12 inches deep and install the horizontal piping from the header to the boreholes.

F. Extend the horizontal piping and connect to ground-loop heat-pump piping systems at outside face of building wall in locations and pipe sizes indicated.

1. Terminate water-service piping at building wall until building ground-loop heat-pump piping systems are installed. Terminate piping with caps. Make connections to building ground-loop heat-pump piping systems when those systems are installed.

G. Purge, flush, and pressure test all piping before backfilling trenches.

1. Pressure test in accordance with ASTM F2164.

H. Backfill all horizontal piping and header trenches.

1. Install sand in trench and all around pipe to protect pipe from damage by sharply edged rocks and similar material.
2. Install continuous detectable warning tape for underground piping. Locate tape a minimum of 24 inches below finished grade, directly over piping.

I. Mark borehole locations, header pipes, and horizontal runs with metallic locator tape as specified in Section 23 05 53 "Identification for HVAC Piping and Equipment."

J. Seal penetrations through building walls.

K. Wall sleeves are specified in Section 23 05 00 "Common Work Results for HVAC."

L. Mechanical sleeve seals are specified in Section 23 05 00 "Common Work Results for HVAC."

3.5 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

3.6 FIELD QUALITY CONTROL

A. Piping Tests: Fill piping 24 hours before testing and apply test pressure to stabilize piping. Use potable water only.

B. Hydrostatic Tests: Test at not less than one and one-half times the pipe working pressure and temperature rating specified above.

1. Test for piping system leaks at 100 psi test for 1 hour.
2. Maintain a minimum pipe velocity of 24 in./s for a minimum of 15 minutes to remove all air.

C. Prepare test and inspection reports.

END OF SECTION

SECTION 23 81 46

WATER-SOURCE UNITARY HEAT PUMPS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes unitary heat pumps with refrigerant-to-water heat exchangers, refrigeration circuits, and refrigerant compressor(s).

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 each water-source unitary heat pump.
2. Include rated capacities, operating characteristics, furnished specialties, and accessories.

B. Shop Drawings:

1. Include plans, elevations, sections, and mounting and attachment details.
2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include diagrams for power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of water-source unitary heat pump, signed by product manufacturer.

B. Field quality-control reports.

C. Sample Warranty: For manufacturer's warranty.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For water-source unitary heat pumps to include in emergency, operation, and maintenance manuals.

1.6 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of water-source unitary heat pumps that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, refrigeration components and refrigerant.
2. Warranty Period: Four years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. ASHRAE Compliance:

1. ASHRAE 15.

B. Comply with NFPA 70.

C. Comply with safety requirements in UL 484 for assembly of free-delivery, water-source heat pumps.

2.2 WATER-SOURCE UNITARY HEAT PUMPS, 6 TONS AND SMALLER

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. ClimateMaster, Inc.
2. FHP Manufacturing Inc.
3. Trane Inc. (Basis of Design)
4. WaterFurnace International, Inc.

B. Description: Packaged water-source unitary heat pump with temperature controls; factory assembled, piped, wired, tested, and rated according to ASHRAE/ARI/ISO-13256-1.

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Cabinet and Chassis: Galvanized-steel casing with the following features:

1. Access panel for access and maintenance of internal components.
2. Knockouts for electrical and piping connections.
3. Cabinet Insulation: Glass-fiber liner, minimum 1/2 inch, thick, complying with UL 181, ASTM C1071, and ASTM G21.

D. Water Circuits:

1. Refrigerant-to-Water Heat Exchangers:

a. Source-side coaxial heat exchangers with copper water tube, with enhanced heat-transfer surfaces inside a steel shell; both shell and tube are leak tested to 450 psig on refrigerant side and 400 psig on water side.

b. Load-side coaxial heat exchangers with copper water tube, mechanically bonded into evenly spaced aluminum fins; leak tested to 400 psig on water side.

E. Refrigerant Circuit Components:

1. Sealed Refrigerant Circuit: Charge with R-454B refrigerant.
2. Filter-Dryer: Factory installed to clean and dehydrate the refrigerant circuit.
3. Charging Connections: Service fittings on suction and liquid for charging and testing on each circuit.
4. Reversing Valve: Four-way, solenoid-activated valve designed to be fail-safe in heating position with replaceable magnetic coil.
5. Compressor:

    a. Scroll.
    b. Single stage.
    c. Installed on vibration isolators and mounted on a structural steel base plate and full-length channel stiffeners.
    d. Exterior of compressor shall be wrapped with a high-density sound-attenuating blanket and housed in an acoustically treated enclosure.
    e. Factory-Installed Safeties:

        1) Antirecycle timer.
        2) High-pressure cutout.
        3) Low-pressure cutout or loss of charge switch.
        4) Internal thermal-overload protection.
        5) Freezestat to stop compressor if water-loop temperature in refrigerant-to-water heat exchanger falls below 35 deg F.
        6) Water-coil, low-temperature switch.

6. Refrigerant Piping Materials: ASTM B743 copper tube with wrought-copper fittings and brazed joints.
7. Pipe Insulation: Refrigerant minimum 3/8-inch-thick, flexible elastomeric insulation on piping exposed to airflow through the unit. Maximum 25/50 flame-spread/smoke-developed indexes according to ASTM E84.
8. Refrigerant Metering Device: Dual-port, thermal-expansion valve to allow specified operation with entering-water temperatures from 25 to 125 deg F.
9. Modulating hot gas reheat.

F. Controls:

1. Basic Unit Control Modes and Devices:

    a. Unit shutdown on high or low refrigerant pressures.
    b. Unit shutdown on low water temperature.
    c. Low- and high-voltage protection.
    d. Overcurrent protection for compressor.
    e. Random time delay, three to 10 seconds, start on power-up.
    f. Time delay override for servicing.
    g. Control voltage transformer.
    h. Water-coil freeze protection (selectable for water or antifreeze).
    i. Automatic intelligent reset. Unit shall automatically reset five minutes after trip if the fault has cleared. Should a fault reoccur three times sequentially, lockout requiring manual reset occurs.
    j. Ability to defeat time delays for servicing.
    k. Digital display to indicate high pressure, low pressure, low voltage, and high voltage.

l. The low-pressure switch shall not be monitored for the first 90 seconds after a compressor start command to prevent nuisance safety trips.
m. Remote fault-type indication at thermostat.
n. Selectable 24-V dc or pilot duty dry contact alarm output.
o. 24-V dc output to cycle a motorized water valve with compressor contactor.
p. Service test mode for troubleshooting and service.
q. Unit-performance sentinel warns when heat pump is running inefficiently.
r. Compressor soft start.
s. Hot gas reheat dehumidification cycle

2. Terminal Controller:

a. Scheduled operation for occupied and unoccupied periods on seven-day clock with minimum of four programmable periods per day.
b. Two-hour unoccupied override period.
c. Remote-control panel to contain programmable timer and digital display for fault condition.
d. Compressor-disable relay to stop compressor operation for demand limiting or switch to unoccupied operation.
e. Automatic restart after five minutes if fault clears. Lockout after three attempts to restart following fault. Indicate fault for service technician.
f. Backup for volatile memory.

G. Electrical Connection: Single electrical connection.

H. Capacities and Characteristics: Refer to schedule on drawings.

2.3 WATER-SOURCE UNITARY HEAT PUMPS LARGER THAN 6 TONS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. ClimateMaster, Inc.
2. FHP Manufacturing Inc.
3. Trane. (Basis of Design)
4. WaterFurnace International, Inc.

B. Description: Packaged water-source unitary heat pump with temperature controls; factory assembled, piped, wired, tested, and rated according to ASHRAE/ARI/ISO-13256-1.

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency and marked for intended location and application.

C. Cabinet and Chassis: Galvanized-steel casing with the following features:

1. Access panel for access and maintenance of internal components.
2. Knockouts for electrical and piping connections.
3. Cabinet Insulation: Glass-fiber liner, minimum 1/2 inch, thick, complying with UL 181, ASTM C1071, and ASTM G21.

D. Water Circuits:

1. Refrigerant-to-Water Heat Exchangers:

a. Source-side coaxial heat exchangers with copper water tube, with enhanced heat-transfer surfaces inside a steel shell; both shell and tube are leak tested to 450 psig on refrigerant side and 400 psig on water side.
b. Load-side coaxial heat exchangers with copper water tube mechanically bonded to evenly spaced aluminum fins; leak tested to 400 psig on water side.

E. Refrigerant Circuit Components:

1. Sealed Refrigerant Circuit: Charge with R-454B refrigerant.
2. Filter-Dryer: Factory installed to clean and dehydrate the refrigerant circuit.
3. Charging Connections: Service fittings on suction and liquid for charging and testing on each circuit.
4. Reversing Valve: Four-way, solenoid-activated valve designed to be fail-safe in heating position with replaceable magnetic coil.
5. Compressor:

a. Scroll.
b. Two stage.
c. Installed on vibration isolators and mounted on a structural steel base plate and full-length channel stiffeners.
d. Exterior of compressor shall be wrapped with a high-density sound-attenuating blanket and housed in an acoustically treated enclosure.
e. Factory-Installed Safeties:

1) Antirecycle timer.
2) High-pressure cutout.
3) Low-pressure cutout or loss of charge switch.
4) Internal thermal-overload protection.
5) Freezestat to stop compressor if water-loop temperature in refrigerant-to-water heat exchanger falls below 35 deg F.
6) Water-coil, low-temperature switch.

6. Refrigerant Piping Materials: ASTM B743 copper tube with wrought-copper fittings and brazed joints.
7. Pipe Insulation: Refrigerant minimum 3/8-inch-thick, flexible elastomeric insulation on piping exposed to airflow through the unit. Maximum 25/50 flame-spread/smoke-developed indexes according to ASTM E84.
8. Refrigerant Metering Device: Dual-port, thermal-expansion valve to allow specified operation with entering-water temperatures from 25 to 125 deg F.
9. Modulating hot gas reheat.

F. Controls:

1. Basic Unit Control Modes and Devices:

a. Unit shutdown on high or low refrigerant pressures.
b. Unit shutdown on low water temperature.
c. Low- and high-voltage protection.
d. Overcurrent protection for compressor.
e. Random time delay, three to 10 seconds, start on power-up.
f. Time delay override for servicing.
g. Control voltage transformer.
h. Water-coil freeze protection (selectable for water or antifreeze).

i. Automatic intelligent reset. Unit shall automatically reset five minutes after trip if the fault has cleared. Should a fault reoccur three times sequentially, lockout requiring manual reset occurs.
j. Ability to defeat time delays for servicing.
k. Digital display to indicate high pressure, low pressure, low voltage, and high voltage.
l. The low-pressure switch shall not be monitored for the first 90 seconds after a compressor start command to prevent nuisance safety trips.
m. Remote fault-type indication at thermostat.
n. Selectable 24-V dc or pilot duty dry contact alarm output.
o. 24-V dc output to cycle a motorized water valve with compressor contactor.
p. Service test mode for troubleshooting and service.
q. Unit-performance sentinel warns when heat pump is running inefficiently.
r. Compressor soft start.
s. Hot gas reheat dehumidification cycle

2. Terminal Controller:

a. Scheduled operation for occupied and unoccupied periods on seven-day clock with minimum of four programmable periods per day.
b. Two-hour unoccupied override period.
c. Remote-control panel to contain programmable timer and digital display for fault condition.
d. Compressor-disable relay to stop compressor operation for demand limiting or switch to unoccupied operation.
e. Automatic restart after five minutes if fault clears. Lockout after three attempts to restart following fault. Indicate fault for service technician.
f. Backup for volatile memory.

G. Electrical Connection: Single electrical connection.

H. Capacities and Characteristics: Refer to schedule on drawings.

2.4 ACCESSORIES

A. Hose Kit Assemblies:

1. Minimum Working Pressure: 400-psig.
2. Operating Temperatures: From 33 to 211 deg F.
3. Hose Length: 24 inches.
4. Minimum Hose Diameter: Equal to water-source unitary heat-pump piping connection.
5. Hose Material: Braided stainless steel with adapters for pipe connections.
6. Supply hose having Y-pattern strainer with blowdown valve and ball valve with pressure-temperature port; return hose having ball valve with pressure-temperature port.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for piping and electric installations for water-source unitary heat pumps to verify actual locations of piping connections and electrical conduits before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Suspend water-source, unitary heat pumps from structure with all-thread hanger rods and elastomeric hangers. Hanger rods and attachments to structure are specified in Section 230529 "Hangers and Supports for HVAC Piping and Equipment."

B. Install wall-mounting thermostats and switch controls in electrical outlet boxes at heights to match lighting controls or as required in Section 230923 "Direct Digital Control (DDC) System for HVAC."

3.3 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties. Specific connection requirements are as follows:

1. Connect supply and return hydronic piping to heat pump with unions and shutoff valvesor hose kits.

B. Install electrical devices furnished by manufacturer but not specified to be factory mounted.

C. Install piping adjacent to machine to allow space for service and maintenance.

3.4 FIELD QUALITY CONTROL

A. Perform the following field tests and inspections:

1. After installing water to water heat pumps 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 safeties. Replace damaged and malfunctioning controls and equipment.

B. Heat pumps will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports.

3.5 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

1. Complete installation and startup checks according to manufacturer's written instructions.
2. Inspect for visible damage to unit casing.
3. Inspect for visible damage to compressor and coils.
4. Inspect internal insulation.
5. Verify that labels are clearly visible.

6. Verify that clearances have been provided for servicing.
7. Verify that controls are connected and operable.
8. Adjust vibration isolators.
9. Start unit according to manufacturer's written instructions.
10. Complete startup sheets and attach copy with Contractor's startup report.
11. Inspect and record performance of interlocks and protective devices; verify sequences.
12. Operate unit for an initial period as recommended or required by manufacturer.
13. Verify thermostat calibration.
14. Inspect controls for correct sequencing of heating, refrigeration, and normal and emergency shutdown.

3.6 ADJUSTING

A. Adjust initial temperature set points.

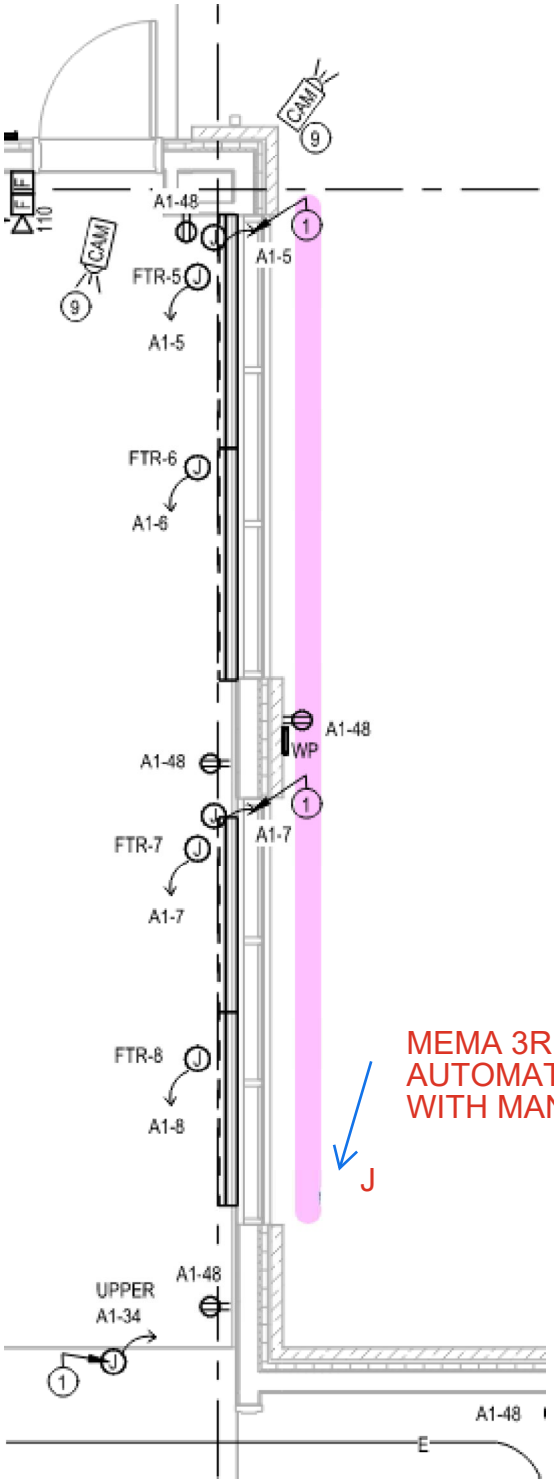
B. Set field-adjustable switches and circuit-breaker trip ranges as indicated.

C. Occupancy Adjustments: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

3.7 DEMONSTRATION

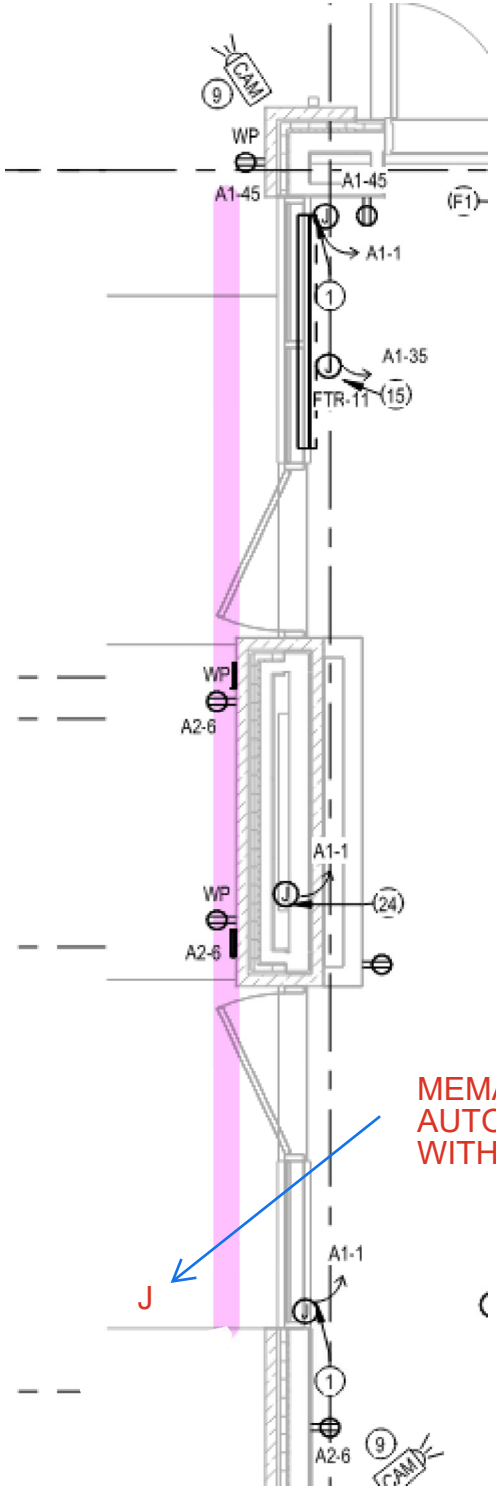
A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain water-source unitary heat pumps.

END OF SECTION



MEMA 3R RATED ELECTRICAL CONNECTION FOR AUTOMATED AIRFOIL. COORDINATE EXACT LCTN. WITH MANFCT. CIRCUIT 2-12.

SHEET E1-1 ADD #1



MEMA 3R RATED ELECTRICAL CONNECTION FOR AUTOMATED AIRFOIL. COORDINATE EXACT LCTN. WITH MANFCT. CIRCUIT 2-12.

SHEET E1-1 ADD #1