STATE OF IOWA
REQUEST FOR PROPOSALS
PROFESSIONAL DESIGN SERVICES

RFP COVER SHEET

Administrative Information

RFP Number	RFP937700-01	**Title of RFP**	Hope-Stratton HVAC Replacement
Agency	Iowa Department of Administrative Services (DAS)		
Project Description	The State of Iowa Department of Administrative Services (DAS) is seeking professional design services for upgrades to the current HVAC system at Hope House at 2501 Holiday Road, Coralville, IA 52240.		

State Issuing Officer:
Michael Bradbury
Issuing Officer
Iowa Department of Administrative Services
Hoover State Office Building, First Floor
1305 East Walnut, Des Moines, IA 50319-0105 Phone: 515-823-9327
Email: construction.procurement@iowa.gov

PROCUREMENT TIMETABLE—Event or Action	**Date/Time (Central Time)**
State Posts Notice of RFP on TSB website	04/30/2024
State Issues RFP	05/02/2024
Pre-Proposal Conference Location and Address: Is Pre-Proposal Conference mandatory? No If a map is needed, contact the Issuing Officer.	May 8, 2024 @ 11 am at 2501 Holiday Rd, Coralville, IA 52240
Questions, requests for clarification, and suggested changes from Respondents due to Construction Procurement	5/16/2024 @ 12 pm
Proposals Due	5/23/2024 @ 2 pm

Relevant Websites

Website where Addenda to this RFP will be posted http://bidopportunities.iowa.gov

Website where contract terms and conditions are posted
https://das.iowa.gov/sites/default/files/procurement/pdf/ConsensusDoc803.pdf

Number of Copies of Proposals Required to be Submitted: 1 Digital

Firm Proposal Terms
The minimum number of days following the deadline for submitting Proposals that the firm guarantees all proposal terms, including price, will remain firm is 120 Days.

1.1 INTRODUCTION

The Iowa Department of Administrative Services (DAS) is seeking proposals from qualified and available Design companies for services, per RFP cover page, and as outlined in the following (Sections 1.2 - 1.3). The successful proposal must:

- For the staff that will be assigned, identify and describe qualifications, experience, and expertise in providing services for similar, or relevant, projects.
- For the staff that will be assigned, provide a list of past similar or relevant projects completed in the last 5 years, and include brief descriptions of what the projects entailed and a contact name and phone number (reference). In addition provide estimated project cost, final project cost at acceptance, and whether it was completed on time.
- Describe the composition of your team. Identify staff to be assigned. Provide resumes of key individual(s) including education, relevant experience, and certifications/licensing. NOTE: Any responding company and/or consultant that is part of the project design services cannot receive an award from the resulting request for bid of construction services.
- Describe the cost estimating, status reporting, and cost reporting procedures you utilize.
- Describe computer program/software capabilities and expertise you utilize. Please describe your experience.
- Provide a copy of your organizational chart.
- Describe your experience, if any, on designing similar or relevant projects for the State of Iowa.
- Provide the hourly rates, and anticipated hours by position, for all persons (including sub-consultants) that will be assigned to the project. Also provide an estimated fee total.
- Identify desired reimbursable charges (the State has limitations, per State of Iowa Accounting Policies and Procedures 210.245), and all other charges.

1.2 SCHEDULE

DAS is seeking a firm that can commence work upon execution of a contract. Time is of the essence.

Execution of Designer's Contract	Week of June 03, 2024
Tentative Design Kick-Off Meeting	Week of June 10, 2024
100% Design Development Documents and Cost Opinion By	Design Professional to Propose in RFP Schedule
95% Construction Documents and Cost Opinion By	Design Professional to Propose in RFP Schedule
100% Construction Documents and Cost Opinion By	August 23, 2024
Contractor Bidding	September 2024
Execution of Contractor's Contract(s)	September 2024
Submittals, Procurement and Construction	October 2024 to April 2025
Close out	April 2025 to May 2025

1.3 PROJECT DESCRIPTION

Construction Manager (McGough Construction) has been engaged for this Project to serve as advisor to DAS and to provide assistance in administrating the Contract for Design between DAS and the Designer according to separate contract between DAS and Construction Manager. DAS is currently seeking design services from qualified firms for a project consisting of HVAC upgrades for Phase 1 only as specified in the Hope-Stratton HVAC Evaluation report to improve humidity issues within the facility. DAS may negotiate with the design firm selected through this process to provide additional future design services for Phase 2 and any other HVAC-related recommendations that may develop.

Design services shall include:

1.3.1 The contract for this work will be a modified ConsensusDoc 803. See link on cover page for a sample contract.

1.3.2 All design disciplines necessary to complete the scope of work.

1.3.3 Attend design kick-off meeting onsite to discuss desired outcome of the project with the Owner, Construction Manager, and Owner's maintenance staff.

1.3.4 Use of the State of Iowa's construction management software program for uploading all documents, submitting and approving pay apps, and construction administration. The cost for the use of the software is paid by the Owner.

1.3.5 Design for the follow scope of work:

1.3.5.1 Phase 1 HVAC Upgrades as noted in the Hope-Stratton HVAC Evaluation report. Designer to review and confirm all recommendations for equipment sizing, controls and ventilation levels.

1.3.6 Existing PDF drawings will be provided to the successful design firm. Accuracy of drawings shall be verified by the design firm.

1.3.7 Field examination of the existing buildings.

1.3.8 Design for scope of work. Provide material recommendations based on experience, quality, and price. Recommendations for replacements and upgrades shall include non-proprietary equipment and systems.

1.3.9 Provide minor drawing work to assist the Construction Manager in the development of hazardous materials bid package. This shall include providing PDF backgrounds for identification, by others, of hazardous materials removal.

1.3.10 Designer shall include any and all survey work required for completion of project.

1.3.11 Coordinate with State agencies to confirm utilities that may be abandoned as well as shut down requirements where required.

1.3.12 Provide detailed input of design schedule to Construction Manager for overall incorporation into master schedule.

1.3.13 Designer shall assist Construction Manager in the evaluation of long lead times.

1.3.14 Quality control during Design, Preconstruction and Construction.

1.3.15 Compliance with all Federal, State, and applicable AHJ codes.

1.3.16 Completion of State building and energy code documents, as required.

1.3.17 Design review will be conducted at 100% design development documents, and 95% construction documents. Dates for design review meetings to be coordinated with the design and project team and set no later than the design kickoff meeting. Review will be conducted with DAS Owner Representative, Construction Manager, and Facility Representative, at a minimum. Drawings, specifications and cost opinions (if applicable) shall be provided at least five days prior to each review meeting. An additional review meeting may be required at the end if there are discrepancies in cost opinions or constructability review questions.

1.3.18 Review with the Department of Inspections, Appeals, and Licensing's Building Code Bureau for approval of plans or exemption from review. All fees associated with the Bureau are the responsibility of the designer.

1.3.19 Develop and distribute agendas and meeting minutes for all meetings during the design phase.

1.3.20 Designer shall provide any information necessary to obtain utility rebates where applicable.

1.3.21 Construction cost opinions provided by the Design Professional team during Design (at 100% design development documents, and 95% construction documents) with a Final Estimate for construction included with bid documents, per Iowa Code.

1.3.22 Construction drawings, specifications (the Construction Manager will produce Divisions 00 and 01), and addenda.

1.3.23 Provide bid alternates as determined during the course of design and bid package development.

1.3.24 Assist Owner and Construction Manager in obtaining bids from qualified contractors.

1.3.25 Construction administration, including creation of the submittal and closeout items log, review of and responses to submittals and closeout documentation, RFIs, proposal requests, change orders, pay applications, periodic site visits, attendance at project meetings as required, participation / development of contractor punch list, closeout documentation review and approval, certificates of substantial completion, and certificates of final completion, as well as development of Architectural Supplemental Instructions for design revisions, and punch lists within the construction management software program.

1.3.26 Participation with project team during construction progress meetings as required. Designer shall participate in bi-weekly conference calls during the construction period.

1.3.27 Field Observation reports, with photos, submitted for each site inspection within five (5) days of the site visit.

1.3.28 Acknowledgement that all documents are copyright to the State of Iowa and shall be turned over to the State of Iowa in their native computer format. Any ASIs/RFIs/PRs and addendums will be expected to be incorporated before final posting. Both the native computer format and PDF versions shall be uploaded to the construction management software program at the end of the project.

1.3.29 The Department requests lump sum pricing from the respondents to this RFP, with the lump sum base scope price being inclusive of all reimbursables, such as printing, mileage

and travel expenses. The Department requests the fee proposal from the respondents to this RFP be broken down as follows. These breakdown prices will be used as the schedule of values for billing purposes.

1.3.29.1 Design Development Documents

1.3.29.2 Construction Documents

1.3.29.3 Bidding or Negotiation Assistance

1.3.29.4 Construction Phase

Include at a minimum, eight (8) site visits. Design kick-off/Building evaluation, 100% design development document review meeting, Pre-bid meeting, Construction Field Observation (2), Substantial completion/punch list development, Punch list/Final Completion approval, and one year warranty correction period visit. Design Review at 95% construction document development will be conducted via conference call. Beyond these site visits, each proposing firm shall provide additional visits as they see fit to complete the work of design. In addition to the lump sum pricing, the Department requests a unit price per construction inspection visit. This unit price will be additive or deductive based on the number of actual visits made.

1.4 ATTACHMENTS

1.4.1 DOC 6JD IC Hope-Stratton HVAC Evaluation Report

2 – ADMINISTRATIVE ISSUES

2.1 GENERAL INFORMATION

2.1.1 DAS will evaluate the qualifications, experience, and other relevant information from companies interested in contracting with the State of Iowa to provide the necessary services to complete the project described in this RFP.

2.1.2 Companies certified as Targeted Small Businesses are encouraged to submit Proposals. The Iowa Department of Economic Development administer the Targeted Small Business (TSB) Program. Businesses meeting the requirements of the program are approved and registered with the Department of Economic Development and areconsidered Targeted Small Businesses for purposes of this RFP and most other solicitations issued by DAS. Questions concerning the TSB Program and for identification of companies certified as Targeted Small Businesses, contact the TSB Certification office in the Department of Economic Development at (515) 348-6159.

2.2 INQUIRIES

2.2.1 All inquiries concerning this RFP shall reference the RFP number and shall be provided (via email) to the issuing officer email address identified on the cover page of this RFP. Addenda type questions must be submitted per Schedule, Section 1.2.

2.2.2 Any information provided by prospective companies orally shall not be considered part of the companies Proposal.

2.2.3 DAS assumes no responsibility for representations concerning conditions made by its officers or employees prior to the execution of a contract. Oral discussions pertaining to modifications or clarifications of this RFP shall not be considered part of this RFP and are not binding.

2.3 PREPARATION OF THE PROPOSAL

2.3.1 **Proposals must be submitted on the Iowa IMPACS Electronic Procurement System.** Prospective companies are solely responsible for timely submission.

2.4 DATE, TIME AND PLACE TO SUBMIT PROPOSALS

2.4.1 As stated above the proposal must be submitted on the Iowa IMPACS Electronic Procurement System

2.4.2 The Proposal must be submitted into IMPACS, on or before 2:00 pm, central time on the Proposal due date.

2.5 ECONOMY OF PRESENTATION

Proposals shall address the specific RFP requirements. All questions posed by the RFP shall be answered clearly and concisely.

2.6 RFP CHANGES AND ADDENDA

Written Addenda will serve to amend the RFP documents accordingly.

2.7 CERTIFICATION OF INDEPENDENT PRICE DETERMINATION

By submission of a response to this Proposal, the Company certifies, and in the case of a joint Proposal, each party thereto certifies as to its own organization, that in connection with this procurement:

2.7.1 Any prices or hourly rates in this Proposal 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 competitor.

2.7.2 Unless otherwise required by law, any prices or hourly rates which have been provided in this Proposal shall not knowingly be disclosed by the Firm, directly or indirectly, to any competitor prior to the notice of intent to award a contract for services.

2.7.3 No attempt has been made or shall be made by the Company to induce any other person or Company to submit or not to submit a Proposal for the purpose of restricting competition.

2.7.4 Each person signing this Proposal certifies that:

2.7.4.1 He/she is the person in the Firm's organization responsible within that organization for the decision as to any prices being offered herein, or

2.7.4.2 He/she is not the person in the Firm's organization responsible within that organization for the decision as to any prices being offered herein, but that he/she has been authorized in writing to act as agent for the persons responsible for such decision, and

2.7.4.3 Any offer made by the submitted Proposal and any clarifications to that Proposal shall be signed by an officer of the offering Company or a designated agent empowered to bind the Company in a contract.

2.8 NOTICE OF INTENT TO AWARD

After the successful Company has been selected, a copy of the *Notice of Intent to Award* will be issued to all Companies who submitted Proposals in response to this RFP.

2.9 WITHDRAWAL OF PROPOSALS

Prospective Companies may withdraw, modify, and/or resubmit at any time prior to the date and time set for the receipt of Proposals. Once the time set for receipt of Proposals has passed, a Company shall not withdraw a Proposal for a period of sixty (60) days following the issuance of the Notice of Intent to Award a contract. Proposals shall remain open and valid for consideration by DAS throughout this period of sixty days, and until such time thereafter that written request to withdraw a Proposal is received by DAS.

2.10 DISPOSITION OF PROPOSALS

All Proposals become the property of DAS and disposition of the Proposals shall be at the sole discretion of DAS.

2.11 DISCLOSURE OF PROPOSAL CONTENT

Proposals will be placed in the public domain and be available for examination by interested parties. No Proposals shall be disclosed until after a *Notice of Intent to Award* has been issued. DAS reserves

the right to destroy all Proposals if the RFP is withdrawn or otherwise in the normal course of business. Trade secrets or proprietary information legally recognized as such and protected by law may be withheld if they are clearly and conspicuously labeled "Proprietary" in the margin of each individual page where they appear in the Proposal. Pricing information is not normally considered proprietary.

Public Records and Requests for Confidential Treatment.

The Agency's release of public records is governed by Iowa Code chapter 22. Contractors are encouraged to familiarize themselves with Chapter 22 before submitting a Proposal. The Agency will copy and produce public records upon request as required to comply with Chapter 22 and will treat all information submitted by a Contractor as non-confidential records unless Contractor requests specific parts of the Proposal be treated as confidential at the time of the submission as set forth herein **AND the information is confidential under Iowa or other applicable law.**

Failure to request information be treated as confidential as specified herein shall relieve Agency and State personnel from any responsibility for maintaining the information in confidence. Contractors may not request confidential treatment with respect to pricing information and transmittal letters. A contractor's request for confidentiality that does not comply with this section or a contractor's request for confidentiality on information or material that cannot be held in confidence as set forth herein are grounds for rejecting contractor's Proposal as non-responsive. Requests to maintain an entire Proposal as confidential will be rejected as non-responsive.

If Agency receives a request for information that Contractor has marked as confidential and if a judicial or administrative proceeding is initiated to compel the release of such material, Contractor shall, at its sole expense, appear in such action and defend its request for confidentiality. If Contractor fails to do so, Agency may release the information or material with or without providing advance notice to Contractor and with or without affording Contractor the opportunity to obtain an order restraining its release from a court possessing competent jurisdiction. Additionally, if Contractor fails to comply with the request process set forth herein, if Contractor's request for confidentiality is unreasonable, or if Contractor rescinds its request for confidential treatment, Agency may release such information or material with or without providing advance notice to Contractor and with or without affording Contractor the opportunity to obtain an order restraining its release from a court possessing competent jurisdiction.

2.12 PROPOSAL EVALUATION AND AWARD

The contract shall be awarded to the Company determined to be the best qualified to provide the services required under this RFP and the best value to the State.

2.13 GRATUITIES

The laws of Iowa provide that it is a felony to offer, promise, or give anything of value or benefit to a State employee with the intent to influence that employee's acts, opinions and judgment or exercise the discretion with respect to that employee's duties. Evidence of violations of this statute will be turned over to the proper prosecuting attorney.

Note: The State provides reimbursement to its employees for their transportation, lodging, meals, and miscellaneous expenses that are deemed necessary.

2.14 CONFLICTS BETWEEN TERMS

DAS reserves the right to accept or reject any exception taken by a prospective Company to the terms and conditions of this RFP. Should a prospective Company take exception to the terms and conditions required by DAS, the Firm's exceptions may be rejected and the entire Proposal declared non-responsive. DAS may elect to negotiate with the Company regarding contract terms or the contents of the Firm's Proposal.

2.15 IOWA STATUTES AND RULES

The terms and conditions of this RFP, the resulting contract, or activities based upon this RFP shall be construed in accordance with the laws of Iowa.

2.16 COSTS FOR PREPARATION OF PROPOSALS

No payments will be made to cover costs incurred by any Company in the preparation or the submission of this RFP, nor for any other associated costs.

2.17 NEWS RELEASES

News releases or other materials made available to the public, the Firm's clients, or potential clients pertaining to this procurement or any part of the Proposal shall not be made without prior written approval from DAS.

2.18 MISCELLANEOUS

2.18.1 DAS reserves the right to accept or reject any part of any Proposal, and to accept or reject any or all Proposals without penalty.

2.18.2 DAS reserves the right to waive minor deficiencies and informalities if, in the judgment of DAS, the best interests of the State of Iowa will be served.

2.18.3 DAS reserves the right to make a written request for additional information from a Company to assist in understanding or clarifying a Proposal. Any information received shall not be considered in the evaluation of the Firm's Proposal if it materially alters the content of said Proposal.

Section 3 – CONTRACT TERMS AND CONDITIONS

3.1 ELEMENTS OF CONTRACT

3.1.1 No contract relationship is created or implied by DAS from the acceptance of a proposal oran interview with a company in response to this RFP.

3.1.2 No contract relationship is created or implied by DAS from the acceptance of a proposalor an interview with a company in response to this RFP.

3.1.3 The proposed form of contract between the Company and the State will be a revised Consensus Doc 803, which will be modified to include thefollowing:

3.1.3.1 Incorporation, by reference, of this Request for Proposal and subsequent addenda and the Proposal submitted by the successful Firm in response to this RFP.

3.1.3.2 Professional liability insurance in the amount of $2 million will be required. See Exhibit A – Sample Insurance Certificate.

3.1.3.3 The proposed project fee, start dates, and scheduling of the selected Firm's services shall be established during negotiations.

3.1.3.4 *Iowa Code* Section 8.47, The Accountable Government Act, requires that the terms and conditions of service contracts shall include the following:

3.1.3.4.1 The amount or basis for paying consideration to the party based on the party's performance under the service contract.

3.1.3.4.2 Methods to effectively oversee the party's compliance with the service contract.

3.1.3.4.3 Methods to effectively review performance of a service contract.

3.1.3.5 Other terms, mutually agreeable to the State and the Firm, may be developedduring negotiations with the selected Firm.

Other contract forms, as mutually agreeable, may be utilized as appropriate for additional services directly associated with this project.

3.1.4 This RFP does NOT establish a statewide contract.

Section 4 –REQUIREMENTS

All services to be provided by the Firm shall take into account the following assumptions:

4.1 MINIMUM FIRM QUALIFICATIONS

4.1.1 Firms, other than Sole Proprietorships and General Partnerships, shall be registered with the Office of the Iowa Secretary of State.

4.1.2 The selected Firm shall have sufficient, qualified staff to deliver the services needed. Per Chapter 26 of the Iowa Code regarding construction bids: A governmental entity shall havean engineer licensed under chapter 542B, a landscape architect licensed under chapter 544B, or an architect registered under chapter 544A prepare plans and specifications, and calculate the estimated total cost of a proposed public improvement.

4.1.3 The selected Firm shall have the resources and capabilities and the commitment tocomplete the required work in an efficient and timely manner, within the time period specified/negotiated.

4.1.4 DAS reserves the right to require proof of a submitting Firm's financial stability.

4.1.5 Failure to adhere to these instructions may be grounds for a Firm's Proposal to befound non-compliant with requirements of this RFP, and may be cause for rejection of the Proposal.

4.2 PROPOSAL CONTENT

Please do not exceed 10 MB on the file size of your proposal. The Proposal shall consist of the following elements in the order given below, and shall be limited to thirty (30) single pages or less, not including dividers, cover page, or resumes:

4.2.1 Letter of Transmittal/Statement of Interest including understanding and compliance with all requirements in this RFP (note section 4), email address for contact person, and acknowledgment of any addenda.

4.2.2 Executive Summary of the Proposal.

4.2.3 Response to all things in Sections 1 (1.1-1.3) and Section 4.

4.2.4 Company information regarding Organizational Stability, and Financial Strength (or provide Bank or Accountant reference).

4.2.5 Overview and Discussion of Offered Services including Approach and Methods (reference Section 1).

4.2.6 Estimated fee total, hourly rates, and anticipated hours by position per Section 1.1(8).

Section 5 – PROPOSAL EVALUATION, SELECTION, AND AWARD

5.1 EVALUATION PROCEDURES

5.1.1 Proposal packages will be opened by the Issuing Officer and the names of all Companies who submitted Proposals will be released upon request.

5.1.2 The Issuing Officer will review the proposals for compliance with the RFP instructions/requirements.

5.1.3 The Issuing Officer will retain non-compliant Proposals.

5.1.4 Copies of proposals determined by the Issuing Officer to be compliant with the RFP will be evaluated.

5.1.5 Evaluation criteria is shown in 5.2.2

5.1.6 All answers provided to the questions asked in this RFP are subject to verification. Misleading answers shall be grounds for disqualification at any stage in the procurement process.

5.1.7 DAS reserves the right to make a written request for additional information from a prospective Company to assist in understanding or clarifying a Proposal.

5.1.8 The Companies with the highest scoring Proposals may be selected for interviews.

5.1 SELECTION PROCEDURES

5.1.1 A Selection Committee will be formed to evaluate all compliant proposals. The committee's size and membership will be determined at the sole discretion of DAS.

5.1.2 Criteria for evaluating the proposals:

5.2.1.1 Qualifications (experience and expertise of staff assigned for similar projects), firm's capabilities and financial stability.

5.2.1.2 Approach and Proposed Methods.

5.2.1.3 The Firm's proposed schedule with respect to the State's needs.

5.2.1.4 Stipulated Fee, hourly rates, and anticipated hours by position per Section 1.1(8).

5.2.1.5 Interviews (optional)

5.3 AWARD OF CONTRACT

5.3.1 After selection, DAS will meet with the Firm for the purpose of negotiating an Agreement that is acceptable to both parties. In the event that the parties do not achieve an acceptable agreement, DAS reserves the right, at its sole discretion, to negotiate with other RFP respondents.

5.3.2 Should the above process not result in a contract, DAS will re-evaluate relevant issues and take appropriate follow-up action.

Exhibit A – SAMPLE INSURANCE CERTIFICATE

SAMPLE

ACORD

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY): XX/XX/XXXX

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

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

PRODUCER	CONTACT NAME: Agent's Information
Agent's Name Agent's Address	PHONE (A/C, No, Ext): FAX (A/C, No):
	E-MAIL ADDRESS:
	INSURER(S) AFFORDING COVERAGE / NAIC #
	INSURER A: Company A (AM Best Rated A/VI or Better) — Admitted Carriers
INSURED	INSURER B:
Designer's Name Designer's Address	INSURER C:
	INSURER D:
	INSURER E:
	INSURER F:

COVERAGES **CERTIFICATE NUMBER:** **REVISION NUMBER:**

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

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS Minimum	
A	COMMERCIAL GENERAL LIABILITY CLAIMS-MADE [X] OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: POLICY [X] PRO-JECT [ ] LOC OTHER:			#TBD- CGL	3/1/17	3/1/18	EACH OCCURRENCE	$ 1,000,000
							DAMAGE TO RENTED PREMISES (Ea occurrence)	$
							MED EXP (Any one person)	$
							PERSONAL & ADV INJURY	$1,000,000
							GENERAL AGGREGATE	$2,000,000
							PRODUCTS - COMP/OP AGG	$1,000,000
								$
B	AUTOMOBILE LIABILITY [X] ANY AUTO ALL OWNED AUTOS HIRED AUTOS SCHEDULED AUTOS NON-OWNED AUTOS			#TBD-AL	3/1/17	3/1/18	COMBINED SINGLE LIMIT (Ea accident)	$ 1,000,000
							BODILY INJURY (Per person)	$
							BODILY INJURY (Per accident)	$
							PROPERTY DAMAGE (Per accident)	$
								$
C	UMBRELLA LIAB [ ] OCCUR EXCESS LIAB [ ] CLAIMS-MADE DED RETENTION $						EACH OCCURRENCE	$
							AGGREGATE	$
								$
D	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? Y/N [ ] N/A (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below			#TBD-WC	3/1/17	3/1/18	PER STATUTE [X] OTH-ER	$1,000,000
							E.L. EACH ACCIDENT	$ 1,000,000
							E.L. DISEASE - EA EMPLOYEE	$ 1,000,000
							E.L. DISEASE - POLICY LIMIT	$ 1,000,000
	Professional Liability (Claims-Made Policy) Max Ded: $25,000			#TBD- DPR	3/1/17	3/1/18	Per Claim $2,000,000 Aggregate $2,000,000	

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

Project XXXX.XX (Number varies by project)

CERTIFICATE HOLDER	CANCELLATION
Iowa Department of Administrative Services (DAS) 109 SE 13th Street Des Moines, IA 50319	SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS. AUTHORIZED REPRESENTATIVE Signature

WEST PLAINS ENGINEERING, INC.

MECHANICAL ELECTRICAL PLUMBING POWER

AN ENGINEERING SOLUTION CENTER

9377.00 DOC 6JD IC HOPE-STRATTON HVAC EVALUATION

CORALVILLE, IOWA

MARCH 11, 2024

Michael Drahos, P.E. Mike.Drahos@westplainsengineering.com

TABLE OF CONTENTS

INTRODUCTION

West Plains Engineering (WPE) was contacted by Iowa Department of Administrative Services (DAS) to perform a HVAC Evaluation for the Department of Corrections 6th Judicial District Hope House (Stratton Center) in Coralville, Iowa. The study would be the first part of an improvement project to identify and correct deficiencies in the building. McGough Construction is the Construction Manager on this project. SystemWorks is the Testing, Adjusting, and Balancing Agent on this project.

The facility is currently observing high humidity issues in the summer season. This is causing uncomfortable space conditions. The high humidity is also thought to be contributing to condensation in and on the ductwork which is dripping through diffusers and onto the ceiling tile. The goal of the evaluation is to identify current deficiencies in the HVAC systems. There are no heating concerns and the study shall be focused on the air handling unit cooling system. The study will include recommendations for HVAC upgrades and estimated construction costs.

BACKGROUND

The building was constructed in 1992. Most of the original equipment (furnaces and condensing units) have since been upgraded to higher efficient units approximately 10 years ago.

The building HVAC system consists of multiple furnace air handling units with remote condensing units mounted on-grade. There are louvers on the side of the building that bring ventilation air into the air handling units. The bottom portion of the louvers used to serve combustion air for the furnaces. These ducts and dampers still remain, but have been closed off since the upgrade to high efficient sealed combustion furnaces. Facility engineering installed bi-polar ionization air cleaners on the air handling units in 2021.

The air handing units are controlled by programmable thermostats. The thermostats have an on/off/auto feature for fan operation. The thermostats used to be kept in the auto mode, but this did not provide proper continuous ventilation for the spaces. In this mode, the fans would shut off when the heating or cooling space temperature was satisfied, and no ventilation was provided. Now the thermostats are kept in 'fan on' mode since most of the spaces operate 24/7.

There are exhaust fans that serve janitor closets, toilets, shower rooms, kitchen hoods, and dishwasher hood. The exhaust fans are a combination of roof mounted exhausters and ceiling mounted cabinet fans. There is a roof mounted supply fan that provides makeup air to the kitchen hood. This kitchen hood makeup air is not conditioned (heated or cooled).

The air distribution system has fully ducted supply and return air. The ductwork is routed in the interstitial space between the insulated attic and the gypsum ceiling or lay-in ceiling tiles. No ducts are routed in the attic, except for exhaust serving roof exhausters.

ANALYSIS

WPE's approach in gathering information for the study was to review existing construction documents, perform site investigations, interview DOC Hope House facilities staff, and review airflow data collected by SystemWorks.

EXISTING DOCUMENTS

WPE had access to existing drawings from the original construction project. Although the documents were not As-Built drawings, the drawings had notes indicating changes in the original design. WPE utilized existing construction drawings to review the current equipment sizing. The following evaluation will identify cases where the equipment appeared to be improperly sized for the area being served.

SITE INVESTIGATIONS

WPE performed a site visit to survey the existing air handling equipment. As part of the survey, we compared current installations with the existing construction drawings. In most cases, the installation of equipment and ductwork matched what was shown on the construction documents.

WPE did not perform above ceiling verification during the site visit. This effort would be accomplished when new documents are developed for HVAC upgrades from the outcome of this evaluation.

INTERVIEW FACILITIES STAFF

WPE held a meeting with Cory Snyder and Brian Mullinnix. The purpose of the discussion was to get insight on building temperature/humidify concerns and equipment performance deficiencies that cannot be obtained by visual inspection. Cory Snyder maintains the equipment and was knowledgeable of which air handling systems are operating properly and which systems have cooling overages/shortages. Since the timing of the site investigation was not in the summer season, the locations of condensation problems were identified by the staff. Information gathered from the staff interview was incorporated into the evaluation.

AIRFLOW DATA

Humidity issues are commonly a result of too much outside air entering the building that is not properly conditioned to remove moisture. Humidity can also be a result of too high of airflow at the evaporator coils. In order to evaluate these potential causes of the humidity, WPE requested DAS to hire a testing agency to measure current outside air to the air handling units. SystemWorks performed airflow measurements that were evaluated as part of HVAC evaluation.

AIR HANDLING SYSTEMS

The following summarizes our evaluation of the 14 air handling systems that serve the building. The evaluation also addresses the observed condensation issues. Our evaluation does not include the basement storage area air handling unit.

Refer to **Appendix A** for floor plans with air handling unit locations and comments.

Refer to **Appendix B** for SystemWorks balance report.

Refer to **Appendix C** for existing equipment sizes and model numbers.

The following is a list of air handling systems with area served, square footage of area served, cooling capacity, and original design airflow:

System #	Area Served	Zone Area (SF)	Capacity (Tons)	Design Airflow (CFM)*
F-1	Office SW Wing	815	2	875
F-2	Office SW Wing	1040	2	1075
F-3	Office Central	1450	4	1975
F-4	Office SE Wing	925	2.5	950
F-5	Office SE Wing	1130	5	1850
F-6	Resident, NW Wing	1095	3	1200
F-7	Resident, NW Wing	1490	5	1725
F-8	Classroom W Central	845	5	1255
F-9	Resident NE Wing	1340	5**	1600
F-10	Office E Central	490	2**	850
F-11	Resident NE Wing	1225	3	1325
F-12	Dining West	1035	6	1950
F-13	Dining East	1210	6	1950
F-14	Kitchen	750	(2) 5	1940

* Design Airflow is the sum of the Original Construction Document room outlets.

** Original Construction Schedule had F-9 as 2 tons and F-10 as 5 tons. This was believed to be an error and the current installation has them switched as indicated above.

OUTSIDE AIR TO AIR HANDLING UNITS

The original design had motorized dampers intended to open the outside air to each furnace when the unit is operating. There is evidence of an attempt to install low voltage controls for the dampers, but this was abandoned. Currently the dampers have no damper operators, so the dampers are locked opened manually. In the event the furnace is not operating, outside air will enter the building with no enabled cooling coil to condition this air. This situation will add humidity to the building.

The current installation does not have balancing dampers to control the amount of outside air flow to the furnaces. Without balancing dampers, the outside air flow could get too high for the dehumidification capabilities of the furnace cooling coil. Too much outside air flow above design conditions will add humidity to the building.

IMPROPERLY SIZED AIR HANDLING UNITS

Our evaluation identified some air handling units that were not properly sized. Oversized equipment will not allow the cooling coil to run long enough to remove moisture from the air and increase humidity to the space. Oversized condensing units may cause excessive cycling on/off of the cooling which is not desirable and can cause premature failure of compressors. Undersized equipment will not have enough cooling capacity to remove moisture from the air and increase humidity to the space.

New installations incorporate variable speed furnace blowers, and multistage (or variable) burners and condensing units to best control space temperatures and humidity in the building. This is especially recommended for units that operate 24/7 such as this facility. Although it is desirable to upgrade the existing furnaces for improved performance, they are only 10 years old and have several years of expected life. Since the upgrade budget is limited, the furnace replacement with variable blowers and burners is considered on only a few units. Others furnaces can be replaced in the future.

MISMATCH CONDENSING UNITS AND EVAPORATOR COILS

Our evaluation identified some air handling units that had mismatched condensing unit and furnace cooling (evaporator) coils. If an evaporator coil has a larger capacity than the condensing unit, it can operate more efficiently but it can be difficult to dehumidify. If the evaporator has less capacity than the condensing unit, the system will dehumidify but it may be difficult to cool the space. It is not standard practice to mismatch condensing units and furnace evaporator coils. It is unknown why this was done.

Our recommendations have selectively chosen to remedy a few of these mismatched instances, but not in all cases. The recommended corrections were focused on the larger capacity systems where mismatched condensing units and evaporator coils were suspected to be a cause of the humidity concerns.

FURNACE-1

This furnace was originally designed for 2 tons. I agree with this sizing. The updated furnace has a 3-ton casing, 3-ton evaporator coil, and a 2-ton condensing unit. The evaporator is oversized compared to the condensing unit and would provide limited dehumidification capabilities at higher airflows. The unit has single stage heating, single stage cooling, and constant speed fan. The fan has 4 fan speed options and is running at low heating/low cooling speed settings.

The outside air design is 100 CFM and it is delivering 33 CFM. Airflow needs to be adjusted.

FURNACE-2

This furnace was originally for 2 tons. I would recommend the sizing to be 2.5 tons. The updated furnace has a 3-ton casing, 3-ton evaporator coil, and a 2-ton condensing unit. The evaporator is oversized compared to the condensing unit and would provide limited dehumidification capabilities at higher airflows. The unit has single stage heating, single stage cooling, and constant speed fan. The fan has 4 fan speed options and is running at low heating/low cooling speed settings.

The outside air design is 100 CFM and it is only delivering 134 CFM. Airflow needs to be adjusted.

FURNACE-3

This furnace was originally designed for 4 tons. This space has an added split A/C unit for the Computer area. I agree with the sizing although the room design airflows exceed this capacity. The airflow in the Corridor, Conference Room, and Waiting can be reduced to better match system capacity of 4 tons. The updated furnace has a 5-ton casing, 5-ton evaporator coil, and a 4-ton condensing unit. The evaporator is oversized compared to the condensing unit and would provide limited dehumidification capabilities at higher airflows. The unit has single stage heating, single stage cooling, and constant speed fan. The fan has 4 fan speed options and is running at medium low heating/high cooling settings.

The outside air design is 125 CFM and it is delivering 126 CFM.

FURNACE-4

This furnace was originally designed for 2.5 tons. I agree with this sizing. The updated furnace has a 3-ton casing, 3-ton evaporator coil, and a 3-ton condensing unit. The unit has single stage heating, single stage cooling, and constant speed fan. The fan has 4 fan speed options and is running at medium low heating/high cooling settings. AAA Mechanical had found that this unit had a bad thermal expansion valve that was not feeding all the way and only getting about 2 tons of cooling capacity. This thermal expansion valve has been replaced.

The outside air design is 150 CFM and it is delivering 204 CFM. Airflow needs to be adjusted.

FURNACE-5

This furnace was originally designed for 5 tons. I would recommend the capacity to be 4 tons. I believe the airflow in the Clerical area is too high. This space is 305 square feet and the airflow should be closer to 600 CFM and not 900 CFM as originally designed. The updated furnace has a 5-ton casing, 5-ton evaporator coil, and a 5-ton condensing unit. The unit has single stage heating, single stage cooling, and constant speed fan. The fan has 4 fan speed options and is running at medium low heating/medium high cooling settings. The single state condensing unit at this oversized capacity can make it difficult to maintain temperature and humidity at a constant airflow.

The outside air design is 200 CFM and it is delivering 404 CFM. Airflow needs to be adjusted.

FURNACE-6

This furnace was originally designed for 3 tons. I agree with this sizing. The updated furnace has a 3-ton casing, 3-ton evaporator coil, and a 3-ton condensing unit. The unit has single stage heating, single stage cooling, and constant speed fan. The fan has 4 fan speed options and is running at medium low heating/medium high cooling settings.

The outside air design is 175 CFM and it is delivering **negative** 104 CFM. It appears Furnaces 7 & 8 are drawing air from Furnace 6 outside air duct. Airflow needs to be adjusted.

FURNACE-7

This furnace was originally designed for 5 tons. I would recommend the capacity to be 4 tons. The updated furnace has a 5-ton casing, 5-ton evaporator coil, and a 5-ton condensing unit. The unit has single stage heating, single stage cooling, and constant speed fan. The fan has 4 fan speed options and is running at medium low heating/medium high cooling settings. The single state condensing unit at this oversized capacity can make it difficult to maintain temperature and humidity at a constant airflow.

The outside air design is 200 CFM and it is delivering 376 CFM. Airflow needs to be adjusted.

FURNACE-8

This furnace was originally designed for 5 tons. I would recommend the capacity to be 4 tons. The updated furnace has a 5-ton casing, 5-ton evaporator coil, and a 5-ton condensing unit. The unit has single stage heating, single stage cooling, and constant speed fan. The fan has 4 fan speed options and is running at medium low heating/medium high heating settings. The single state condensing unit at this oversized capacity can make it difficult to maintain temperature and humidity at a constant airflow.

The outside air design is 375 CFM and it is delivering 112 CFM. Airflow needs to be adjusted.

FURNACE-9

This furnace was originally designed for 2 tons, but I believe there was an error on the design documents and it should be 5 tons. I would recommend the capacity to be 4 tons. The updated furnace has a 5-ton casing, 5-ton evaporator coil, and a 5-ton condensing unit. The unit has single stage heating, single stage cooling, and constant speed fan. The fan has 4 fan speed options and is running at medium low heating/medium high cooling settings.

The outside air design is 100 CFM and it is delivering 0 CFM as the outside air is capped. It is my understanding that this was done as the smoking area is near the outdoor intake. This should be corrected to provide proper ventilation.

FURNACE-10

This furnace was originally designed for 5 tons, but I believe there was an error on the design documents and it should be 2 tons. I agree with this sizing. The updated furnace has a 3-ton casing, 3-ton evaporator coil, and a 2-ton condensing unit. The evaporator is oversized compared to the condensing unit and would provide limited dehumidification capabilities at higher airflows. The unit has single stage heating, single stage cooling, and constant speed fan. The fan has 4 fan speed options and is running at low heating/medium high cooling speed settings.

The outside air design is 200 CFM and it is delivering 0 CFM as the outside air is capped. It is my understanding that this was done as the smoking area is near the outdoor intake. This should be corrected to provide proper ventilation.

FURNACE-11

This furnace was originally designed for 3 tons. I agree with this sizing. The updated furnace has a 3-ton casing, 3-ton evaporator coil, and a 3-ton condensing unit. The unit has single stage heating, single stage cooling, and constant speed fan. The fan has 4 fan speed options and is running at medium low heating/medium high cooling settings.

The outside air design is 175 CFM and it is delivering 404 CFM. Airflow needs to be adjusted.

FURNACE-12

This furnace serves the Dining area. It was originally designed for 6 tons. I agree with the sizing. The furnace has a 5-ton evaporator coil and a 6-ton condensing unit. The unit has single stage heating, single stage cooling, and constant speed fan. The fan has 4 fan speed options and is running at medium low heating/medium high heating settings.

The outside air design is 700 CFM and it is delivering **negative** 547 CFM. Airflow needs to be adjusted. There was a missing outdoor air access door on this furnace which contributed to the negative outside airflow.

FURNACE-13

This furnace serves the Dining area. It was originally designed for 6 tons. I agree with the sizing. The furnace has a 5-ton evaporator coil and a 6-ton condensing unit. The unit has single stage heating, single stage cooling, and constant speed fan. The fan has 4 fan speed options and is running at medium low heating/medium high cooling settings.

The outside air design is 700 CFM and it is delivering 399 CFM. Airflow needs to be adjusted.

FURNACE-14

This furnace serves the Kitchen area. The system is a twinned system consisting of two furnaces with 5-ton evaporator coils and two 5-ton condensing units. I agree with this sizing. Each system has single stage heating, single stage cooling, and constant speed fan. The fans have 4 fan speed options and are running at medium low heating/medium high cooling settings.

The outside air design is 1500 CFM and it is delivering 832 CFM. The outside air for this system is used for makeup air to the kitchen and dishwasher hoods. The outside air damper for this system has been closed for an undetermined number of years. During testing, only one furnace system was operating. The kitchen hood was on during testing. It would be my understanding that twinned furnaces should both be operating when the kitchen hood is on. I am not sure if one of the furnaces had a fault or if the controls are set up to stage the furnaces. Since Furnace-12 and Furnace-13 had adequate outside air to help supplement the kitchen hood makeup air, it is possible that Furnace-14 system does not need to operate both furnaces. This needs to be investigated further. To help with dehumidification, the kitchen makeup air (outside air) could be shared between systems Furnace-12, 13, and 14.

CONDENSATION

The building has observed condensation dripping on the ceiling tiles. Site investigations have verified that there are areas where the duct is not continuously insulated. A hole was drilling to one of the supply ducts and confirmed that the ducts are internally lined. The take-offs to supply diffusers are externally wrapped with insulation. Some of the connections between the lined ductwork and wrapped ductwork are missing insulation. Refer to attached photo.

It has been my experience that buildings operating at higher humidity levels will also observe condensation on the surface of the supply diffuser cones and drip water at the diffuser outlets. We have had success mitigating this problem by insulating the top of the diffusers. Refer to Photos for top of diffusers.

AIRFLOW

Several of the air handling units were not operating at design airflow conditions per the sum of air outlet design. This was confirmed as part of the testing and balancing effort. This is most likely contributed to the design airflow being set at the higher cooling speed setting and the testing was done during the heating season at a lower speed setting. The testing was performed at an estimated 20% filter loading, so the data should be representative of standard condition. Further balancing should be performed to adjust diffusers, registers, and furnace fan speeds to meet design conditions.

ELECTRICAL

The power for the 2-ton and 2.5-ton capacity condensing units is 208 volt, single phase. The power for the 3-ton and larger capacity condensing units is 208 volt, three phase. The electrical requirements of newer 2-stage and variable stage condensing unit that would offer improved cooling capacity and dehumidification control require single phase (1-phase) power. The existing electrical distribution system does not offer a simple change of a 3-phase condensing unit with a 1-phase condensing unit.

The existing main distribution panel (MDP) has 5 branch breakers that provide 3-phase feeders to exterior wireways that serve groups of condensing units. These wireways have multiples splices (taps) that feed the disconnects for the condensing units. As an example, condensing units #9, 10, and 11 come from the same exterior wireway. It is difficult to make changes within the wireway to balance loads when changing a 3-phase condensing unit to a 1-phase condensing unit. The wireways should be replaced with exterior branch panels to make it easier for current and future electrical distribution changes associated with condensing unit replacement.

The existing feeders to the exterior wireways need to be reviewed further to identify if the wires need to be upsized for the increase amp draw for 1-phase condensing units.

RECOMMENDATIONS

INSULATION

Provide additional insulation on supply ductwork where the insulation is interrupted. Exterior flexible duct insulation shall be installed on the existing ducts to ensure there is continuous insulation between the lined ductwork and insulated flex duct take-offs, at flexible duct connections to diffusers, and at uninsulated transitions to sidewall supply registers. The extent of corrections for the insulation deficiencies shall be reviewed further during the development of construction documents.

ALL FURNACES

Install manual outside air volume dampers in the existing ductwork. Balance to design airflow.

Install motorized outside air damper, actuator, and controller. Tie damper to fan status to open the damper when the fan is on. This work would include providing electrical power to the controller and a low voltage transformer for control wiring if a transformer is not included in the controller.

FURNACE-1

Although the evaporator coil is oversized, no equipment changes are recommended for this system at this time. The furnace speed setting should be increased to achieve design airflow.

FURNACE-2

Change condensing unit to 2.5 tons. The furnace speed setting should be increased to achieve design airflow.

FURNACE-3

Change evaporator coil to 4-ton size. Upgrade condensing unit to a 2-state 4-ton unit.

FURNACE-4

Replace bad thermal expansion valve. No equipment changes are recommended for this system. A 2-stage condensing unit replacement could be considered.

FURNACE-5

Upgrade furnace, evaporator coil, and condensing unit to a 4-ton system. Include variable speed blower and 2-stage condensing unit.

Rebalance airflow in Clerical area to 220 CFM per diffuser for a total of 660 CFM.

A 5-ton 2-stage condensing unit could be considered and keep the furnace and evaporator coil, but the system will be slightly oversized. The two-stage condensing would help with the existing oversized furnace/condensing unit.

FURNACE-6

No equipment changes are recommended for this system. A 2-stage condensing unit replacement could be considered.

FURNACE-7

Upgrade furnace, evaporator coil, and condensing unit to a 4-ton system. Include variable speed blower and 2-stage condensing unit.

A 5-ton 2-stage condensing unit could be considered and keep the furnace and evaporator coil, but the system will be oversized. The two-stage condensing would help with the existing oversized furnace/condensing unit.

FURNACE-8

Upgrade furnace, evaporator coil, and condensing unit to a 4-ton system. Include variable speed blower and 2-stage condensing unit.

FURNACE-9

Upgrade furnace, evaporator coil, and condensing unit to a 4-ton system. Include variable speed blower and 2-stage condensing unit.

Modify the outside air plenum to include an activated carbon filter for removing smoke. Else provide a different location for smoking.

FURNACE-10

Although the evaporator coil is oversized, no equipment changes are recommended for this system. The furnace speed setting should be increased to achieve design airflow.

Modify the outside air plenum to include an activated carbon filter for removing smoke. Else provide a different location for smoking.

FURNACE-11

No equipment changes are recommended for this system. A 2-stage condensing unit replacement could be considered. The furnace speed setting should be increased to achieve design airflow.

FURNACE-12

A new 6-ton 2-stage or variable stage condensing unit replacement should be considered for this unit with the high amount outside air. This new equipment feature will provide better space conditioning and humidity control.

Install a new access door for outside air damper.

FURNACE-13

A new 6-ton 2-stage or variable stage condensing unit replacement should be considered for this unit with the high amount outside air. This new equipment feature will provide better space conditioning and humidity control.

FURNACE-14

Two new 5-ton 2-stage condensing unit replacement should be considered for this system with the high amount outside air. This new equipment feature will provide better space conditioning and humidity control.

ELECTRICAL

Install exterior branch panels to replace the existing exterior wireways. Only install new branch panels where Phase 1 condensing units are being replaced. Review the future amp draw of the 1-phase condensing units and MDP feeder size to identify if the feeder size needs to be replaced with larger wire size.

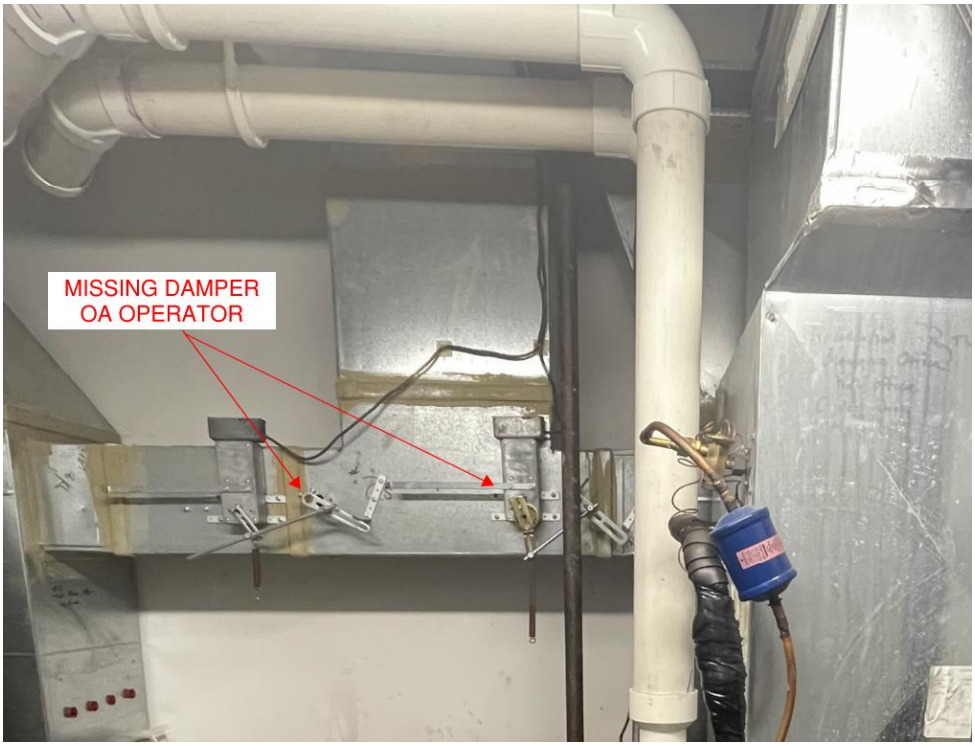
COST OPINION

The following is a preliminary opinion of probable construction costs for the work associated with the HVAC upgrade recommendations. The costs include associated general construction, ductwork, controls, balancing, and electrical.

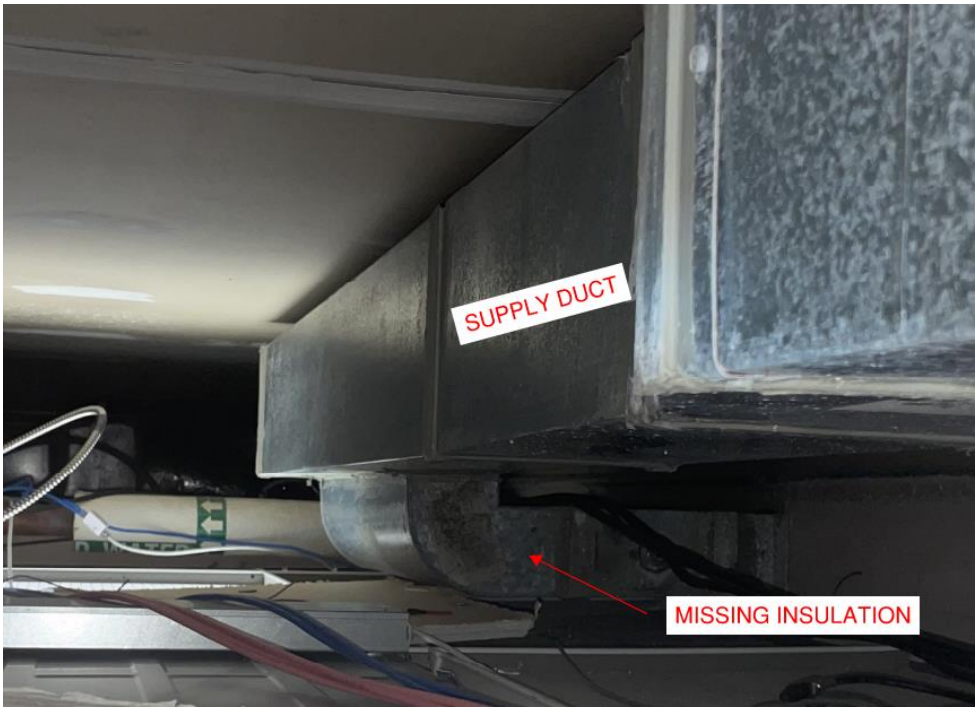
New Motorized OA Dampers for the 14 Furnaces and Low Voltage for Controls	.....	$ 25,000
New Manual Volume Dampers for OA Balancing	.....	$ 10,000
Insulate Duct Takeoffs and Diffusers	.....	$ 24,000
Upgrade Exterior Wireway for Furnaces 1, 2, 3, 4 & 5 to an Exterior Panelboard	.....	$ 12,000
Furnace 2 Upgrade to 2.5-Ton 2-Stage Condensing Unit	.....	$ 9,000
Furnace 3 Upgrade to 4-ton 2-Stage Condensing Unit and Evaporator Coil	.....	$ 12,000
Furnace 5 Upgrade to 4-ton Variable Condensing Unit, 2-Stage Gas Furnace and Evaporator Coil	.....	$ 20,000
Upgrade Exterior Wireway for Furnaces 6, 7 & 8 to an Exterior Panelboard	.....	$ 9,000
Furnace 8 Upgrade to 4-ton Variable Condensing Unit, 2-Stage Gas Furnace and Evaporator Coil	.....	$ 20,000
TOTAL PHASE 1 PROJECT COSTS		$ 141,000

Furnace 7 Upgrade to 4-ton Variable Condensing Unit, 2-Stage Gas Furnace and Evaporator Coil	.....	$ 20,000
Upgrade Exterior Wireway for Furnaces 9, 10 & 11 to an Exterior Panelboard	.....	$ 9,000
Furnace 9 Upgrade to 4-ton Variable Condensing Unit, 2-Stage Gas Furnace and Evaporator Coil	.....	$ 20,000
Furnace 12 Upgrade to 6-ton Variable Condensing Unit	.....	$ 16,000
Furnace 13 Upgrade to 6-ton Variable Condensing Unit	.....	$ 16,000
Furnace 14 Upgrade to two 5-ton 2-Stage Condensing Units.	.....	$ 26,000
TOTAL PHASE 2 PROJECT COSTS		$ 107,000

PHOTOS

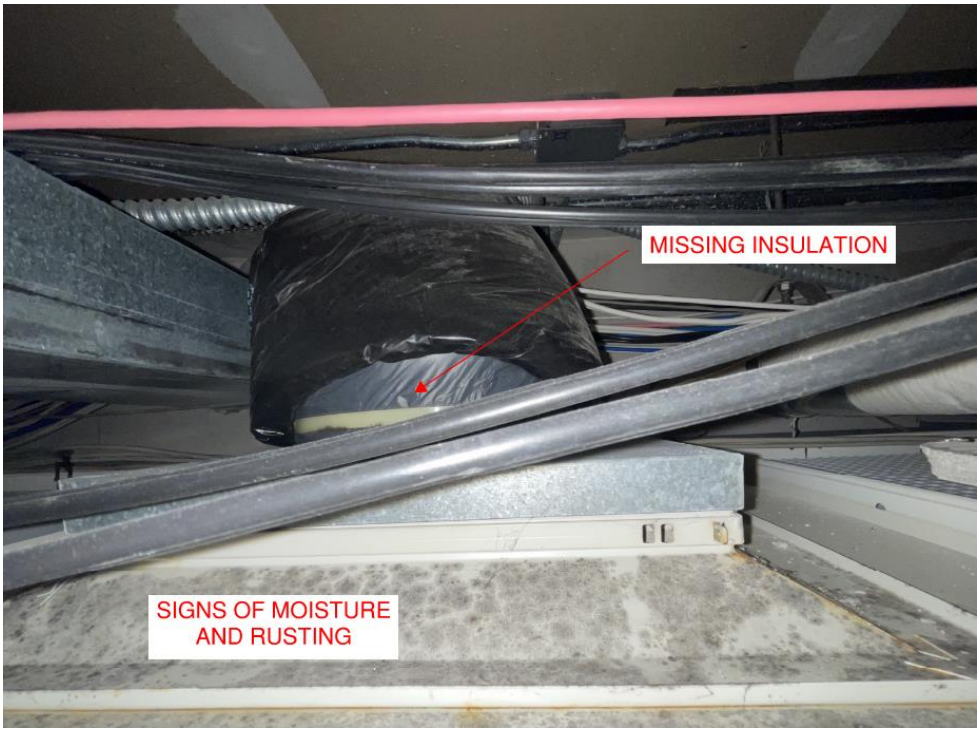


TYPICAL LOCATION WHERE OUTSIDE AIR DAMPERS TO FURNACES ARE MISSING DAMPER OPERATORS.



TYPICAL LOCATION OF INSULATION MISSING ON SUPPLY DUCT BRANCH TAKE-OFF TO SUPPLY GRILLE.

TYPICAL LOCATION OF INSULATION MISSING ON SUPPLY DUCT BRANCH TAKE-OFF TO SUPPLY DIFFUSER.



TYPICAL LOCATION IF INSULATION MISSING AT CONNECTION TO DIFFUSER AND MOISTURE ON DIFFUSER CONE.

REPORT

APPENDIX B

TESTING, ADJUSTING, AND BALANCING

State of Iowa
Hope House HVAC Evaluation
Coralville, IA

February 10, 2024

SystemWorks LLC
Commissioning Sustainable Buildings

SystemWorks LLC | 409 Fifth Street, West Des Moines, IA 50265 | **phone:** 515.975.0575 | **fax:** 515.255.1155

Name:	Rick L Boozell
Certification:	TABB Supervisor
Certification #:	TB923866S
Expiration Date:	03/31/2025
Contractor:	SystemWorks LLC

Furnace Report

Project : Hope House Evaluation
System : Furnace's

Test Date : 02/06/2024 & 02/07/2024
Readings By : Stephen Waltz

	Diffuser Information			Outlet Information		
RTU Served	No.	Face/Neck Size	Type	Design CFM	Actual CFM	Notes
					Traverse	Speed = Heat/Cool
Furnace # 1	Design Tonnage = 2			875	698	Speed Set - Low/Low
						CFM/Ton = 317
						RA Filter Load = 20%
						Outdoor CFM = 33
					Traverse	Speed = Heat/Cool
Furnace # 2	Design Tonnage = 2			1,075	853	Speed Set - Low/Low
						CFM/Ton = 388
						RA Filter Load = 20%
						Outdoor CFM = 134
					Traverse	Speed = Heat/Cool
Furnace # 3	Design Tonnage = 4			1,975	1,895	Speed Set - Med. Low/High
						CFM/Ton = 462
						RA Filter Load = 20%
						Outdoor CFM = 126
					Traverse	Speed = Heat/Cool
Furnace # 4	Design Tonnage = 3			950	855	Speed Set - Med. Low/High
						CFM/Ton = 342
						RA Filter Load = 20%
						Outdoor CFM = 204
					Traverse	Speed = Heat/Cool
Furnace # 5	Design Tonnage = 5			1,850	1,615	Speed Set - Med. Low/Med. High
				Flow Hood Readings		CFM/Ton = 323
				1,850	1,495	RA Filter Load = 20%
	1			300	32	Outdoor CFM = 404
	2			300	233	Duct Leakage = 8%
	3			300	319	
	4			125	147	
	5			125	159	
	6			125	140	
	7			125	155	
	8			150	126	
	9			125	38	
	10			175	146	

Notes:

1) Furnace 1, 2, 3 are connected to a common OA plenum.
2) Furnace 4, 5 are connected to a common OA plenum.

Furnace Report

Project : Hope House Evaluation
System : Furnace's

Test Date : 02/06/2024 & 02/07/2024
Readings By : Stephen Waltz

	Diffuser Information			Outlet Information		
RTU Served	No.	Face/Neck Size	Type	Design CFM	Actual CFM	Notes
					Traverse	Speed = Heat/Cool
Furnace # 6	Design Tonnage = 3			1,200	1,038	Speed Set - Med. Low/Med. High
						CFM/Ton = 358
						RA Filter Load = 20%
						Outdoor CFM = Neg. 104
					Traverse	Speed = Heat/Cool
Furnace # 7	Design Tonnage = 5			1,725	1,628	Speed Set - Med. Low/Med. High
						CFM/Ton = 326
						RA Filter Load = 20%
						Outdoor CFM = 376
					Traverse	Speed = Heat/Cool
Furnace # 8	Design Tonnage = 5			1,255	1,455	Speed Set - Med. Low/Med. High
						CFM/Ton = 291
						RA Filter Load = 20%
						Outdoor CFM = 112
					Traverse	Speed = Heat/Cool
Furnace # 9	Design Tonnage = 5			1,600	1,330	Speed Set - Med. Low/Med. High
						CFM/Ton = 605
						RA Filter Load = 20%
						Outdoor CFM = Capped
					Traverse	Speed = Heat/Cool
Furnace # 10	Design Tonnage = 2			850	611	Speed Set - Low/Med. High
						CFM/Ton = 122
						RA Filter Load = 20%
						Outdoor CFM = Capped
					Traverse	Speed = Heat/Cool
Furnace # 11	Design Tonnage = 3			1,325	903	Speed Set - Med. Low/Med High
						CFM/Ton = 311
						RA Filter Load = 20%
						Outdoor CFM = 404

Notes:

1) Furnace 6, 7, 8 are connected to a common OA plenum.

Furnace Report

Project : Hope House Evaluation
System : Furnace's

Test Date : 02/06/2024 & 02/07/2024
Readings By : Stephen Waltz

	Diffuser Information			Outlet Information		
RTU Served	No.	Face/Neck Size	Type	Design CFM	Actual CFM	Notes
					Traverse	Speed = Heat/Cool
Furnace # 12	Design Tonnage = 6			1,950	2,068	Speed Set - Med. Low/Med. High
						CFM/Ton = 363
						RA Filter Load = 40%
						Outdoor CFM = Neg. 574
					Traverse	Speed = Heat/Cool
Furnace # 13	Design Tonnage = 6			1,950	1,716	Speed Set - Med. Low/Med. High
						CFM/Ton = 303
						RA Filter Load = 40%
						Outdoor CFM = 399
					Traverse	Speed = Heat/Cool
Furnace # 14 (Gang Furnace)	Design Tonnage = 5 | 5			1,940	1,363	Speed Set - Med. Low/Med. High
Only 1 Furnace Running						CFM/Ton = 272
						RA Filter Load = 40%
						Outdoor CFM = 832

Notes:

1) There is a missing OA duct access door on furnace # 12.
2) Some furnace CFM's are low or high per design tonnage which leads to poor temperature/humidity control.
3) Overall, OA flows to furnaces have an imbalance. Some high, low and reverse direction.
4) The building is operating on a negative pressure (-0.015") which will allow unconditioned air to enter the building.

AIRDATA MULTIMETER CERTIFICATE OF RECALIBRATION

Customer ID: 016281 S/N: M04081
Customer: SYSTEM WORKS LLC City: WEST DES MOINES State: IA
As-Received Model #: ADM-870C Converted to Model #: Order #: R221625
PO #: Customer Eqpt ID#: Calibration Due Date:

This instrument has been calibrated using Calibration Standards which are traceable to NIST (National Institute of Standards and Technology). Test accuracy ra is 4:1 for pressures and temperature. Quality Assurance Program and calibration procedures meet the requirements for ANSI/NCSL Z540-1, ISO 17025, MIL-ST 45662A and manufacturer's specifications. Calibration accuracy is certified when meters are used with properly functioning accessories only. All Uncertainties a expressed in expanded terms (twice the calculated uncertainty). This report shall not be reproduced, except in full, without the written approval of Shortridg Instruments, Inc. Results relate only to the item calibrated. For limitations on use, see Shortridge Instruments, Inc. Instruction Manual for the use of AirDa Multimeters. Procedure used: Procedure for Differential Pressure, Absolute Pressure and Temperature Recalibration of AirData Multimeters SIP-CPC Revision: 30 Dated: 04/04/16

Calibration Technician(s): B.Robinett Calibration Date: 07/13/2022
Calibration Approved by: ATORNELL Title: ASST. SUP. Date: 07/13/2022

AS-Received	FINAL	
By B.Robinett	Test By B.Robinett	Test By
Date 06/28/2022 Rh 49 %	Date 07/13/2022 Rh 52 %	Date Rh %
Ambient Temperature 74 °F	Ambient Temperature 74 °F	Ambient Temperature N/A °F
Barometric Pressure 28.48 in Hg	Barometric Pressure 28.34 in Hg	Barometric Pressure in Hg
All within spec (YES) NO NA	All within spec (YES) NO	All within spec YES NO

ABSOLUTE PRESSURE TEST (in Hg)

TEST METER TOLERANCE = ± 2.0 % ± .1 in Hg AS-RECEIVED TEST WITHIN SPEC (YES) NO N/A See Notes

Pressure Standard: Heise #02-R S/N: 41741/42451 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #04-R S/N: 41743/42453 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #06-R S/N: 41742/42452-1 (As-Rcvd) (Test 2) Test 3
Pressure Standard: Heise #08-R S/N: 42186/43328 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #10-R S/N: 42203/43352 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #12A-R S/N: 45605/48491 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #14-R S/N: 43412/45043-2 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #16-R S/N: 43413/45044 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #18-R S/N: 44581/46845 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #20-R S/N: 44582/46847 As-Rcvd Test 2 Test 3

Approx Set Pt	Standard	Test Meter	% Diff	Standard	Test Meter	% Diff	Standard	Test Meter	% Diff
14.0	14.05	14.1	.36	14.06	14.1	.28			
28.4	28.48	28.6	.42	28.34	28.4	.21		N/A	
40.0	40.08	40.1	.05	40.08	40.1	.05			

DIFFERENTIAL PRESSURE TEST (in wc)

TEST METER TOLERANCE = ± 2.0 % ± 0.001 in wc AS-RECEIVED TEST WITHIN SPEC (YES) NO N/A See Notes

Pressure Standard: Heise #01-L S/N: 41739/42449 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #01-R S/N: 41739/42446 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #02-L S/N: 41741/42454 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #03A-L S/N: 45570/48461 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #03A-R S/N: 45570/48460 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #04-L S/N: 41743/42456 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #05-L S/N: 41740/42450 (As-Rcvd) (Test 2) Test 3
Pressure Standard: Heise #05-R S/N: 41740/42447 (As-Rcvd) (Test 2) Test 3
Pressure Standard: Heise #06-L S/N: 41742/42455 (As-Rcvd) (Test 2) Test 3
Pressure Standard: Heise #07-L S/N: 42185/42186 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #07-R S/N: 42185/43326 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #08-L S/N: 42186/43329 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #09-L S/N: 42202/43351 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #09-R S/N: 42202/43350 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #10-L S/N: 42203/43353 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #11-L S/N: 43165/44551-1 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #11-R S/N: 43165/44730 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #12A-L S/N: 45605/48490-1 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #13-L S/N: 43415/45041 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #13-R S/N: 43415/45039 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #14-L S/N: 43412/45045 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #15-L S/N: 43416/45042 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #15-R S/N: 43416/45040-1 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #16-L S/N: 43413/45046 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #17-L S/N: 44579/46842 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #17-R S/N: 44579/46841 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #18-L S/N: 44581/46846 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #19-L S/N: 44580/46844 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #19-R S/N: 44580/46843 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #20-L S/N: 44582/46848 As-Rcvd Test 2 Test 3

Approx Set Pt	Standard	Test Meter	% Diff	Standard	Test Meter	% Diff	Standard	Test Meter	% Diff
0.0500	.0502	.0502	.00	.0505	.0504	-.20			
0.1250	.1255	.1254	-.08	.1254	.1253	-.08			
0.2250	.2253	.2251	-.09	.2260	.2256	-.18			
1.000	1.004	1.003	-.10	1.006	1.011	.50			
2.000	2.006	2.000	-.30	2.007	2.010	.15		N/A	
3.600	3.614	3.605	-.25	3.604	3.601	-.08			
4.400	4.409	4.401	-.18	4.404	4.406	.05			
27.00	27.05	27.01	-.15	27.07	27.01	-.22			
50.00	50.09	49.92	-.34	50.10	49.93	-.34			
Overange	NA	✓	NA	NA	✓	NA	NA		NA

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AIRDATA MULTIMETER CERTIFICATE OF RECALIBRATION

S/N: M04081

Order #: R221625

LOW VELOCITY CONFIRMATION (FPM)

TEST METER TOLERANCE = ± 3.0% ± 7 FPM AS-RECEIVED TEST WITHIN SPEC (YES) NO N/A See Notes

Vel Eqv Trans Std: S/N: M02009	As-Rcvd	Test 2	Test 3	Vel Eqv Trans Std: S/N: M10897	As-Rcvd	Test 2	Test 3
Vel Eqv Trans Std: S/N: M02903	As-Rcvd	Test 2	Test 3	Vel Eqv Trans Std: S/N: M10901	As-Rcvd	Test 2	Test 3
Vel Eqv Trans Std: S/N: M10839	As-Rcvd	Test 2	Test 3	Vel Eqv Trans Std: S/N: M13492	As-Rcvd	Test 2	Test 3
Vel Eqv Trans Std: S/N: M10840	As-Rcvd	Test 2	Test 3	Vel Eqv Trans Std: S/N: M19325	As-Rcvd	Test 2	Test 3

Approx Set Point	Standard	Test Meter	Diff	Standard	Test Meter	Diff	Standard	Test Meter	Diff
100	110.9	110	-.9	116.3	118	1.7		N/A	
500	503.3	501	-2.3	509.7	509	-.7			

ADM-880C, ADM-870/870C and ADM-860/860C models are read in AirFoil Mode. ADM-850/850L models are read in Pitot Tube Mode.

TEMPERATURE TEST - AIRDATA MULTIMETER (° F)

TEST METER TOLERANCE = ± 0.2° F AS-RECEIVED TEST WITHIN SPEC (YES) NO N/A See Notes

RTD Simulator: S/N 249	As-Rcvd	Test 2	Test 3	Set Point: 35.6° F	95° F	154.4° F	
RTD Simulator: S/N 250	As-Rcvd	Test 2	Test 3	Set Point: 35.6° F	95° F	154.4° F	
RTD Simulator: S/N 253	As-Rcvd	Test 2	Test 3	Set Point: 35.6° F	95° F	154.4° F	
RTD Simulator: S/N 254	As-Rcvd	Test 2	Test 3	Set Point: 35.6° F	95° F	154.4° F	
RTD Simulator: S/N 256	As-Rcvd	Test 2	Test 3	Set Point: 35.6° F	95° F	154.4° F	
RTD Simulator: S/N 257	As-Rcvd	Test 2	Test 3	Set Point: 35.6° F	95° F	154.4° F	
RTD Simulator: S/N 292	As-Rcvd	Test 2	Test 3	Set Point: 35.6° F	95° F	154.4° F	
RTD Simulator: S/N 293	As-Rcvd	Test 2	Test 3	Set Point: 35.6° F	95° F	154.4° F	
RTD Simulator: S/N 294	As-Rcvd	Test 2	Test 3	Set Point: 35.6° F	95° F	154.4° F	
RTD Simulator: S/N 313	As-Rcvd	Test 2	Test 3	Set Point: 35.6° F	95° F	154.4° F	
RTD Simulator: S/N 314	As-Rcvd	Test 2	Test 3	Set Point: 35.6° F	95° F	154.4° F	
RTD Simulator: S/N 315	As-Rcvd	Test 2	Test 3	Set Point: 35.6° F	95° F	154.4° F	
RTD Simulator: S/N 316	As-Rcvd	Test 2	Test 3	Set Point: 35.6° F	95° F	154.4° F	
RTD Simulator: S/N 317	As-Rcvd	Test 2	Test 3	Set Point: 35.6° F	95° F	154.4° F	
RTD Simulator: S/N 318	As-Rcvd	Test 2	Test 3	Set Point: 35.6° F	95° F	154.4° F	

RTD Simulator Temperature Equivalent Set Point	Test Meter	Difference	Test Meter	Difference	Test Meter	Difference
35.60	35.6	.0	35.6	.0		
95.00	94.9	-.1	94.9	-.1	N/A	
154.40	154.4	.0	154.4	.0		

There were no additions to or deviations from the specified calibration procedure during the calibration process.

Any calibration due date shown is specified by the customer.

The enclosed ADM Calibration Standards for Pressure and Temperature form(s) is/are an integral part of this calibration and must remain with this Certificate of Calibration. There may be more than one such form included that pertains to this calibration.

Any additional information required pertaining to this calibration or to any repairs performed may be included in other documentation. If applicable, these documents may include, but not be limited to an AirData Multimeter Recalibration Notes form, and/or a Repair Record Notes form.

NOTES: _____

Shortridge Instruments, Inc.
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Shortridge Instruments, Inc. AirData Multimeter Calibration Equipment

Order Number: R221625 Serial Number: M04081 Test Type: Initial As-Received (Final)

ABSOLUTE PRESSURE STANDARDS

ADM #02-R	S/N: 41741/42451	Heise Model: PPM-2	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 04/28/22	Due Date: 04/2023
ADM #04-R	S/N: 41743/42453	Heise Model: PPM-2	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 11/19/21	Due Date: 11/2022
ADM #06-R	S/N: 41742/42452-1	Heise Model: PPM-2	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 08/17/21	Due Date: 08/2022
ADM #08-R	S/N: 42186/43328	Heise Model: PPM-2	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 03/26/22	Due Date: 02/2023
ADM #10-R	S/N: 42203/43352	Heise Model: PPM-2	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 03/07/22	Due Date: 03/2023
ADM #12A-R	S/N: 45605/48491	Heise Model: PPM-2	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 07/27/21	Due Date: 07/2022
ADM #14-R	S/N: 43412/45043-2	Heise Model: PPM-2	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 09/24/21	Due Date: 09/2022
ADM #16-R	S/N: 43413/45044	Heise Model: PPM-2	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 01/27/22	Due Date: 01/2023
ADM #18-R	S/N: 44581/46845	Heise Model: PPM-2	Mfgd & Calibrated by Ashcroft, Inc.		Calibration Date: 10/26/21	Due Date: 10/2022
ADM #20-R	S/N: 44582/46847	Heise Model: PPM-2	Mfgd & Calibrated by Ashcroft, Inc.		Calibration Date: 06/16/21	Due Date: 06/2022

#02-R, 04-R, 06-R, 08-R, 10-R, 12A-R, 14-R, 16-R	Rated Accuracy: 0.05% fs (0.0305 in Hg)	Range: 0-30 psia	Resolution: 0.01	Uncertainty: < 0.0358
#18-R, 20-R	Rated Accuracy: 0.05% fs (0.0305 in Hg)	Range: 0-60 in Hg	Resolution: 0.001	Uncertainty: < 0.0358

DIFFERENTIAL PRESSURE STANDARDS

ADM #01-L	S/N: 41739/42449	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 04/28/22	Due Date: 04/2023
ADM #01-R	S/N: 41739/42446	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 04/29/22	Due Date: 04/2023
ADM #02-L	S/N: 41741/42454	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 04/28/22	Due Date: 04/2023
ADM #03A-L	S/N: 45570/48461	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 11/24/21	Due Date: 11/2022
ADM #03A-R	S/N: 45570/48460	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 11/24/21	Due Date: 11/2022
ADM #04-L	S/N: 41743/42456	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 11/23/21	Due Date: 11/2022
ADM #05-L	S/N: 41740/42450	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 09/08/21	Due Date: 08/2022
ADM #05-R	S/N: 41740/42447	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 09/07/21	Due Date: 08/2022
ADM #06-L	S/N: 41742/42455	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 09/07/21	Due Date: 08/2022
ADM #07-L	S/N: 42185/42186	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 03/29/22	Due Date: 02/2023
ADM #07-R	S/N: 42185/43326	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 03/29/22	Due Date: 02/2023
ADM #08-L	S/N: 42186/43329	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 03/28/22	Due Date: 02/2023
ADM #09-L	S/N: 42202/43351	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 03/07/22	Due Date: 03/2023
ADM #09-R	S/N: 42202/43350	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 03/07/22	Due Date: 03/2023
ADM #10-L	S/N: 42203/43353	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 03/07/22	Due Date: 03/2023
ADM #11-L	S/N: 43165/44551-1	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 07/30/21	Due Date: 07/2022
ADM #11-R	S/N: 43165/44730	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 07/30/21	Due Date: 07/2022
ADM #12A-L	S/N: 45605/48490-1	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 08/09/21	Due Date: 07/2022
ADM #13-L	S/N: 43415/45041	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 09/24/21	Due Date: 09/2022
ADM #13-R	S/N: 43415/45039	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 09/24/21	Due Date: 09/2022
ADM #14-L	S/N: 43412/45045	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 09/24/21	Due Date: 09/2022
ADM #15-L	S/N: 43416/45042	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 02/07/22	Due Date: 01/2023
ADM #15-R	S/N: 43416/45040-1	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 02/07/22	Due Date: 01/2023
ADM #16-L	S/N: 43413/45046	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 02/07/22	Due Date: 01/2023
ADM #17-L	S/N: 44579/46842	Heise Model: PPM-1	Mfgd & Calibrated by Ashcroft, Inc.		Calibration Date: 10/29/21	Due Date: 10/2022
ADM #17-R	S/N: 44579/46841	Heise Model: PPM-1	Mfgd & Calibrated by Ashcroft, Inc.		Calibration Date: 10/29/21	Due Date: 10/2022
ADM #18-L	S/N: 44581/46846	Heise Model: PPM-1	Mfgd & Calibrated by Ashcroft, Inc.		Calibration Date: 10/29/21	Due Date: 10/2022
ADM #19-L	S/N: 44580/46844	Heise Model: PPM-1	Mfgd & Calibrated by Ashcroft, Inc.		Calibration Date: 06/23/21	Due Date: 06/2022
ADM #19-R	S/N: 44580/46843	Heise Model: PPM-1	Mfgd & Calibrated by Ashcroft, Inc.		Calibration Date: 06/24/21	Due Date: 06/2022
ADM #20-L	S/N: 44582/46848	Heise Model: PPM-1	Mfgd & Calibrated by Ashcroft, Inc.		Calibration Date: 06/23/21	Due Date: 06/2022

#01-L, 03A-L, 05-L, 07-L, 09-L, 11-L, 13-L, 15-L, 17-L, 19-L	Rated Accuracy: > 0.07% fs (0.000175 in wc)	Range: 0.0-0.25 in wc	Res.: 0.00001	Uncertainty: < 0.00035
#01-R, 03A-R, 05-R, 07-R, 09-R, 11-R, 13-R, 15-R, 17-R, 19-R	Rated Accuracy: > 0.06% fs (0.003 in wc)	Range: 0.0-5.0 in wc	Res.: 0.0001	Uncertainty: < 0.00348
#02-L, 04-L, 06-L, 08-L, 10-L, 12A-L, 14-L, 16-L, 18-L, 20-L	Rated Accuracy: > 0.06% fs (0.03 in wc)	Range: 0.0-50.0 in wc	Res.: 0.001	Uncertainty: < 0.0346

Shortridge Instruments, Inc.
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Customer Order Number, Meter Serial Number, and Test Type are referenced on page 1

LOW VELOCITY EQUIVALENT CONFIRMATION STANDARDS

Vel Eqv Transfer Standard S/N: M02009	Model ADM-870C	Mfgd & Calibrated by Shortridge Instruments, Inc.	Calibration Date: 08/20/21	Due Date: 08/2022
Vel Eqv Transfer Standard S/N: M02903	Model ADM-870C	Mfgd & Calibrated by Shortridge Instruments, Inc.	Calibration Date: 12/16/21	Due Date: 12/2022
Vel Eqv Transfer Standard S/N: M10839	Model ADM-870C	Mfgd & Calibrated by Shortridge Instruments, Inc.	Calibration Date: 10/26/21	Due Date: 10/2022
Vel Eqv Transfer Standard S/N: M10840	Model ADM-870C	Mfgd & Calibrated by Shortridge Instruments, Inc.	Calibration Date: 10/26/21	Due Date: 10/2022
Vel Eqv Transfer Standard S/N: M10897	Model ADM-870C	Mfg'd & Calibrated by Shortridge Instruments, Inc.	Calibration Date: 01/25/22	Due Date: 01/2023
Vel Eqv Transfer Standard S/N: M10901	Model ADM-870C	Mfg'd & Calibrated by Shortridge Instruments, inc.	Calibration Date: 12/16/21	Due Date: 12/2022
Vel Eqv Transfer Standard S/N: M13492	Model ADM-870C	Mfg'd & Calibrated by Shortridge Instruments, inc.	Calibration Date: 08/20/21	Due Date: 08/2022
Vel Eqv Transfer Standard S/N: M19325	Model ADM-870C	Mfgd & Calibrated by Shortridge Instruments, Inc.	Calibration Date: 06/29/21	Due Date: 06/2022

Rated Accuracy: Velocity ± 1.5 % ± 3.5 fpm Range: 100-5000 fpm Resolution: 0.1 Uncertainty: <5.00 fpm at 100 fpm; <7.50 fpm at 500 fpm

TEMPERATURE STANDARDS

RTD Simulator S/N: 249	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 04/02/20	Due Date: 03/2024
RTD Simulator S/N: 250	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 04/02/20	Due Date: 03/2024
RTD Simulator S/N: 253	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 04/02/20	Due Date: 03/2024
RTD Simulator S/N: 254	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 05/04/20	Due Date: 04/2024
RTD Simulator S/N: 256	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 05/04/20	Due Date: 04/2024
RTD Simulator S/N: 257	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 05/04/20	Due Date: 04/2024
RTD Simulator S/N: 292	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 01/03/20	Due Date: 01/2024
RTD Simulator S/N: 293	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 01/03/20	Due Date: 01/2024
RTD Simulator S/N: 294	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 01/03/20	Due Date: 01/2024
RTD Simulator S/N: 313	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 03/25/22	Due Date: 03/2026
RTD Simulator S/N: 314	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 03/25/22	Due Date: 03/2026
RTD Simulator S/N: 315	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 03/25/22	Due Date: 03/2026
RTD Simulator S/N: 316	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 06/06/22	Due Date: 05/2026
RTD Simulator S/N: 317	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 05/23/22	Due Date: 05/2026
RTD Simulator S/N: 318	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 05/23/22	Due Date: 05/2026

Rated Accuracy: 0.025% of setting Range: 100.00 Ω to 11111.10 Ω Resolution: 0.01 Ω Uncertainty: ≤ 32 ppm

Thermometer #1 S/N 8A089/Thermistor S/N A410660	Model 1504/5610	Mfgd by Hart Scientific	Calibrated by Fluke	Calibration Date: 02/24/22	Due Date: 02/2024
Thermometer #2 S/N 8B104/Thermistor S/N 871507	Model 1504/5610	Mfgd by Hart Scientific	Calibrated by Fluke	Calibration Date: 11/04/20	Due Date: 11/2022
Thermometer #5 S/N B11780/Thermistor S/N B10505	Model 1504/5610	Mfgd by Hart Scientific	Calibrated by Fluke	Calibration Date: 05/16/22	Due Date: 05/2024
Thermometer #6 S/N B11782/Thermistor S/N B10509	Model 1504/5610	Mfgd by Hart Scientific	Calibrated by Fluke	Calibration Date: 06/09/22	Due Date: 06/2024
Thermometer #7 S/N B49938/Thermistor S/N B482202	Model 1504/5610	Mfgd and Calibrated by Fluke		Calibration Date: 10/13/21	Due Date: 10/2023

Rated Accuracy(combined): 0.0324° F Range: 32° F to 176° F Resolution: 0.001° F Combined Uncertainty with Baths: ≤ 0.040° F

Temp Transfer Standard S/N M00136	Model ADM-870	Mfgd & Calibrated by Shortridge Instruments, Inc.	Calibration Date: 10/26/21	Due Date: 10/2022
Temp Transfer Standard S/N M96100	Model ADM-870	Mfgd & Calibrated by Shortridge Instruments, Inc.	Calibration Date: 03/15/22	Due Date: 03/2023

Rated Accuracy: 0.03° F Range: 33° F to 158° F Resolution: 0.01° F Uncertainty: < 0.023° F

Total combined Uncertainty for MultiTemp and TemProbe testing : ≤ 0.046° F

This form must remain with the Certificate of Calibration corresponding to the Customer Order Number and Meter Serial Number referenced on page 1.

Shortridge Instruments, Inc.
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Shortridge Instruments, Inc. AirData Multimeter Calibration Equipment

Order Number: R221625 Serial Number: M04081 Test Type: Initial (As-Received) Final

ABSOLUTE PRESSURE STANDARDS

ADM #02-R	S/N: 41741/42451	Heise Model: PPM-2	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 04/28/22	Due Date: 04/2023
ADM #04-R	S/N: 41743/42453	Heise Model: PPM-2	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 11/19/21	Due Date: 11/2022
ADM #06-R	S/N: 41742/42452-1	Heise Model: PPM-2	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 08/17/21	Due Date: 08/2022
ADM #08-R	S/N: 42186/43328	Heise Model: PPM-2	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 03/26/22	Due Date: 02/2023
ADM #10-R	S/N: 42203/43352	Heise Model: PPM-2	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 03/07/22	Due Date: 03/2023
ADM #12A-R	S/N: 45605/48491	Heise Model: PPM-2	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 07/27/21	Due Date: 07/2022
ADM #14-R	S/N: 43412/45043-2	Heise Model: PPM-2	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 09/24/21	Due Date: 09/2022
ADM #16-R	S/N: 43413/45044	Heise Model: PPM-2	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 01/27/22	Due Date: 01/2023
ADM #18-R	S/N: 44581/46845	Heise Model: PPM-2	Mfgd & Calibrated by Ashcroft, Inc.		Calibration Date: 10/26/21	Due Date: 10/2022
ADM #20-R	S/N: 44582/46847	Heise Model: PPM-2	Mfgd & Calibrated by Ashcroft, Inc.		Calibration Date: 06/16/21	Due Date: 06/2022

#02-R, 04-R, 06-R, 08-R, 10-R, 12A-R, 14-R, 16-R	Rated Accuracy: 0.05% fs (0.0305 in Hg)	Range: 0-30 psia	Resolution: 0.01	Uncertainty: < 0.0358
#18-R, 20-R	Rated Accuracy: 0.05% fs (0.0305 in Hg)	Range: 0-60 in Hg	Resolution: 0.001	Uncertainty: < 0.0358

DIFFERENTIAL PRESSURE STANDARDS

ADM #01-L	S/N: 41739/42449	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 04/28/22	Due Date: 04/2023
ADM #01-R	S/N: 41739/42446	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 04/29/22	Due Date: 04/2023
ADM #02-L	S/N: 41741/42454	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 04/28/22	Due Date: 04/2023
ADM #03A-L	S/N: 45570/48461	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 11/24/21	Due Date: 11/2022
ADM #03A-R	S/N: 45570/48460	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 11/24/21	Due Date: 11/2022
ADM #04-L	S/N: 41743/42456	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 11/23/21	Due Date: 11/2022
ADM #05-L	S/N: 41740/42450	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 09/08/21	Due Date: 08/2022
ADM #05-R	S/N: 41740/42447	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 09/07/21	Due Date: 08/2022
ADM #06-L	S/N: 41742/42455	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 09/07/21	Due Date: 08/2022
ADM #07-L	S/N: 42185/42186	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 03/29/22	Due Date: 02/2023
ADM #07-R	S/N: 42185/43326	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 03/29/22	Due Date: 02/2023
ADM #08-L	S/N: 42186/43329	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 03/28/22	Due Date: 02/2023
ADM #09-L	S/N: 42202/43351	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 03/07/22	Due Date: 03/2023
ADM #09-R	S/N: 42202/43350	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 03/07/22	Due Date: 03/2023
ADM #10-L	S/N: 42203/43353	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 03/07/22	Due Date: 03/2023
ADM #11-L	S/N: 43165/44551-1	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 07/30/21	Due Date: 07/2022
ADM #11-R	S/N: 43165/44730	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 07/30/21	Due Date: 07/2022
ADM #12A-L	S/N: 45605/48490-1	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 08/09/21	Due Date: 07/2022
ADM #13-L	S/N: 43415/45041	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 09/24/21	Due Date: 09/2022
ADM #13-R	S/N: 43415/45039	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 09/24/21	Due Date: 09/2022
ADM #14-L	S/N: 43412/45045	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 09/24/21	Due Date: 09/2022
ADM #15-L	S/N: 43416/45042	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 02/07/22	Due Date: 01/2023
ADM #15-R	S/N: 43416/45040-1	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 02/07/22	Due Date: 01/2023
ADM #16-L	S/N: 43413/45046	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 02/07/22	Due Date: 01/2023
ADM #17-L	S/N: 44579/46842	Heise Model: PPM-1	Mfgd & Calibrated by Ashcroft, Inc.		Calibration Date: 10/29/21	Due Date: 10/2022
ADM #17-R	S/N: 44579/46841	Heise Model: PPM-1	Mfgd & Calibrated by Ashcroft, Inc.		Calibration Date: 10/29/21	Due Date: 10/2022
ADM #18-L	S/N: 44581/46846	Heise Model: PPM-1	Mfgd & Calibrated by Ashcroft, Inc.		Calibration Date: 10/29/21	Due Date: 10/2022
ADM #19-L	S/N: 44580/46844	Heise Model: PPM-1	Mfgd & Calibrated by Ashcroft, Inc.		Calibration Date: 06/23/21	Due Date: 06/2022
ADM #19-R	S/N: 44580/46843	Heise Model: PPM-1	Mfgd & Calibrated by Ashcroft, Inc.		Calibration Date: 06/24/21	Due Date: 06/2022
ADM #20-L	S/N: 44582/46848	Heise Model: PPM-1	Mfgd & Calibrated by Ashcroft, Inc.		Calibration Date: 06/23/21	Due Date: 06/2022

#01-L, 03A-L, 05-L, 07-L, 09-L, 11-L, 13-L, 15-L, 17-L, 19-L	Rated Accuracy: > 0.07% fs (0.000175 in wc)	Range: 0.0-0.25 in wc	Res.: 0.00001	Uncertainty: < 0.00035
#01-R, 03A-R, 05-R, 07-R, 09-R, 11-R, 13-R, 15-R, 17-R, 19-R	Rated Accuracy: > 0.06% fs (0.003 in wc)	Range: 0.0-5.0 in wc	Res.: 0.0001	Uncertainty: < 0.00348
#02-L, 04-L, 06-L, 08-L, 10-L, 12A-L, 14-L, 16-L, 18-L, 20-L	Rated Accuracy: > 0.06% fs (0.03 in wc)	Range: 0.0-50.0 in wc	Res.: 0.001	Uncertainty: < 0.0346

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Customer Order Number, Meter Serial Number, and Test Type are referenced on page 1

LOW VELOCITY EQUIVALENT CONFIRMATION STANDARDS

Vel Eqv Transfer Standard S/N: M02009	Model ADM-870C	Mfgd & Calibrated by Shortridge Instruments, Inc.	Calibration Date: 08/20/21	Due Date: 08/2022
Vel Eqv Transfer Standard S/N: M02903	Model ADM-870C	Mfgd & Calibrated by Shortridge Instruments, Inc.	Calibration Date: 12/16/21	Due Date: 12/2022
Vel Eqv Transfer Standard S/N: M10839	Model ADM-870C	Mfgd & Calibrated by Shortridge Instruments, Inc.	Calibration Date: 10/26/21	Due Date: 10/2022
Vel Eqv Transfer Standard S/N: M10840	Model ADM-870C	Mfgd & Calibrated by Shortridge Instruments, Inc.	Calibration Date: 10/26/21	Due Date: 10/2022
Vel Eqv Transfer Standard S/N: M10897	Model ADM-870C	Mfg'd & Calibrated by Shortridge Instruments, Inc.	Calibration Date: 01/25/22	Due Date: 01/2023
Vel Eqv Transfer Standard S/N: M10901	Model ADM-870C	Mfg'd & Calibrated by Shortridge Instruments, inc.	Calibration Date: 12/16/21	Due Date: 12/2022
Vel Eqv Transfer Standard S/N: M13492	Model ADM-870C	Mfg'd & Calibrated by Shortridge Instruments, inc.	Calibration Date: 08/20/21	Due Date: 08/2022
Vel Eqv Transfer Standard S/N: M19325	Model ADM-870C	Mfgd & Calibrated by Shortridge Instruments, Inc.	Calibration Date: 06/29/21	Due Date: 06/2022

Rated Accuracy: Velocity ± 1.5 % ± 3.5 fpm Range: 100-5000 fpm Resolution: 0.1 Uncertainty: <5.00 fpm at 100 fpm; <7.50 fpm at 500 fpm

TEMPERATURE STANDARDS

RTD Simulator S/N: 249	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 04/02/20	Due Date: 03/2024
RTD Simulator S/N: 250	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 04/02/20	Due Date: 03/2024
RTD Simulator S/N: 253	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 04/02/20	Due Date: 03/2024
RTD Simulator S/N: 254	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 05/04/20	Due Date: 04/2024
RTD Simulator S/N: 256	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 05/04/20	Due Date: 04/2024
RTD Simulator S/N: 257	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 05/04/20	Due Date: 04/2024
RTD Simulator S/N: 292	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 01/03/20	Due Date: 01/2024
RTD Simulator S/N: 293	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 01/03/20	Due Date: 01/2024
RTD Simulator S/N: 294	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 01/03/20	Due Date: 01/2024
RTD Simulator S/N: 313	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 03/25/22	Due Date: 03/2026
RTD Simulator S/N: 314	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 03/25/22	Due Date: 03/2026
RTD Simulator S/N: 315	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 03/25/22	Due Date: 03/2026
RTD Simulator S/N: 316	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 04/16/18	Due Date: 05/2022
RTD Simulator S/N: 317	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 04/16/18	Due Date: 05/2022
RTD Simulator S/N: 318	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 04/16/18	Due Date: 05/2022

Rated Accuracy: 0.025% of setting Range: 100.00 Ω to 11111.10 Ω Resolution: 0.01 Ω Uncertainty: ≤ 32 ppm

Thermometer #1 S/N 8A089/Thermistor S/N A410660	Model 1504/5610	Mfgd by Hart Scientific Calibrated by Fluke	Calibration Date: 02/24/22	Due Date: 02/2024
Thermometer #2 S/N 8B104/Thermistor S/N 871507	Model 1504/5610	Mfgd by Hart Scientific Calibrated by Fluke	Calibration Date: 11/04/20	Due Date: 11/2022
Thermometer #5 S/N B11780/Thermistor S/N B10505	Model 1504/5610	Mfgd by Hart Scientific Calibrated by Fluke	Calibration Date: 05/16/22	Due Date: 05/2024
Thermometer #6 S/N B11782/Thermistor S/N B10509	Model 1504/5610	Mfgd by Hart Scientific Calibrated by Fluke	Calibration Date: 02/24/20	Due Date: 05/2022
Thermometer #7 S/N B49938/Thermistor S/N B482202	Model 1504/5610	Mfgd and Calibrated by Fluke	Calibration Date: 10/13/21	Due Date: 10/2023

Rated Accuracy(combined): 0.0324° F Range: 32° F to 176° F Resolution: 0.001° F Combined Uncertainty with Baths: ≤ 0.040° F

Temp Transfer Standard S/N M00136	Model ADM-870	Mfgd & Calibrated by Shortridge Instruments, Inc.	Calibration Date: 10/26/21	Due Date: 10/2022
Temp Transfer Standard S/N M96100	Model ADM-870	Mfgd & Calibrated by Shortridge Instruments, Inc.	Calibration Date: 03/15/22	Due Date: 03/2023

Rated Accuracy: 0.03° F Range: 33° F to 158° F Resolution: 0.01° F Uncertainty: < 0.023° F

Total combined Uncertainty for MultiTemp and TemProbe testing : ≤ 0.046° F

This form must remain with the Certificate of Calibration corresponding to the Customer Order Number and Meter Serial Number referenced on page 1.

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APPENDIX C

EQUIPMENT #	MANUFACTURER	DESIGN TONS	MODEL NUMBER			COMMENTS
			FURNACE	EVAPORATOR	CONDENSING UNIT	
F-1	LENNOX	2	ML195UH045XP36B-56	LC19/36S9BG	14ACXS024-230A17	
F-2	LENNOX	2	ML195UH045XP36B-56	LC19/36S9BG	14ACXS024-230A17	Unit seems undersized. Recommend 2.5 tons
F-3	LENNOX	4	ML193UH110XP60C-04	C33-50/60C-2-6	TSA048S4N43Y	Undersized condensing unit
F-4	LENNOX	2.5	ML195UH070XP36B-56	LC19/36S9BG	14ACXSO30-230A18	
F-5	LENNOX	5	ML195UH090XP60C-56	LC42/60Y9CG	TSA060S4N44Y	Unit seems oversized. Recommend 4 tons
F-6	LENNOX	3	ML195UH070XP36B-06	LC19/36S9BG	TSA036S4N43Y	
F-7	LENNOX	5	ML195UH090XP60C-56	CX34-62C-6F-1	TSA060S4N44Y	Unit seems oversized. Recommend 4 tons
F-8	LENNOX	5	ML195UH090XP60C-56	CX34-62C-6F-1	TSA060S4N44Y	Unit seems oversized. Recommend 4 tons
F-9	LENNOX	5	ML193UH110XP60C-07	LC42/60Y9CG	TSA060S4N44Y	Unit seems oversized. Recommend 4 tons
F-10	LENNOX	2	ML195UH045XP36B-56	LC19/36S9BG	14ACXS024-230A17	Undersized condensing unit
F-11	LENNOX	3	ML195UH070XP36B-56	LC23/37Y9BG	TSA036S4N43Y	
F-12	CARRIER	6	59SP5A120E24 1222	CNPVP6124AL	38AUZA07A0A5	
F-13	CARRIER	6	59SP5A120E24 1222	CNPVP6124AL	38AUZA07A0A5	
F-14	AMERICAN STANDARD	10	(2) AUH1D100A9601AA		(2) 4TTA3060D3	Twinned furnaces. Only one furnace operating?

**** END OF RFP ***