Energy Docs™
Home Performance Contractor
1881 ASPIN AVE, REDDING, CA 96003
O: 530.245.1703 ♦ C: 530.945.7401
GENERAL B CONTRACTORS LIC. # 742178

PROPOSAL

6/28/2021

Mt Shasta Elementary & Sisson School
HVAC Replacement Project per NM&R Plans 06.04.2020

Summary of Proposed Scope of Work:

1. Provide performance testing of the existing classroom structures including targeted air pressurization and thermal imaging analysis in order to help ensure a more accurate match of equipment size to estimated heat gains and losses.
2. Review all equipment and material specifications and supply a list of performance recommendations to the mechanical engineer.
3. Develop performance-based specifications for the installing contractor to follow and provide remote and site support to ensure successful implementation.
4. Provide during and post-installation testing and certification and provide a payment authorization for the installing contractor upon successful completion and obtainment of all performance metrics.

Background

The HVAC industry as a whole is skilled and capable at meeting minimum design specifications from mechanical engineers (ME), but design specifications don't ensure optimum equipment performance. Design specifications ensure the building blocks are present for the intended outcome, but the outcome is wholly dependent on the methods and level of attention to installation detail of the contractor. In the last 30 years, building performance test equipment has been developed that now enables us to quantify the skill and level of attention to detail of the installing contractor to the extent that it's now possible to ensure you're getting what you're paying for. And additionally, utility funded research in California has shown us how modern and efficient equipment actually behaves so that we can avoid the shortcomings inherent to designing from limited manufacturer specifications alone.

Energy Docs approach is to bridge the gap between the desired end result: A comfortable, efficient and durable product- and the HVAC industry. We do this by understanding building science, equipment performance, diagnostic equipment, construction practices, design professionals and construction workers, and provide both instruction and verification assurance that proper installation procedures are followed and performance

targets are achieved. We also co-authored a utility sponsored Best Practices Guide[1] for the same variable speed heat pump technology that has been proposed for this project so that designers and equipment installers gain valuable knowledge of the necessary steps and procedures for obtaining the best installation results.

Detailed Scope of Work (two phases)

Design phase:

Note: This is diagnostic work to be performed first and upon contract approval for use in improving the quality of the project plans and specifications.

1. Review the current version of the project plans and documentation.
2. Using a calibrated blower door, measure the air leakage of the classroom structures at MSE and Sisson Locations as necessary to quantify the overall construction quality of the enclosure(s) for use in ACCA heat gain and heat loss calculations (heat gain/loss calculations are not included in the Total Project Cost but are included as an option, see Option A).
3. Perform infrared and visual examination of the thermal enclosure and air barrier of all rooms to identify areas of potential improvement and quantify overall insulation levels in order to ensure more accurate equipment sizing for efficiency and comfort.
4. Supply list of recommendations, specifications, performance targets, and contractor payment clause to the ME for incorporation into the project plans and specifications.

Installation Phase:

1. Attend contractor walkthrough meeting(s), schedule and visit sites during installation for feedback and quality assurance at key installation steps.
2. Provide written summary of findings, all conversations and corrections requested and implemented.
3. Provide heat pump performance verification including refrigerant charge (superheat and subcooling as applicable), total system airflow, and total external static pressure.
4. Optimize the heat pump airflow per room and design and adjust throw within rooms to optimize classroom comfort and ventilation performance.
5. Measure heat pump performance and energy use of the systems as operating and compare to manufacturer specifications.
6. Provide digital documentation containing installation notes, refrigerant evacuation and charge data, and specifications for each individual system serving the building.
7. Provide construction quality assurance during by monitoring key installation steps including refrigerant connection brazing, press and/or flare tools and procedures, refrigerant line evacuation and pressure testing, and refrigerant installation weights and accuracy. *Note that the performance of the proposed equipment is highly dependent upon installation quality, and once installed, it is both difficult and time consuming to find and fix any installation shortcuts.*
8. Provide payment release form to contractor upon contractor's successful obtainment of all specified performance metrics.

[1] Best Practice Guide has been completed but not yet published. Draft copy is available here, no reproduction or sharing is permitted: https://www.dropbox.com/s/w05l2f668tmaa5y/VCHP_BestPracticesGuide_DRAFT.pdf?dl=0

Heat/energy recovery ventilators (HRV/ERV):

1. Measure and ensure total ventilation system airflow
2. Measure total system power consumption

Total Project Cost: $ 40,800.00

Option A

Create commercial heat loss/gain (mechanical) calculations for the two building locations (MSE and Sisson School) based on internationally accepted ASHRAE heat loss/gain standards (ASHRAE 62 standard ventilation calculations). Calculations to incorporate the measured enclosure performance data (envelope leakage characterization) and infrared analysis to best characterize the in situ enclosure performance for use in properly sizing the heating and cooling systems.

Calculations will include the ASHRAE 62 standard ventilation requirements based on classroom occupancy and impacts of occupancy on thermal loads for proper equipment sizing, and the ventilation target for use in sizing equipment and verifying actual delivered ventilation.

Includes a site visit to each location and thorough survey of enclosure materials and design, site and construction methods and orientation, and approximation of insulation levels.

Option A Cost: $ 8,000.00

Total Project Cost including Option A: $ 48,800.00

Submitted by Mike MacFarland, Owner
Email: EnergyDocsHPC@gmail.com
Cell: (530) 945-7401