



Facility Assessment and Planning Report



Plainfield Public Library

15025 S. Illinois Street

Plainfield, IL 60544



Disclaimer

The intent of this report is to provide an analysis of the condition and findings from the facility survey of the mechanical, plumbing, and fire protection systems and controls. Aero Building Solutions is not liable if the items listed are different of current site conditions or budget pricing varies from actual proposals. All findings and cost estimates in the report are for informational purposes, and are not to be construed as a design document or as guarantees.

Plainfield Public Library shall independently evaluate any advice or suggestions provided in this report. In no event will Aero Building Solutions be liable for the failure of the operation of the customer's facilities or any incidental or consequential damages of any kind in connection with this report or the installation of any suggested action.

Aero Building Solutions is not assigning responsibility or financial burden for repairs of any items or deficiencies listed in this report or its attachments. Plainfield Public Library is responsible for assigning tasks to appropriate contractors or in-house staff and determining what parties should incur costs.

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Project Overview / System Description

General Project Description

Aero Building Solutions was contacted by Plainfield Public Library to conduct a conditional assessment of the existing facility located at 15025 S. Illinois Street. The scope of this work included reviewing the building mechanical, plumbing, and fire protection systems for general condition, functionality and maintenance, as well as testing of the building automation (BAS) system functionality and programming. The purpose of this assessment is to analyze the existing infrastructure of the library and provide feedback that will improve the current system operation.

The original library was constructed in the 1940's with a significant addition built in 1990 that increased its size to 27,000 square feet. Some capital projects have been completed over the last five years based on recommendations from an initial facility assessment by KJWW Engineering Consultants. These include building envelope upgrades, replacement of four rooftop units (RTU) and integration of the BAS with the main mechanical equipment, installation of low-flow plumbing fixtures, new domestic water heater and hot water recirculating pump, and LED lighting retrofits.

Mechanical System Description

The mechanical system within the library consists of systems linked together to create conditioned environment for the building occupants. These systems include four variable air volume rooftop units (RTU), a hot water system serving perimeter radiators and cabinet unit heaters, and a combined bathroom/general exhaust fan. The following is a summary of the existing library systems and how each system is currently operating based on our field investigations, review of the construction drawings and BAS, and discussions with library staff.

Variable Air Volume RTU Systems

The variable air volume RTU systems are made up of two components, the air handling units and the air distribution devices (VAV boxes). These units operate together to send conditioned air to all spaces within the building. Each cooling-only packaged RTU is equipped with a DX coil, airside economizer, one supply fan integrated with a variable frequency drive (VFD) that modulates speed to maintain duct static pressure, and four power exhaust fans all integrated with a VFD that modulates speed to maintain building pressure of +0.05" w.c. per the construction drawings.

A demand control ventilation feature is programmed for each RTU when in occupied mode. The outside air dampers will modulate to maintain return CO₂ concentrations of 900 ppm or until they reach their minimum position. The supply air temperature setpoint is on a reset schedule to vary between 55°F-65°F based on outside air temperature. Programming is also in place to control the airside economizer based on differential enthalpy: when the outside air enthalpy is

below the return air enthalpy, the outside air damper modulates open until the supply air temperature setpoint is reached or the economizer is 100% open.

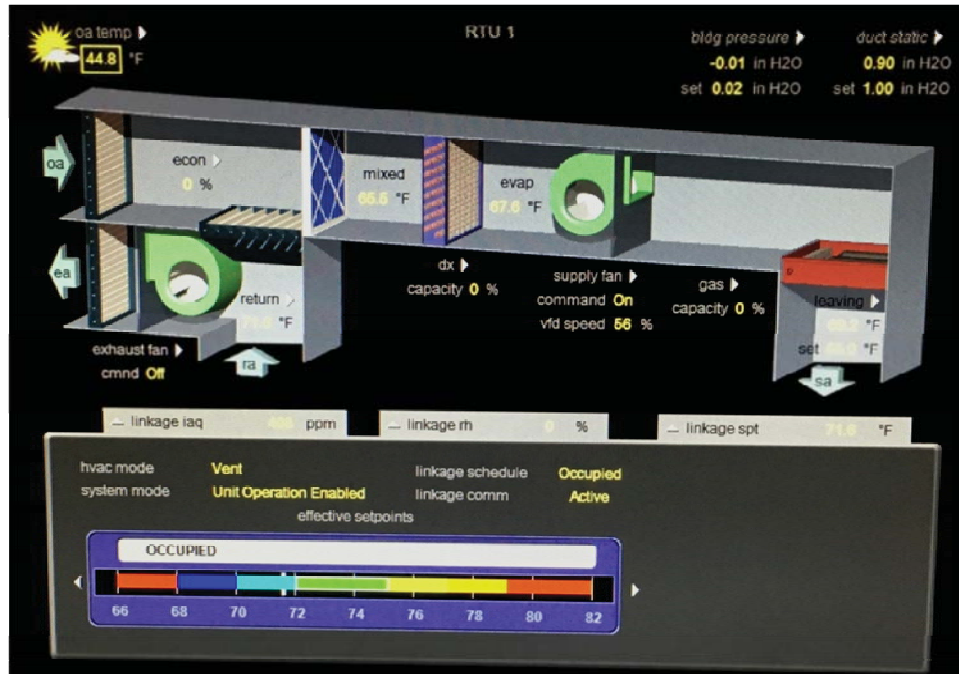


Figure 1: RTU-1 Layout from the BAS

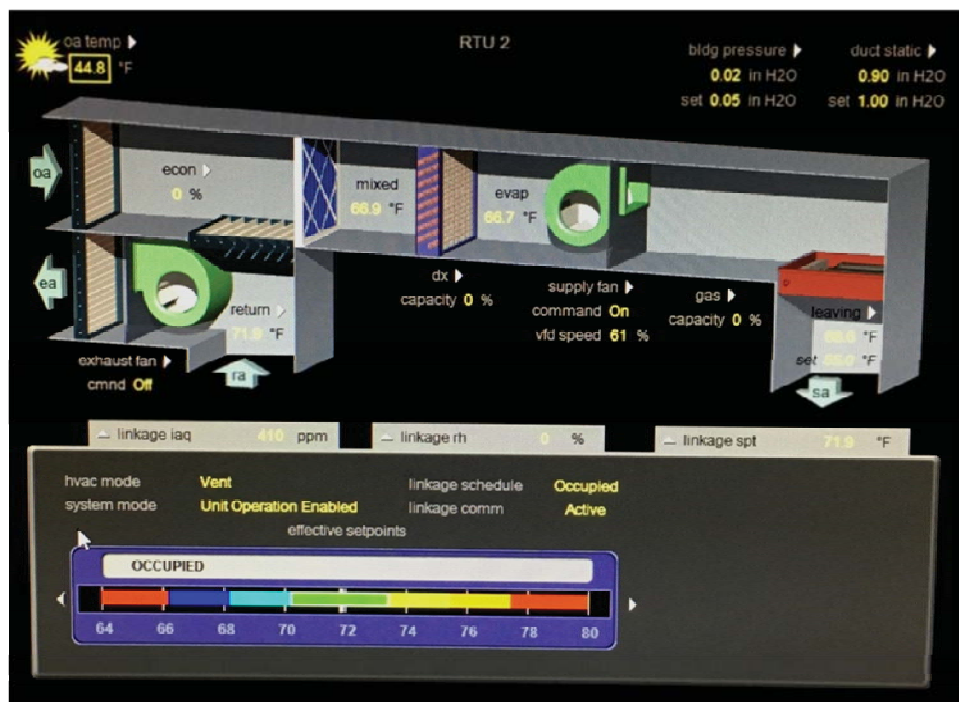


Figure 2: RTU-2 Layout from the BAS

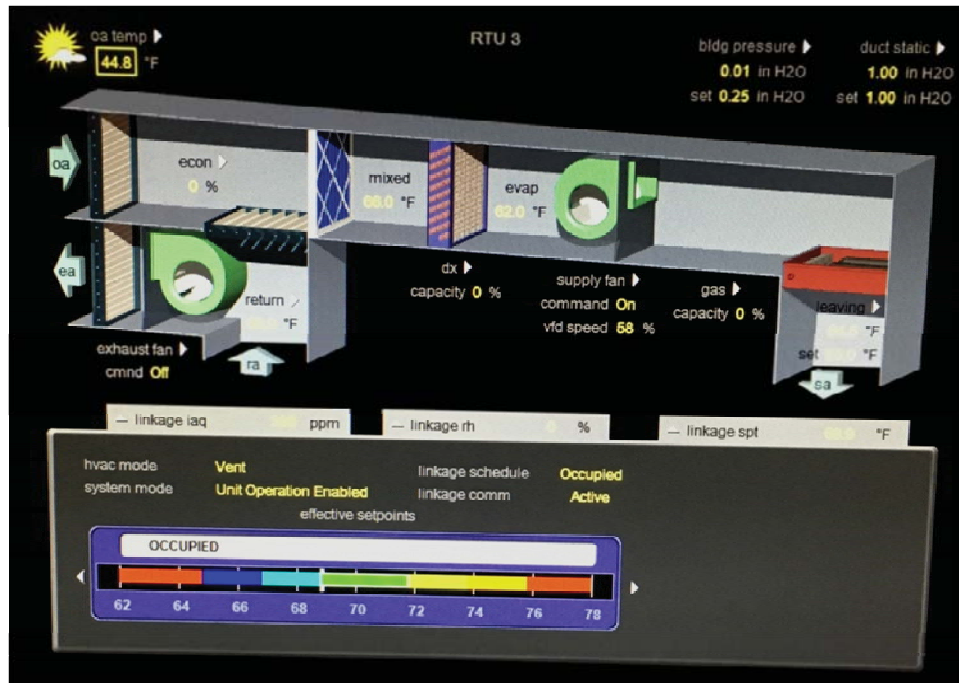


Figure 3: RTU-3 Layout from the BAS

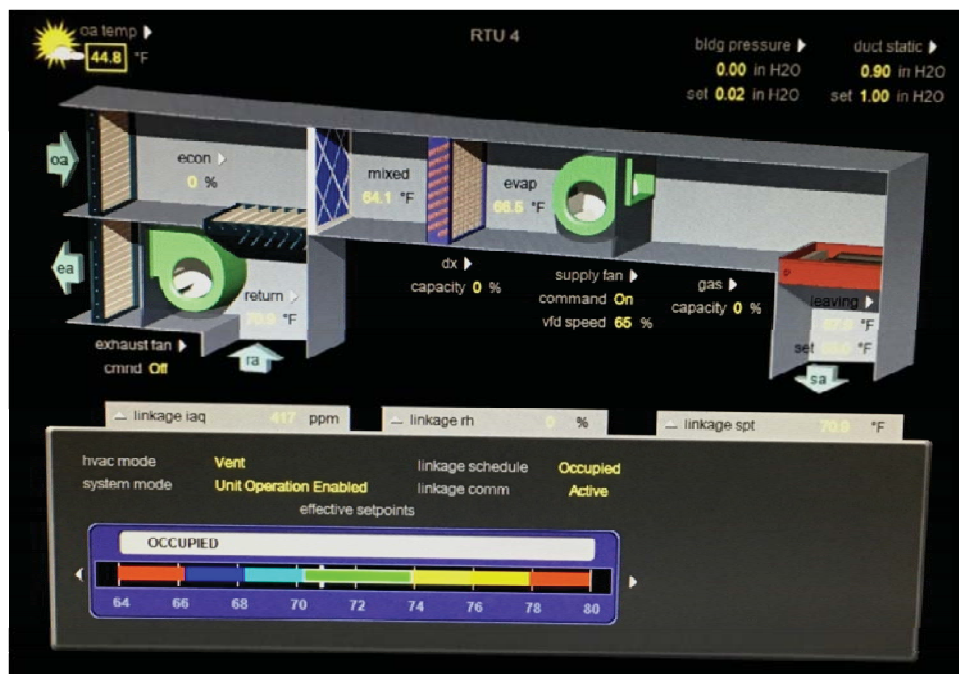


Figure 4: RTU-4 Layout from the BAS

The VAV boxes downstream serving the building are cooling only and are also fully integrated into the BAS. The damper modulates to maintain the space temperature based on the setpoint from the wall-mounted temperature sensor in each space. When full cooling is required, the boxes open to maintain their maximum airflow setpoints. When space temperature is below setpoint, the boxes close until setpoint is maintained or they reach minimum damper position.

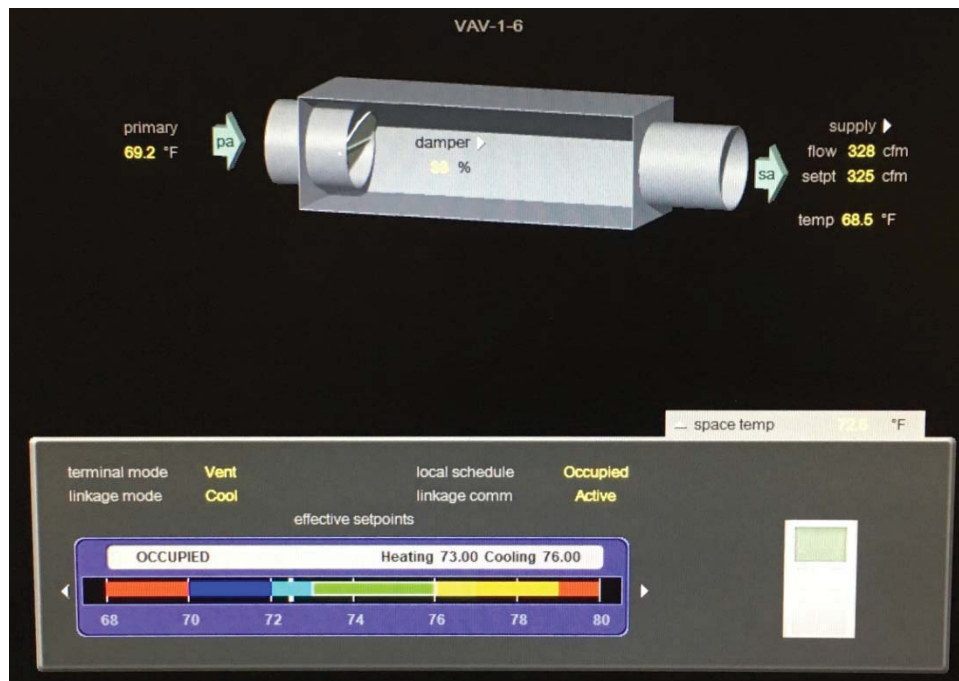


Figure 5: Typical VAV Box Layout from the BAS

Hot Water Heating System

The hot water system is made up of one boiler and two lead/lag primary pumps that provide heating to the facility. The boiler has a 720 MBH output capacity and was installed as a part of the addition in 1990. Programming is in place to reset the hot water supply temperature from 140°F to 200°F based on the outside air temperature. The valves for perimeter radiators and cabinet unit heaters are two-way with a main bypass valve used to maintain volume control. The majority of the perimeter radiators are not integrated with the BAS (controlled locally by a sensing element), most likely leading to wasted energy and “fighting” with the VAV boxes.

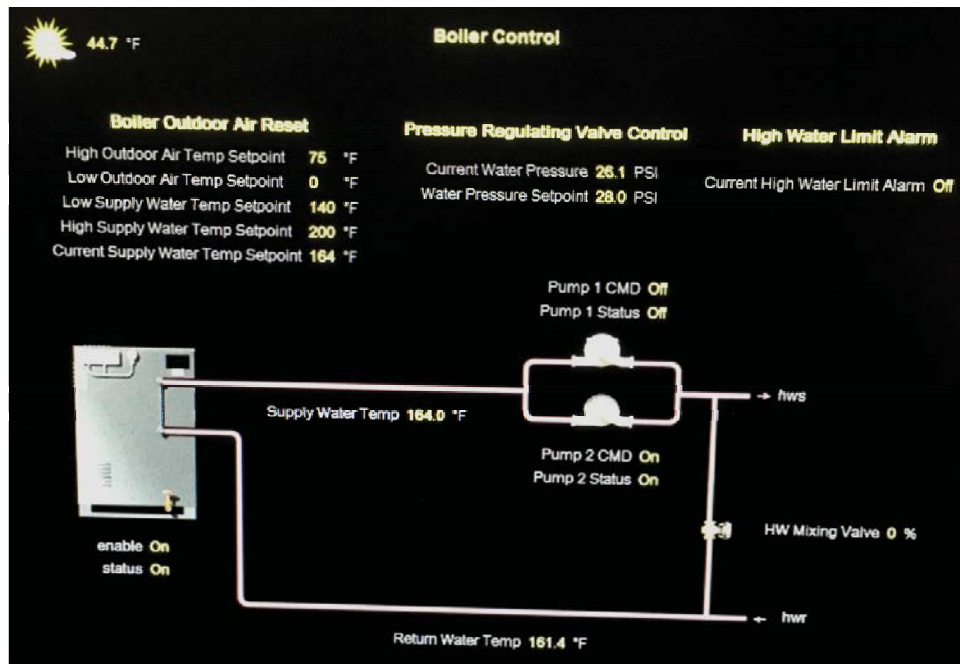


Figure 6: Hot Water Piping Layout from the BAS

Exhaust Fan System

One mushroom exhaust fan, located on the roof, is utilized for bathroom and general building exhaust. This is tied into the main schedule and is enabled whenever the building is occupied.



Figure 7: Exhaust Fan Layout from the BAS

Fire Protection System Description

Hill Fire Protection was contracted through Aero to provide an evaluation of the existing fire protection systems with particular focus on deficiencies or areas that are not code compliant. The existing fire sprinkler system description is based on information obtained from a site survey of the existing property. No existing fire protection as-built or engineering drawings could be obtained. Currently, there is a wet automatic sprinkler system protecting the following areas:

- Lower Level – Stack Areas, Mechanical Room, and Back of House and Meeting Rooms
- Upper Level – Stack Areas, Meeting and Conference Rooms, Library Offices
- Ground Level – Lobby, Building Entry Foyer
- Attic Combustible Concealed Spaces

The building contains a Single Zone Wet Sprinkler System supplied by a 6" dedicated water service with a 6" Reduced Pressure Detector Backflow Device. The system is controlled by the system Backflow Device control valves. The system riser installation complies with NFPA 13 requirements for main drain, gauge and water flow alarm device installations. A 6" interior bell is installed in the Water Service/Building Maintenance Room. The Spare Sprinkler Cabinet is wall mounted and contains NFPA required selection of spare sprinklers and head installation wrenches. No hydraulic plaque is installed and based on a limited survey of the existing system piping; it can be assumed that the system was designed to comply with the design requirements for a pipe schedule system.

The fire department connection (2 ½ x 2 ½ x 4 Wye Connection) is installed near the main building entrance 36" above exterior grade. A 10" exterior alarm bell and Knox box are installed on the wall about 14'-0" south of the FD Connection. The wet system inspectors test connection is located at the employee/service entrance on the upper level of the building. All Sprinklers on the property are 155°F ordinary temperature rated and standard response type sprinklers.

For the analysis at this property, the library stack areas are protected based on a light hazard occupancy as defined in the NFPA 13 Standard for Installation of Sprinkler Systems. Stack heights do not exceed 8'-0" and all aisles are greater than 30" in width.

Plumbing System Description

The plumbing system utilizes a 6" combined cold water service for both fire protection and domestic uses. There is no booster pump needed to distribute water to the end uses based on city water pressure and the limited size of the building. The domestic hot water system was recently updated with a new water heater and recirculation pump and piping for remote hot water uses. This was completed to improve the operation of the building hot water system and provide these remote uses hot water more quickly. In addition, the plumbing fixtures were also upgraded to reduce water usage for the library. Issues that were discovered with the plumbing systems are detailed in the project issue report from Appendix 1.

Project Approach

The project was initiated with a walkthrough of the facility by an Aero field commissioning specialist with the assistance of library employees. Several issues were highlighted for investigation during the field survey and condition assessment of the building as well as controls-related items. The field commissioning specialist then began the condition assessment of the equipment. The first day was dedicated to reviewing the overall condition, noting maintenance items, deficiencies, and areas for improvement in the facility.

The next couple of days were allocated for functional testing of the mechanical equipment as it relates to the sequences of operation from the construction drawings and listed in the BAS. During that testing, any deviation from the sequence was noted and added to the project issues report. Once testing of the RTU's was completed, the boiler plant and VAV boxes were also examined in how they operated compared to the sequence and the original design.

During that same time, a test and balance (TAB) technician was brought on-site to record the airflows for each VAV box. This work also involved testing the interaction between the boxes and their associated RTU's upstream. The Aero field commissioning specialist and TAB technician worked to understand and verify the operations of the systems. The results of the testing can be found in the total project issues list in Appendix 1.

As the field testing was finalized, Aero also had the contracted vendors familiar provide pricing for their recommendations to improve overall comfort and operation in the facility. These budgeted costs can be found in the next section of the report.

Building System Deficiencies / Action Items

This list represents what Aero Building Solutions finds to be the major or most pressing items to be addressed. The complete list of all line items can be found in specific Appendices.

*Pricing estimate for high level budgeting only. Pricing may vary after exact scope of work is defined by the Plainfield Public Library. Prices do not include Architectural or Engineering fees for the below recommendations and range from 15-20% over the project cost. All pricing assume work to be performed during normal business hours. Work done outside that time will likely be charged at overtime rates, which are typically 1.5 times the cost of regular time.

Life Safety - Urgent

1. Address Fire Protection Deficiencies from Hill Fire Protection Assessment

- a. Description: Many items were found to be non-compliant with NFPA 13 Standard for Installation of Fire Sprinkler Systems. These include installing sprinklers in areas with no coverage, spacing of existing sprinklers not adequate per code requirements, and relocation and/or replacement of sprinklers in mechanical and electrical rooms. This is not only a safety hazard to guests and staff in the library, but the building is more susceptible to serious fire damage.
- b. Suggested Action: It is recommended to bring the library up to code based on the recommendations from Hill Fire Protection, which are listed in the Fire Sprinkler System Analysis and Budgeted Costs section. Note these recommendations are based on a field survey with no as-builts or engineering drawings to reference.
- c. Budget Pricing:
 - i. See breakdown of estimated costs in Fire Sprinkler System Analysis and Budgeted Costs section.

Major - Correct ASAP

2. Replace Damaged Wire for RTU-1 Compressor #4 (B2)

- a. Description: During the visual inspection of RTU-1, the L3 wire for compressor #4 (B2) was found to be burned. The compressor remained disabled during functional testing, and the breaker feeding compressor #3 and #4 was shut off. If enabled, the charred contactor could pose as a fire hazard.
- b. Suggested Action: It is recommended to remove the damaged L3 wire and replace with new electrical wiring and components (if necessary).
- c. Budget Pricing:
 - i. New electrical parts and material (assume work completed in-house) - \$750* (est.)

3. Repair Outside Air Intake Damper for Boiler

- a. Description: When power was shut off to the hot water boiler and the generator started, the outside air intake damper did not open. This can lead to incomplete combustion and high carbon monoxide concentrations in the library. Further investigation is needed to determine the reason behind the damper remaining closed.
- b. Suggested Action: It is recommended to make the necessary repairs to ensure the outside air intake damper operates properly upon shut down of the boiler each night as well as when power is lost to the facility. Adding controls wiring and programming to show the intake damper on the BAS is also recommended.
- c. Budget Pricing:
 - i. Repair intake damper - \$2,500* (est.)

4. Identify and Repair Supply Air Ductwork Leakages

- a. Description: It was observed that the RTU's ranged in supply fan VFD speed from 55-75%. Based on the RTU design airflow, the total amount of air supplied to all VAV boxes for each unit was estimated. However, when the actual measured airflow from each box was totaled, there was a significant discrepancy between what is supplied from the RTU and what is measured at the boxes (see the table below). From the previous facility assessment and our own investigation, duct air leakage was observed from the RTU's to the VAV boxes.
- b. Suggested Action: It is recommended to identify all instances of duct air leakage and repair the ductwork deficiencies for improved supply air distribution throughout the library. Particular focus should be given to RTU-2 and RTU-3 as these systems were the worst when comparing the airflow from the unit to what was measured at each VAV box. These repairs would take place in conjunction with the next two recommendations to alleviate discomfort issues to the guests.
- c. Budget Pricing:
 - i. Repair intake damper - \$50,000* (est. based on KJWW report)

	RTU-1	RTU-2	RTU-3	RTU-4
Design CFM	11,965	11,070	7,155	7,785
VFD Speed from BAS	56.0%	59.5%	60.5%	69.5%
CFM supplied from each RTU	6,700	6,587	4,329	5,411
CFM measured from all Boxes (per TAB report)	2,985	2,600	750	2,845
CFM measured compared to CFM supplied	44.5%	39.5%	17.3%	52.6%

5. VAV Box Airflow Setpoint Deficiencies - Items Not Matching Construction Drawings

- a. Description: In the control sequences, the minimum position is listed at 30%; however, many of the VAV boxes have minimum airflow setpoints lower than the listed design setpoint and/or the damper minimum positions have been reduced to 0%. Combined with the fact that two of the RTU's are consistently in Vent mode throughout the day, the majority of VAV boxes are supplying significant less air than required code minimums. Because the perimeter radiator valves are not integrated with the boxes, some radiators are being enabled with no airflow. The figure on the following page shows the damper fully closed during occupancy with the perimeter radiator enabled.
- b. Suggested Action: It is recommended to adjust the maximum and minimum airflow setpoints for each VAV box to match the design setpoints and/or the ones listed in the test and balance report from 2012. Further investigation is required to ensure the minimum damper position for each box is 30% and the correct programming is in place to limit the dampers going below the minimum position.
- c. Budget Pricing:
 - i. Cost of corrective action with controls contractor - \$750* (est.)

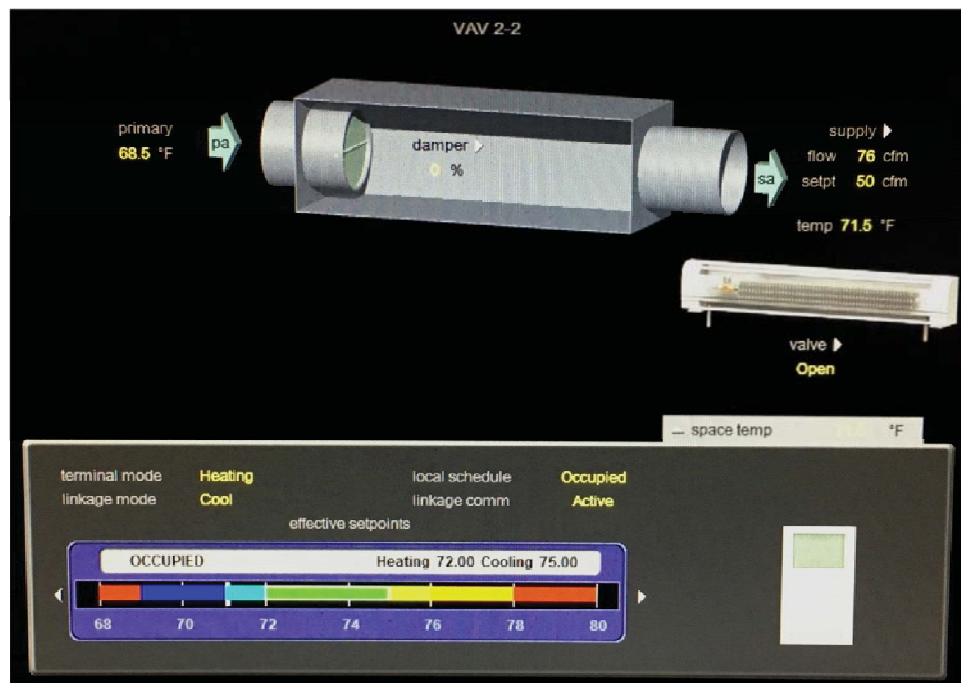


Figure 8: VAV 2-2 with Low Airflow Setpoint, Damper Position of 0%

6. Complete Air Balance of RTU's and VAV Boxes

- a. Description: From the as-is readings in the test and balance report, the majority of boxes in the library are significantly lower than the design airflow setpoint. In

fact, many boxes had airflow measured below the minimum setpoint. The RTU supply fan speeds were, on average, running around 55-65%, which may not be fast enough to push air from the RTU's down to the respective boxes.

- b. Suggested Action: It is recommended to have a TAB technician investigate the cause for low airflow for most VAV boxes.
 - c. Sample Scope of Work:
 - i. Adjust VAV box airflow setpoints to original design setpoints from previous measure recommendation.
 - ii. Balance airflow to RTU's, VAV boxes, and all grilles/registers/diffusers to ensure each space is receiving proper amount of conditioned air
 - 1. See provided test and balance scope of work in Appendix 2.
 - d. Budget Pricing:
 - i. Balance RTU's, VAV's, and Grilles/Registers/Diffusers - \$11,000* (est.)
7. Re-commissioning of Systems After Adjustments are Completed
- a. Description: After all programming changes, mechanical repairs, and upgrades are completed, the system should be functionally tested by Aero Building Solutions to verify that the system is operating properly with the previously listed adjustments taken into consideration.
 - b. Sample Scope of Work:
 - i. Review system operation similar to initial commissioning and functionality testing
 - 1. Project cost will be adjusted based on reduced scope of work to investigate only adjusted equipment.
 - c. Budget Pricing:
 - i. Building systems commissioning - TBD

Non Critical / Maintenance

8. Repair Crankcase Heaters on Compressors for all RTU's
- a. Description: During the visual inspection of each RTU, the crankcase band heaters on the compressors appeared to not be working. The Aero technician applied voltage to the heaters, but no amp draw could be read. These heaters keep oil warmer than the system temperature, which prevents mixing of oil and refrigerant in the compressors.
 - b. Suggested action: It is recommended to repair and/or replace the crankcase heaters for the compressors in each RTU. The overall efficiency of the refrigeration cycle for DX cooling will improve, and could potentially reduce the cooling capacity required throughout the year.
 - c. Budget Pricing:
 - i. Ordering new crankcase heaters and installing in-house - \$1,000* (est.)

9. Revise Occupied Temperature Setpoints to Avoid Prolonged Vent Mode

- a. Description: During the field survey, it was observed that all RTU's enter a Vent mode when first enabled for morning startup. The morning startup operation closes the outside air and exhaust air dampers and fully opens the return air dampers to warm up the library to a cooling enabled setpoint (calculated by taking the average occupied heating setpoint from each space + 2.5°F). If the average temperature measured in each space does not get above the cooling enabled setpoint, the RTU will stay in Vent mode. This also holds the economizer at minimum damper position and locks out mechanical cooling for the RTU.

As the BAS schedule enables the units to go occupied, RTU-2 and RTU-4 quickly switch to a High Cool mode and operate per the programming in place. However, RTU-1 and RTU-3 remain in Vent mode throughout the morning and into the afternoon with the outside air dampers remaining fully closed. No outside air or mechanical cooling is provided to the spaces served by these units. After further investigation, the actual space temperatures being measured were found to consistently be at least 2.5°F lower than the occupied heating setpoints. The units stay in Vent mode because the averaged space temperatures do not reach the cooling enable setpoint.

- b. Suggested action: It is recommended to first lower the occupied heating setpoints for each VAV box served by RTU-1 and RTU-3 by 3°F (adj.). If this does not work, the morning warmup programming should be adjusted to add only 1°F (adj.) to the cooling enabled setpoint equation. The controls contractor may be required to make the programming change. Morning warmup for RTU-1 and RTU-3 can also be disabled to let the units run only during occupied times through the schedule in the BAS.
- c. Budget Pricing:
 - i. Adjust setpoints or disable morning warmup for RTU-1 and RTU-3 (assume work completed in-house) - \$0* (est.)
 - ii. Adjust morning warmup programming - \$750* (est.)

10. Adjust Building Differential Setpoints for RTU's

- a. Description: During the visual inspection of each RTU, the relief fans were spinning the wrong direction, indicating that outside air is being drawn into the RTU's instead of exhausted. From the construction drawings provided to the library from the 2012 HVAC upgrade, the relief fans have their speed controlled to maintain a building differential pressure of +0.05" w.c. From the BAS screenshots, RTU-1 and RTU-4 are set at +0.02" w.c. while RTU-3 is set at 0.25" w.c. Only RTU-2 has its setpoint listed at the original setpoint of +0.05" w.c. The actual pressure readings in the library ranged from -0.01" to +0.02" w.c.
- b. Suggested action: It is recommended that the building differential pressure setpoints be revised to their original value of +0.05" w.c. This can also be

completed in conjunction with the air balance of each RTU system to improve overall performance and occupant comfort.

- c. Budget Pricing:
 - i. Adjust Pressure Setpoints (assume work completed in-house) - \$0* (est.)

11. General Mechanical Maintenance Items

- a. Description: The condition assessment of the mechanical equipment revealed several maintenance items that should be addressed. These include exhaust fan repairs, cleaning of economizer intake filters, fix RTU-2 condensate trap, and lubricating outside air and exhaust air dampers. The full list of these items can be found in Appendix 1.
- b. Suggested action: It is recommended to address all mechanical maintenance items as can be completed in-house. To ensure the future operation of the equipment, a preventive maintenance plan or contract should be put in place either in-house or from a qualified contractor.
- c. Budget Pricing:
 - i. Correction of existing mechanical maintenance items – TBD

12. General Plumbing Maintenance Items

- a. Description: The condition assessment of the plumbing equipment revealed several additional maintenance items that should also be addressed. These include roof deck repair for water leakage near RTU-1, adjusting motion sensor timeouts in all restrooms, repair of hot water valve that cannot be adjusted, and adding covers on the piping under sinks in the women's restrooms. Issues with some restrooms not getting hot water should also be investigated.
- b. Suggested action: It is recommended to address all mechanical maintenance items as can be completed in-house. To ensure the future operation of the equipment, a preventive maintenance plan or contract should be put in place either in-house or from a qualified contractor.
- c. Budget Pricing:
 - i. Correction of existing plumbing maintenance items – TBD

Energy Reduction Measures

11. Upgrade Lighting Fixtures and Controls

- a. Description: Currently, many fixtures throughout the library are either high intensity discharge (HID) or compact florescent lighting (CFL). In addition, the staff uses the circuit breakers as switches to shut off the lights each night. The breakers are not intended to cycle on and off every day and could lead to issues with the electrical equipment.
- b. Suggested action: It is recommended to first replace all the HID and CFL fixtures to high efficiency LED fixtures. Further action is recommended to install

occupancy/motion sensors as well as daylight harvesting controls to reduce the amount of artificial lighting on sunny days. These upgrades will not only lead to reduction in energy costs, but also material costs as the LED bulbs have a longer lifespan than other types of bulbs.

- c. Sample Scope of Work:
 - i. Replace HID and CFL Fixtures with LED Fixtures
 - 1. Scope of work TBD by lighting/controls contractor and Plainfield Public Library.
 - ii. Upgrade Lighting Controls
 - 1. Scope of work TBD by lighting/controls contractor and Plainfield Public Library,
- d. Budget Pricing:
 - i. Upgrade Lighting Systems - \$100,000* (est.)

12. Install Parallel Positioning Controls for Hot Water Boiler

- e. Description: The hot water boiler combustion is currently controlled by a single mechanical linkage. This configuration has the fuel and air positioning devices connected to the linkage with a fixed fuel/air ratio. During the visual inspection, it was observed that the boiler cycles on and off every few minutes, reducing the overall efficiency of the boiler.
- f. Suggested action: It is recommended to install a linkageless control system and install a parallel positioning system. The mechanical linkage is removed, and the fuel and air devices are separated and driven by individual positioners, which automatically adjust for a specific firing rate.
- g. Sample Scope of Work:
 - i. Install Parallel Positioning Controls
 - 1. Scope of work TBD by installing contractor and Plainfield Public Library.
- h. Budget Pricing:
 - i. Install New Parts and Controls (incentive TBD) - \$20,000* (est.)

13. Enable Supply Duct Static Pressure Reset

- i. Description: Currently, it appears that each RTU has its supply duct static pressure setpoint fixed at 1.00" w.c. In the original construction drawings from the 2012 HVAC upgrade, programming was put in place to reset the static pressure setpoint to maintain at least one VAV box 95% open. The BAS did not show any boxes above 75% open during the site survey.
- j. Suggested action: It is recommended to enable the programming to reset the supply duct static pressure setpoint per the original sequence of operation. This will continue to improve overall performance of the RTU systems as well as provide enough air to meet code requirements.
- k. Sample Scope of Work:

- i. Enable Supply Pressure Reset
 - 1. Scope of work TBD by controls contractor and Plainfield Public Library.
 - l. Budget Pricing:
 - i. Enable reset and confirm programming in place and correct - \$750* (est.)
14. Lower Outside Air Temperature Setpoint to Enable Boiler
- a. Description: Currently, the hot water boiler can enable when the outside air temperature is as high as 75°F. Typical boiler plant operation locks out the hot water equipment at lower outside air temperatures than this.
 - b. Suggested action: It is recommended to reduce the high limit outside air temperature setpoint for the boiler to 60°F. No mechanical heating should be needed at these outdoor temperatures, and “fighting” of the cool supply air and perimeter radiators will be avoided during these times.
 - c. Budget Pricing:
 - i. Reduce setpoint in-house (assuming no programming needed) - \$0* (est.)
15. Lower High Limit Hot Water Supply Temperature Setpoint
- a. Description: Currently, the hot water supply temperature is being reset based on outside air temperature. The high limit supply temperature for this reset schedule is set at 200°F. Typical hot water supply temperatures are lower than this.
 - b. Suggested action: It is recommended to reduce the high limit supply temperature setpoint for the boiler to 180°F. At extremely low outside air temperatures, there should be enough mechanical heating at this supply temperature to ensure occupant comfort throughout the building.
 - c. Budget Pricing:
 - i. Reduce setpoint in-house (assuming no programming needed) - \$0* (est.)
16. Rewire Exhaust Fan to Disable in Unoccupied Mode
- a. Description: Currently, the RIB relay for the exhaust fan is wired on normally closed contacts. This is causing the fan to operate 24/7 even though the fan is integrated into the BAS and scheduled to shut down at night.
 - b. Suggested action: It is recommended to rewire the exhaust fan correctly and ensure the exhaust fan shuts down when called to by the BAS
 - c. Sample Scope of Work:
 - i. Rewire Exhaust Fan
 - 1. Scope of work TBD by controls contractor and Plainfield Public Library.
 - d. Budget Pricing:
 - i. Rewire and ensure proper operation through BAS - \$750* (est.)

17. Improve Airside Economizer Control and Operation for all RTU's

- a. Description: Currently, the outside air humidity sensor is disabled for the RTU's and no return air humidity could be found in the BAS. From the construction drawings provided to the library from the 2012 HVAC upgrade, programming was put in place to control the airside economizer based on differential enthalpy: when the outside air enthalpy is below the return air enthalpy, the outside air damper modulates open until the supply air temperature setpoint is reached or the economizer is 100% open. Enthalpy is determined based on temperature and humidity. In addition, the minimum economizer damper position is listed as 35%, and the demand control ventilation option is not resetting this minimum damper position.
- b. Suggested action: It is recommended to first install (if necessary) humidity sensors in both the outside air and return air ductwork and program both values into the BAS. Programming should then be added to calculate outside air and return air enthalpy, and the economizer should be controlled based on differential enthalpy listed in the construction drawings from 2012. In addition, the outside air dampers should be tested and balanced to determine if the minimum damper position can be reduced. This work to be completed by a TAB technician. The demand control ventilation option should also be enabled through the BAS to reset the minimum damper position.
- c. Sample Scope of Work:
 - i. Enable Differential Enthalpy Control
 - 1. Scope of work TBD by controls contractor and Plainfield Public Library.
 - ii. Reduce Minimum Economizer Damper Position
 - 1. Scope of work TBD by TAB contractor and Plainfield Public Library.
 - iii. Enable Demand Control Ventilation Feature
 - 1. To be completed in-house.
- d. Budget Pricing:
 - i. Install humidity sensors and program enthalpy control - \$3,000* (est.)
 - ii. Balance outside air dampers - \$1,200* (est.)
 - iii. Enable DCV Option - \$0* (est.)

18. Enable Supply Air Temperature Reset for all RTU's

- a. Description: Currently, the supply air temperature setpoint is fixed at 55°F throughout the day. It was confirmed through the BAS that the supply air temperature reset is disabled. From the construction drawings provided to the library from the 2012 HVAC upgrade, programming was put in place to reset the supply air temperature setpoint based on outside air temperature:
 - i. When OA temperature is above 40°F (adj.), supply air temperature is 55°F (adj.).

- ii. When OA temperature is below 40°F (adj.) and above 20°F (adj.), supply air temperature is 60°F (adj.).
 - iii. When OA temperature is below 20°F (adj.), supply air temperature is 65°F (adj.).
- b. Suggested action: It is recommended to enable the supply air temperature reset option through the BAS and ensure the programming is correct per the reset schedule listed above.
- c. Budget Pricing:
 - i. Enable reset (assuming no programming needed) - \$0* (est.)

19. Lockout Mechanical Cooling for all RTU's

- a. Description: Currently, the mechanical cooling for each RTU can enable at all times throughout the year. There should not be a need for mechanical cooling at low outside air temperatures.
- b. Suggested action: It is recommended to enable lockout of the mechanical cooling when outside air temperatures are below 40°F (adj.). This value is to match the outside air temperature value used in the supply air temperature reset schedule to ensure the 55°F setpoint can be reached.
- c. Budget Pricing:
 - i. Enable lockout (assuming no programming needed) - \$0* (est.)

Fire Sprinkler System Analysis and Budgeted Costs

The following pages list the observations and deficiencies noted from the fire protection surveyor and the estimated costs to make these repairs.

March 31, 2017

RE: PLAINFIELD LIBRARY FIRE SPRINKLER SYSTEM ANALYSIS

The existing fire sprinkler system description for the Plainfield Library, located at 15025 S. Illinois Street, Plainfield, Illinois, is based on information obtained from a site survey of the existing property. No existing fire protection as-built or engineering drawings could be obtained. Hill Fire Protection, LLC did not design or install the system at this property and assumes no responsibility for the adequacy of the design or the installation of the system at this location.

Items observed to be non-compliant with the NFPA 13 Standard for Installation of Fire Sprinkler Systems:

Lower Level:

- No sprinklers are installed below the lowest landing at main stairwell.
- No sprinklers are installed in the two closets under the main stairwell.
- Sprinkler coverage in staff lounge does not meet the spacing requirements for small room sprinkler protection.
- The proximity of sprinklers in the Storage Room outside the elevator equipment room does not comply with the requirement for standard spray sprinklers and the minimum required allowable distance from an obstruction. Sprinklers in this room also exceed the maximum required deflector distance from the ceiling/deck above for beam and girder construction.
- The proximity of (3) sprinklers at the corridor ramp to the Maintenance/Boiler Room do not comply with the requirement for standard spray sprinklers and the minimum required distance sprinklers are permitted to be installed from an obstruction.
- The walls on the north and east sides of the corridor ramp leading to the Maintenance/Boiler Room are open to the spaces above the ceilings in the adjacent rooms. Additional sprinkler protection is required above the ceilings in the adjacent areas or the corridor walls need to be extended to the floor deck above and fire/smoke sealed per code.
- Adjust/relocate (1) sprinkler in, (1) sprinkler in the Electrical Room entry space and (2) sprinklers in Maintenance Room to comply with the requirement for standard spray sprinklers and the minimum required distance allowable from an obstruction.
- At the minimum, provide intermediate temperature sprinklers at the following locations in lieu of the currently installed standard temperature sprinklers adjacent to the unit heaters and boiler. (1) at the unit heater at the south end of the corridor ramp to the Maintenance/Boiler Room, (1) at the unit heater at the southeast corner of the Maintenance Room, and (1) in the Boiler Room above the boiler.
- Provide (2) sprinklers above partially open, concealed space ceiling in closet at northwest corner of assembly/conference room.

- Provide relief buckets for the main and by-pass reduced pressure backflow devices. These should be piped to a floor drain or safe location to avoid water damage to any adjacent equipment or stored materials.

Upper Level:

- (2) Sprinklers are installed more than 15'-0" apart at west side of main stairway/skylight and south of library check out desk area.
- No sprinkler protection is provided in the buildings center skylight structure. Sprinklers in the beam structure below this skylight provide floor coverage with the exception of (1) location at the center of the skylight.

Ground Level Entry / Lobby:

- No sprinkler protection is installed at the main entry foyer on the west side of the building
- (2) Sprinklers on the south side of the main entry lobby and west of the elevator are located less than 6'-0" apart.
- Horizontal sidewall sprinklers are provided at the arched ceiling in the west entry/stair area. These sprinklers are installed under a 10" wide indirect lighting soffit; however these sprinklers exceed the deflector distance required from the top of the arch as required for protection of ceiling pockets or at a building soffit in order to provide proper heat collection and proper sprinkler operation.

Combustible Attics and Eaves:

- Upright sprinklers in the concealed attic space are not installed with their deflectors parallel to the roof structure. Sprinklers installed on sprig longer than 48" are typically not provided with additional support as required per NFPA 13 installation requirements.
- The combustible wood building eaves on all sides of the building exceed 48" and are not protected with sprinklers.

April 18, 2017

**Re: Plainfield Public Library
Deficiency Pricing**

We are pleased to submit our pricing for the deficiencies found at our preliminary survey of the existing automatic sprinkler system at the Plainfield Library.

Lower Level

I.	Provide sprinkler protection below lowest landing at main stairwell:	\$2,800.00
II.	Provide sprinkler protection at (2) closets under main stairwell:	\$1,800.00
III.	Provide proper sprinkler coverage at staff lounge:	\$1,400.00
IV.	Provide proper sprinkler coverage in storage room outside elevator equipment room:	\$2,500.00
V.	Provide proper sprinkler coverage at maintenance boiler room ramp:	\$1,800.00
VI.	Provide additional sprinkler coverage above ceilings at maintenance boiler area:	\$3,100.00
VII.	Provide proper sprinkler coverage within maintenance boiler room:	\$1,800.00
VIII.	Replace existing sprinkler heads in boiler room with high temperature heads:	\$ 400.00
IX.	Provide sprinkler coverage above ceiling at assembly/conference room:	\$1,800.00

Upper Level

I.	Provide proper sprinkler coverage at south of library check out area:	\$1,800.00
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Ground Level

I.	Provide proper sprinkler coverage at main entry foyer:	\$1,800.00
II.	Modify existing sprinkler heads at south side of the main entry lobby	\$1,800.00
III.	Raise existing sidewall sprinkler heads at arched ceiling in west entry:	\$2,100.00

Combustible Attic & Eaves

I.	Adjust existing sprinkler deflectors and provide additional support on sprinkler heads on sprigs greater than 48":	\$12,000.00
II.	Provide protection at eaves that exceed 48":	\$19,000.00

We have NOT included the following in our above pricing:

- Painting or labeling of existing or new sprinkler pipe.
- Premium time pay or shift work premium.
- Alignment of sprinkler heads for aesthetic purposes.
- Ceiling removal or replacement.
- Shop drawings.
- Permits or fees.
- Cutting or patching.
- Touch up painting of walls.

Plainfield Public Library
Deficiency Pricing
April 18, 2017
Page Two

We appreciate the opportunity to submit this pricing and ask that you contact us if you have any questions regarding this matter.

Sincerely,

HILL FIRE PROTECTION

A handwritten signature in cursive script that reads "Tricia Gavlin".

Tricia Gavlin
Estimator

Appendix 1 – Project Issues List

The following pages detail all mechanical and plumbing issues found during the field survey. Pictures are attached as applicable for some issues.

Hill Energy Solutions

Project Issue Report


PROJECT: Plainfield Library
LOCATION: Plainfield, IL
PROJECT #: 201729

DATE: 4/18/2017
CONTACT: Ron Gordon
AUTHOR:

Issue ID:	0001	Status:	Open	Issue Priority:	
Equipment:	Domestic HW Tank			Created Date:	27-Mar-17
				Completed Date:	
Issue Description: Expansion tank full of water - needs to be replaced.					
Issue Type: Observation					
Role Assignment: Administrator					
User Assignment: Ron Gordon					

Issue ID:	0002	Status:	Open	Issue Priority:	
Equipment:	HW Boiler			Created Date:	27-Mar-17
				Completed Date:	
Issue Description: Generator Issue: O.A. intake damper did not open when power was lost and generator started.					
Issue Type: Observation					
Role Assignment: Administrator					
User Assignment: Ron Gordon					

Issue ID:	0003	Status:	Open	Issue Priority:	
Equipment:	EXF-1			Created Date:	27-Mar-17
				Completed Date:	
Issue Description: Housing worn at two of the securing bolt holes.					
Issue Type: Observation					
Role Assignment: Administrator					
User Assignment: Ron Gordon					

Issue ID:	0004	Status:	Open	Issue Priority:	
Equipment:	EXF-1			Created Date:	27-Mar-17
				Completed Date:	
Issue Description: Belt cracked (4L220) and pulley in poor shape.					
Issue Type: Observation					
Role Assignment: Administrator					
User Assignment: Ron Gordon					
Issue Photos:					
					
Name: Bathroom Exhaust Belt and Sheave.JPG					
Captured: 4/18/2017 1:01 PM					
Caption:					

Hill Energy Solutions

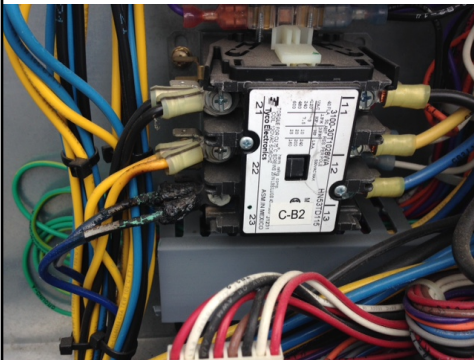
Project Issue Report

PROJECT: Plainfield Library
LOCATION: Plainfield, IL
PROJECT #: 201729

DATE: 4/18/2017
CONTACT: Ron Gordon
AUTHOR:

Issue ID:	0005	Status:	Open	Issue Priority:	
Equipment:	EXF-1			Created Date: 27-Mar-17	
Completed Date:					
Issue Description: RIB wired on normally closed contacts. Fan operates all the time even though fan integrated to BAS and scheduled to shut down at night.					
Issue Type: Observation					
Role Assignment: Administrator					
User Assignment: Ron Gordon					

Issue ID:	0006	Status:	Open	Issue Priority:	
Equipment:	RTU-01/Condensing Unit			Created Date: 29-Mar-17	
Completed Date:					
Issue Description: Crankcase band heaters on compressors not working. Checked for voltage - 120 volts is applied to heater, but no amp draw read.					
Issue Type: Observation					
Role Assignment: Administrator					
User Assignment: Ron Gordon					

Issue ID:	0007	Status:	Open	Issue Priority:	
Equipment:	RTU-01/Condensing Unit			Created Date: 29-Mar-17	
Completed Date:					
Issue Description: Compressor #4 (B2) has burnt wire on L3. Compressor was not enabled, and the breaker feeding compressors #3 and #4 was shut off.					
Issue Type: Observation					
Role Assignment: Administrator					
User Assignment: Ron Gordon					
Issue Photos:					
					
Name: RTU-1 Burned Contactor for Compressor B2.JPG					
Captured: 4/18/2017 1:06 PM					
Caption:					

Hill Energy Solutions

Project Issue Report

PROJECT: Plainfield Library
LOCATION: Plainfield, IL
PROJECT #: 201729

DATE: 4/18/2017
CONTACT: Ron Gordon
AUTHOR:

Issue ID:	0008	Status:	Open	Issue Priority:	
Equipment:	RTU-04/Condensing Unit			Created Date: 29-Mar-17	
				Completed Date:	
Issue Description:					
Crankcase band heaters on compressors not working. Checked for voltage - 120 volts is applied to heater, but no amp draw read.					
Issue Type:	Observation				
Role Assignment:	Administrator				
User Assignment:	Ron Gordon				

Issue ID:	0009	Status:	Open	Issue Priority:	
Equipment:	RTU-02/Condensing Unit			Created Date: 29-Mar-17	
				Completed Date:	
Issue Description:					
Crankcase band heaters on compressors #2, #3, and #4 not working. Checked for voltage - 120 volts is applied to heater, but no amp draw read.					
Issue Type:	Observation				
Role Assignment:	Administrator				
User Assignment:	Ron Gordon				

Issue ID:	0010	Status:	Open	Issue Priority:	
Equipment:	RTU-03/Condensing Unit			Created Date: 29-Mar-17	
				Completed Date:	
Issue Description:					
Crankcase band heaters on compressors #2, #3, and #4 not working. Checked for voltage - 120 volts is applied to heater, but no amp draw read.					
Issue Type:	Observation				
Role Assignment:	Administrator				
User Assignment:	Ron Gordon				

Issue ID:	0011	Status:	Open	Issue Priority:	
Equipment:	RTU-02			Created Date: 29-Mar-17	
				Completed Date:	
Issue Description:					
Condensate trap is broken.					
Issue Type:	Observation				
Role Assignment:	Administrator				
User Assignment:	Ron Gordon				

Issue ID:	0012	Status:	Open	Issue Priority:	
Equipment:	RTU-02			Created Date: 29-Mar-17	
				Completed Date:	
Issue Description:					
Economizer intake filters need to be cleaned.					
Issue Type:	Observation				
Role Assignment:	Administrator				
User Assignment:	Ron Gordon				

Hill Energy Solutions

Project Issue Report

PROJECT: Plainfield Library
LOCATION: Plainfield, IL
PROJECT #: 201729

DATE: 4/18/2017
CONTACT: Ron Gordon
AUTHOR:

Issue ID:	0013	Status:	Open	Issue Priority:	
Equipment:	RTU-01				Created Date: 29-Mar-17 Completed Date:
Issue Description: Economizer intake filters need to be cleaned.					
Issue Type:	Observation				
Role Assignment:	Administrator				
User Assignment:	Ron Gordon				
Issue ID:	0014	Status:	Open	Issue Priority:	
Equipment:	RTU-03				Created Date: 29-Mar-17 Completed Date:
Issue Description: Economizer intake filters need to be cleaned.					
Issue Type:	Observation				
Role Assignment:	Administrator				
User Assignment:	Ron Gordon				
Issue ID:	0015	Status:	Open	Issue Priority:	
Equipment:	RTU-04				Created Date: 29-Mar-17 Completed Date:
Issue Description: Economizer intake filters need to be cleaned.					
Issue Type:	Not Assigned				
Role Assignment:	Administrator				
User Assignment:	Ron Gordon				
Issue ID:	0016	Status:	Open	Issue Priority:	
Equipment:	RTU-01				Created Date: 30-Mar-17 Completed Date:
Issue Description: Exhaust and economizer dampers need to be lubricated.					
Issue Type:	Observation				
Role Assignment:	Administrator				
User Assignment:	Ron Gordon				
Issue ID:	0017	Status:	Open	Issue Priority:	
Equipment:	RTU-02				Created Date: 30-Mar-17 Completed Date:
Issue Description: Exhaust and economizer dampers need to be lubricated.					
Issue Type:	Observation				
Role Assignment:	Administrator				
User Assignment:	Ron Gordon				
Issue ID:	0018	Status:	Open	Issue Priority:	
Equipment:	RTU-03				Created Date: 30-Mar-17 Completed Date:
Issue Description: Exhaust and economizer dampers need to be lubricated.					
Issue Type:	Observation				
Role Assignment:	Administrator				
User Assignment:	Ron Gordon				

Hill Energy Solutions

Project Issue Report

PROJECT: Plainfield Library
LOCATION: Plainfield, IL
PROJECT #: 201729

DATE: 4/18/2017
CONTACT: Ron Gordon
AUTHOR:

Issue ID:	0019	Status:	Open	Issue Priority:	
Equipment:	RTU-04				Created Date: 30-Mar-17
					Completed Date:
Issue Description: Exhaust and economizer dampers need to be lubricated.					
Issue Type: Observation					
Role Assignment: Administrator					
User Assignment: Ron Gordon					

Issue ID:	0020	Status:	Open	Issue Priority:	
Equipment:	RTU-01				Created Date: 30-Mar-17
					Completed Date:
Issue Description: Unit will operate in Vent mode well into the afternoon hours, but RTU-2 and RTU-4 go into High Cool mode after only a short time in Vent mode.					
Issue Type: Observation					
Role Assignment: Administrator					
User Assignment: Ron Gordon					


Issue ID:	0021	Status:	Open	Issue Priority:	
Equipment:	RTU-03				Created Date: 30-Mar-17
					Completed Date:
Issue Description: Unit will operate in Vent mode well into the afternoon hours, but RTU-2 and RTU-4 go into High Cool mode after only a short time in Vent mode.					
Issue Type: Observation					
Role Assignment: Administrator					
User Assignment: Ron Gordon					

Hill Energy Solutions

Project Issue Report

PROJECT: Plainfield Library
LOCATION: Plainfield, IL
PROJECT #: 201729

DATE: 4/18/2017
CONTACT: Ron Gordon
AUTHOR:

Issue ID:	0022	Status:	Open	Issue Priority:	
Equipment:	RTU-01			Created Date: 30-Mar-17	
Completed Date:					
Issue Description: Water leaking into building by RTU-1. It appears that the water is entering the building 2 feet west of gas pipe penetration (building was shown area on roof).					
Issue Type: Observation					
Role Assignment: Administrator					
User Assignment: Ron Gordon					
Issue Photos:					
					
Name: Roof Deck Leak (Not From Curb).JPG					
Captured: 4/18/2017 1:09 PM					
Caption:					

Issue ID:	0023	Status:	Open	Issue Priority:	
Equipment:	Project			Created Date: 18-Apr-17	
Completed Date:					
Issue Description: All bathroom motion sensors time out sooner than sinks can provide hot water.					
Issue Type: Observation					
Role Assignment: Administrator					
User Assignment: Ron Gordon					

Issue ID:	0024	Status:	Open	Issue Priority:	
Equipment:	Project			Created Date: 18-Apr-17	
Completed Date:					
Issue Description: First floor women's staff restroom did not get hot water.					
Issue Type: Observation					
Role Assignment: Administrator					
User Assignment: Ron Gordon					

Hill Energy Solutions

Project Issue Report

PROJECT: Plainfield Library
LOCATION: Plainfield, IL
PROJECT #: 201729

DATE: 4/18/2017
CONTACT: Ron Gordon
AUTHOR:


Issue ID:	0025	Status:	Open	Issue Priority:	
Equipment:	Project				Created Date: 18-Apr-17 Completed Date:
Issue Description: Kitchen staff sink water pressure drops whenever toilet flushes.					
Issue Type:	Observation				
Role Assignment:	Administrator				
User Assignment:	Ron Gordon				
Issue ID:	0026	Status:	Open	Issue Priority:	
Equipment:	Project				Created Date: 18-Apr-17 Completed Date:
Issue Description: Lower level women's handicap restroom sink did not get hot water.					
Issue Type:	Observation				
Role Assignment:	Administrator				
User Assignment:	Ron Gordon				
Issue ID:	0027	Status:	Open	Issue Priority:	
Equipment:	Project				Created Date: 18-Apr-17 Completed Date:
Issue Description: Lower level women's staff restroom and kitchen sinks have independent hot and cold water lines. Hot water temperature exceeds allowable limit (measured at 119 deg. F).					
Issue Type:	Observation				
Role Assignment:	Administrator				
User Assignment:	Ron Gordon				
Issue ID:	0028	Status:	Open	Issue Priority:	
Equipment:	Project				Created Date: 18-Apr-17 Completed Date:
Issue Description: Lower level women's staff restroom hot water valve under sink can not be exercised.					
Issue Type:	Observation				
Role Assignment:	Administrator				
User Assignment:	Ron Gordon				

Hill Energy Solutions

Project Issue Report

PROJECT: Plainfield Library
LOCATION: Plainfield, IL
PROJECT #: 201729

DATE: 4/18/2017
CONTACT: Ron Gordon
AUTHOR:

Issue ID:	0029	Status:	Open	Issue Priority:	
Equipment: Project		Created Date: 18-Apr-17			
Completed Date:					
Issue Description: Piping under sinks only covered in men's restrooms.					
Issue Type: Observation					
Role Assignment: Administrator					
User Assignment: Ron Gordon					
Issue Photos:					
					
Name: Sink Without Insulation - Ron.JPG			Name: Sink With Insulation - Ron.JPG		
Captured: 4/18/2017 1:48 PM			Captured: 4/18/2017 1:49 PM		
Caption:			Caption:		

Appendix 2 - Test and Balance Report

The following pages show the as-is readings for all VAV boxes throughout the library. The TAB technician commanded the boxes to full cooling (100% open) and measured airflow from each diffuser/register to determine the amount of air being supplied to those spaces.



TEST AND BALANCE REPORTS

Plainfield Public Library

Survey

AERO Job #7390

04252017





PROJECT: PLAINFIELD LIBRARY
 LOCATION:
 PROJECT #: 7390

DATE: 4/25/2017
 CONTACT: Brian Benson

SYSTEM/UNIT: RTU-01

Motor Adjustment	
RTU-01/Fan Sections	
Centerline	15-1/2 in.
In	1-1/2 in.
Out	2-1/2 in.

Drive System	
RTU-01/Fan Sections	
Drive Type	BELT
Fan Pulley	1B5V124
Fan Bushing Size	1-15/16
Motor Sheave	1VP65
Motor Bushing Size	1-18
Belt Size	BX58
Number of Belts	1

SYSTEM/UNIT: RTU-01/VAV-01

Tested By: Brian Benson
 Date: 4/4/2017

Air Test Data	
Full Open CFM	340 CFM
Full Open Sensor	320
Primary Max Design CFM	975 CFM
Primary Min Design CFM	230 CFM
Primary Min Actual CFM	230 CFM

RTU-01/VAV-01 GRD - Supply Outlet Summary

System/Unit	Area Served	Size	AK Factor	Design Velocity	Design CFM	Final Velocity	Final CFM
Outlet-01	1st Floor	18/6	Hood	Hood	325	Hood	105
Outlet-02	1st Floor	18/6	Hood	Hood	325	Hood	125
Outlet-03	1st Floor	18/6	Hood	Hood	325	Hood	110
Totals:	-	-	-	-	975	-	340



PROJECT: PLAINFIELD LIBRARY
LOCATION:
PROJECT #: 7390

DATE: 4/25/2017
CONTACT: Brian Benson

SYSTEM/UNIT: RTU-01/VAV-02

Tested By: Brian Benson
Date: 4/4/2017

Air Test Data	
Full Open CFM	430 CFM
Full Open Sensor	450
Primary Max Design CFM	1625 CFM
Primary Min Design CFM	450 CFM
Primary Min Actual CFM	450 CFM

RTU-01/VAV-02 GRD - Supply Outlet Summary

System/Unit	Area Served	Size	AK Factor	Design Velocity	Design CFM	Final Velocity	Final CFM
Outlet-01	1st Floor	18/6	Hood	Hood	325	Hood	90
Outlet-02	1st Floor	18/6	Hood	Hood	325	Hood	80
Outlet-03	1st Floor	18/6	Hood	Hood	325	Hood	75
Outlet-04	1st Floor	18/6	Hood	Hood	325	Hood	85
Outlet-05	1st Floor	18/6	Hood	Hood	325	Hood	100
Totals:	-	-	-	-	1625	-	430

SYSTEM/UNIT: RTU-01/VAV-03

Tested By: Brian Benson
Date: 4/4/2017

Air Test Data	
Full Open CFM	450 CFM
Full Open Sensor	450
Primary Max Design CFM	2250 CFM
Primary Min Design CFM	450 CFM
Primary Min Actual CFM	450 CFM

RTU-01/VAV-03 GRD - Supply Outlet Summary

System/Unit	Area Served	Size	AK Factor	Design Velocity	Design CFM	Final Velocity	Final CFM
Outlet-01	1st Floor	18/6	Hood	Hood	375	Hood	70
Outlet-02	1st Floor	18/6	Hood	Hood	375	Hood	90
Outlet-03	1st Floor	18/6	Hood	Hood	375	Hood	80
Outlet-04	1st Floor	18/6	Hood	Hood	375	Hood	60
Outlet-05	1st Floor	18/6	Hood	Hood	375	Hood	50
Outlet-06	1st Floor	18/6	Hood	Hood	375	Hood	100
Totals:	-	-	-	-	2250	-	450



PROJECT: PLAINFIELD LIBRARY
LOCATION:
PROJECT #: 7390

DATE: 4/25/2017
CONTACT: Brian Benson

SYSTEM/UNIT: RTU-01/VAV-04

Tested By: Brian Benson
Date: 4/4/2017

Air Test Data	
Full Open CFM	220 CFM
Full Open Sensor	237
Primary Max Design CFM	975 CFM
Primary Min Design CFM	230 CFM
Primary Min Actual CFM	230 CFM

RTU-01/VAV-04 GRD - Supply Outlet Summary

System/Unit	Area Served	Size	AK Factor	Design Velocity	Design CFM	Final Velocity	Final CFM
Outlet-01	1st Floor	18/6	Hood	Hood	325	Hood	70
Outlet-02	1st Floor	18/6	Hood	Hood	325	Hood	50
Outlet-03	1st Floor	18/6	Hood	Hood	325	Hood	100
Totals:	-	-	-	-	975	-	220

SYSTEM/UNIT: RTU-01/VAV-05

Tested By: Brian Benson
Date: 4/6/2017

Air Test Data	
Full Open CFM	30 CFM
Full Open Sensor	27
Primary Max Design CFM	1100 CFM
Primary Min Design CFM	230 CFM
Primary Min Actual CFM	10 CFM

RTU-01/VAV-05 GRD - Supply Outlet Summary

System/Unit	Area Served	Size	AK Factor	Design Velocity	Design CFM	Final Velocity	Final CFM
Outlet-01	LL	18/6	Hood	Hood	275	Hood	0
Outlet-02	LL	18/6	Hood	Hood	275	Hood	0
Outlet-03	LL	18/6	Hood	Hood	275	Hood	20
Outlet-04	LL	18/6	Hood	Hood	275	Hood	10
Totals:	-	-	-	-	1100	-	30



PROJECT: PLAINFIELD LIBRARY
LOCATION:
PROJECT #: 7390

DATE: 4/25/2017
CONTACT: Brian Benson

SYSTEM/UNIT: RTU-01/VAV-06

Tested By: Brian Benson
Date: 4/6/2017

Air Test Data	
Full Open CFM	505 CFM
Full Open Sensor	490
Primary Max Design CFM	1400 CFM
Primary Min Design CFM	325 CFM
Primary Min Actual CFM	325 CFM

RTU-01/VAV-06 GRD - Supply Outlet Summary

System/Unit	Area Served	Size	AK Factor	Design Velocity	Design CFM	Final Velocity	Final CFM
Outlet-01	1st Floor	48/4	Hood	Hood	175	Hood	70
Outlet-02	1st Floor	48/4	Hood	Hood	175	Hood	60
Outlet-03	1st Floor	48/4	Hood	Hood	175	Hood	60
Outlet-04	1st Floor	48/4	Hood	Hood	175	Hood	55
Outlet-05	1st Floor	48/4	Hood	Hood	175	Hood	70
Outlet-06	1st Floor	48/4	Hood	Hood	175	Hood	70
Outlet-07	1st Floor	48/4	Hood	Hood	175	Hood	60
Outlet-08	1st Floor	48/4	Hood	Hood	175	Hood	60
Totals:	-	-	-	-	1400	-	505

SYSTEM/UNIT: RTU-01/VAV-07

Tested By: Brian Benson
Date: 4/6/2017

Air Test Data	
Full Open CFM	170 CFM
Full Open Sensor	150
Primary Max Design CFM	740 CFM
Primary Min Design CFM	145 CFM
Primary Min Actual CFM	145 CFM

RTU-01/VAV-07 GRD - Supply Outlet Summary

System/Unit	Area Served	Size	AK Factor	Design Velocity	Design CFM	Final Velocity	Final CFM
Outlet-01	1st Floor	48/4	Hood	Hood	185	Hood	30
Outlet-02	1st Floor	48/4	Hood	Hood	185	Hood	40
Outlet-03	1st Floor	48/4	Hood	Hood	185	Hood	40
Outlet-04	1st Floor	48/4	Hood	Hood	185	Hood	60
Totals:	-	-	-	-	740	-	170



PROJECT: PLAINFIELD LIBRARY
LOCATION:
PROJECT #: 7390

DATE: 4/25/2017
CONTACT: Brian Benson

SYSTEM/UNIT: RTU-01/VAV-08

Tested By: Brian Benson
Date: 4/6/2017

Air Test Data	
Full Open CFM	120 CFM
Full Open Sensor	110
Primary Max Design CFM	520 CFM
Primary Min Design CFM	145 CFM
Primary Min Actual CFM	110 CFM

RTU-01/VAV-08 GRD - Supply Outlet Summary

System/Unit	Area Served	Size	AK Factor	Design Velocity	Design CFM	Final Velocity	Final CFM
Outlet-01	1st Floor	24/24	Hood	Hood	260	Hood	60
Outlet-02	1st Floor	24/24	Hood	Hood	260	Hood	60
Totals:	-	-	-	-	520	-	120

SYSTEM/UNIT: RTU-01/VAV-09

Tested By: Brian Benson
Date: 4/6/2017

Air Test Data	
Full Open CFM	230 CFM
Full Open Sensor	230
Primary Max Design CFM	980 CFM
Primary Min Design CFM	230 CFM
Primary Min Actual CFM	230 CFM

RTU-01/VAV-09 GRD - Supply Outlet Summary

System/Unit	Area Served	Size	AK Factor	Design Velocity	Design CFM	Final Velocity	Final CFM
Outlet-01	1st Floor	24/24	Hood	Hood	450	Hood	90
Outlet-02	1st Floor	24/24	Hood	Hood	450	Hood	100
Outlet-03	1st Floor	8/8	Hood	Hood	80	Hood	40
Totals:	-	-	-	-	980	-	230



PROJECT: PLAINFIELD LIBRARY
 LOCATION:
 PROJECT #: 7390

DATE: 4/25/2017
 CONTACT: Brian Benson

SYSTEM/UNIT: RTU-01/VAV-10

Tested By: Brian Benson
 Date: 4/10/2017

Air Test Data	
Full Open CFM	490 CFM
Full Open Sensor	465
Primary Max Design CFM	1700 CFM
Primary Min Design CFM	325 CFM
Primary Min Actual CFM	400 CFM

RTU-01/VAV-10 GRD - Supply Outlet Summary

System/Unit	Area Served	Size	AK Factor	Design Velocity	Design CFM	Final Velocity	Final CFM
Outlet-01	1st Floor	48/4	Hood	Hood	175	Hood	70
Outlet-02	1st Floor	48/4	Hood	Hood	175	Hood	60
Outlet-03	1st Floor	48/4	Hood	Hood	175	Hood	60
Outlet-04	1st Floor	48/4	Hood	Hood	175	Hood	70
Outlet-05	1st Floor	48/4	Hood	Hood	175	Hood	50
Outlet-06	1st Floor	48/4	Hood	Hood	175	Hood	60
Outlet-07	1st Floor	48/4	Hood	Hood	175	Hood	60
Outlet-08	1st Floor	48/4	Hood	Hood	175	Hood	60
Totals:	-	-	-	-	1400	-	490

SYSTEM/UNIT: RTU-02

Motor Adjustment	
RTU-02/Fan Sections	
Centerline	15-1/2 in.
In	1-1/2 in.
Out	2-1/2 in.

Drive System	
RTU-02/Fan Sections	
Drive Type	BELT
Fan Pulley	1B5V124
Fan Bushing Size	1-15/16
Motor Sheave	1VP65
Motor Bushing Size	1-18
Belt Size	BX58
Number of Belts	1



PROJECT: PLAINFIELD LIBRARY
LOCATION:
PROJECT #: 7390

DATE: 4/25/2017
CONTACT: Brian Benson

SYSTEM/UNIT: RTU-02/VAV-01

Tested By: Brian Benson
Date: 4/10/2017

Air Test Data	
Full Open CFM	230 CFM
Full Open Sensor	220
Primary Max Design CFM	660 CFM
Primary Min Design CFM	145 CFM
Primary Min Actual CFM	145 CFM

RTU-02/VAV-01 GRD - Supply Outlet Summary

System/Unit	Area Served	Size	AK Factor	Design Velocity	Design CFM	Final Velocity	Final CFM
Outlet-01	1st Floor	12/6	Hood	Hood	220	Hood	80
Outlet-02	1st Floor	12/6	Hood	Hood	220	Hood	80
Outlet-03	1st Floor	12/6	Hood	Hood	220	Hood	70
Totals:	-	-	-	-	660	-	230

SYSTEM/UNIT: RTU-02/VAV-02

Tested By: Brian Benson
Date: 4/10/2017

Air Test Data	
Full Open CFM	190 CFM
Full Open Sensor	177
Primary Max Design CFM	800 CFM
Primary Min Design CFM	230 CFM
Primary Min Actual CFM	50 CFM

RTU-02/VAV-02 GRD - Supply Outlet Summary

System/Unit	Area Served	Size	AK Factor	Design Velocity	Design CFM	Final Velocity	Final CFM
Outlet-01	1st Floor	18/6	Hood	Hood	400	Hood	100
Outlet-02	1st Floor	18/6	Hood	Hood	400	Hood	90
Totals:	-	-	-	-	800	-	190



PROJECT: PLAINFIELD LIBRARY
LOCATION:
PROJECT #: 7390

DATE: 4/25/2017
CONTACT: Brian Benson

SYSTEM/UNIT: RTU-02/VAV-03

Tested By: Brian Benson
Date: 4/10/2017

Air Test Data	
Full Open CFM	310 CFM
Full Open Sensor	325
Primary Max Design CFM	1600 CFM
Primary Min Design CFM	325 CFM
Primary Min Actual CFM	325 CFM

RTU-02/VAV-03 GRD - Supply Outlet Summary

System/Unit	Area Served	Size	AK Factor	Design Velocity	Design CFM	Final Velocity	Final CFM
Outlet-01	1st Floor	18/6	Hood	Hood	320	Hood	60
Outlet-02	1st Floor	18/6	Hood	Hood	320	Hood	50
Outlet-03	1st Floor	18/6	Hood	Hood	320	Hood	70
Outlet-04	1st Floor	18/6	Hood	Hood	320	Hood	70
Outlet-05	1st Floor	18/6	Hood	Hood	320	Hood	60
Totals:	-	-	-	-	1600	-	310

SYSTEM/UNIT: RTU-02/VAV-04

Tested By: Brian Benson
Date: 4/10/2017

Air Test Data	
Full Open CFM	150 CFM
Full Open Sensor	145
Primary Max Design CFM	740 CFM
Primary Min Design CFM	145 CFM
Primary Min Actual CFM	145 CFM

RTU-02/VAV-04 GRD - Supply Outlet Summary

System/Unit	Area Served	Size	AK Factor	Design Velocity	Design CFM	Final Velocity	Final CFM
Outlet-01	1st Floor	48/4	Hood	Hood	185	Hood	40
Outlet-02	1st Floor	48/4	Hood	Hood	185	Hood	40
Outlet-03	1st Floor	48/4	Hood	Hood	185	Hood	40
Outlet-04	1st Floor	48/4	Hood	Hood	185	Hood	30
Totals:	-	-	-	-	740	-	150



PROJECT: PLAINFIELD LIBRARY
LOCATION:
PROJECT #: 7390

DATE: 4/25/2017
CONTACT: Brian Benson

SYSTEM/UNIT: RTU-02/VAV-05

Tested By: Brian Benson
Date: 4/10/2017

Air Test Data	
Full Open CFM	280 CFM
Full Open Sensor	270
Primary Max Design CFM	2050 CFM
Primary Min Design CFM	450 CFM
Primary Min Actual CFM	250 CFM

RTU-02/VAV-05 GRD - Supply Outlet Summary

System/Unit	Area Served	Size	AK Factor	Design Velocity	Design CFM	Final Velocity	Final CFM
Outlet-01	1st Floor	24/24	Hood	Hood	500	Hood	70
Outlet-02	1st Floor	24/24	Hood	Hood	525	Hood	60
Outlet-03	1st Floor	24/24	Hood	Hood	500	Hood	80
Outlet-04	1st Floor	24/24	Hood	Hood	525	Hood	70
Totals:	-	-	-	-	2050	-	280

SYSTEM/UNIT: RTU-02/VAV-06

Tested By: Brian Benson
Date: 4/10/2017

Air Test Data	
Full Open CFM	150 CFM
Full Open Sensor	145
Primary Max Design CFM	450 CFM
Primary Min Design CFM	145 CFM
Primary Min Actual CFM	145 CFM

RTU-02/VAV-06 GRD - Supply Outlet Summary

System/Unit	Area Served	Size	AK Factor	Design Velocity	Design CFM	Final Velocity	Final CFM
Outlet-01	1st Floor	24/24	Hood	Hood	170	Hood	60
Outlet-02	1st Floor	24/24	Hood	Hood	280	Hood	90
Totals:	-	-	-	-	450	-	150



PROJECT: PLAINFIELD LIBRARY
LOCATION:
PROJECT #: 7390

DATE: 4/25/2017
CONTACT: Brian Benson

SYSTEM/UNIT: RTU-02/VAV-07

Tested By: Brian Benson
Date: 4/10/2017

Air Test Data	
Full Open CFM	405 CFM
Full Open Sensor	450
Primary Max Design CFM	1860 CFM
Primary Min Design CFM	450 CFM
Primary Min Actual CFM	450 CFM

RTU-02/VAV-07 GRD - Supply Outlet Summary

System/Unit	Area Served	Size	AK Factor	Design Velocity	Design CFM	Final Velocity	Final CFM
Outlet-01	1st Floor	48/4	Hood	Hood	400	Hood	105
Outlet-02	1st Floor	96/4	Hood	Hood	600	Hood	135
Outlet-03	1st Floor	48/4	Hood	Hood	400	Hood	95
Outlet-04	1st Floor	24/24	Hood	Hood	230	Hood	40
Outlet-05	1st Floor	24/24	Hood	Hood	230	Hood	30
Totals:	-	-	-	-	1860	-	405

SYSTEM/UNIT: RTU-02/VAV-08

Tested By: Brian Benson
Date: 4/10/2017

Air Test Data	
Full Open CFM	220 CFM
Full Open Sensor	225
Primary Max Design CFM	975 CFM
Primary Min Design CFM	230 CFM
Primary Min Actual CFM	225 CFM

RTU-02/VAV-08 GRD - Supply Outlet Summary

System/Unit	Area Served	Size	AK Factor	Design Velocity	Design CFM	Final Velocity	Final CFM
Outlet-01	1st Floor	24/24	Hood	Hood	325	Hood	80
Outlet-02	1st Floor	24/24	Hood	Hood	325	Hood	70
Outlet-03	1st Floor	24/24	Hood	Hood	325	Hood	70
Totals:	-	-	-	-	975	-	220



PROJECT: PLAINFIELD LIBRARY
LOCATION:
PROJECT #: 7390

DATE: 4/25/2017
CONTACT: Brian Benson

SYSTEM/UNIT: RTU-02/VAV-09

Tested By: Brian Benson
Date: 4/10/2017

Air Test Data	
Full Open CFM	220 CFM
Full Open Sensor	230
Primary Max Design CFM	960 CFM
Primary Min Design CFM	230 CFM
Primary Min Actual CFM	230 CFM

RTU-02/VAV-09 GRD - Supply Outlet Summary

System/Unit	Area Served	Size	AK Factor	Design Velocity	Design CFM	Final Velocity	Final CFM
Outlet-01	1st Floor	24/24	Hood	Hood	240	Hood	60
Outlet-02	1st Floor	24/24	Hood	Hood	240	Hood	50
Outlet-03	1st Floor	24/24	Hood	Hood	240	Hood	50
Outlet-04	1st Floor	24/24	Hood	Hood	240	Hood	40
Outlet-05	1st Floor	24/24	Hood	Hood	140	Hood	20
Totals:	-	-	-	-	1100	-	220

SYSTEM/UNIT: RTU-02/VAV-10

Tested By: Brian Benson
Date: 4/10/2017

Air Test Data	
Full Open CFM	120 CFM
Full Open Sensor	130
Primary Max Design CFM	680 CFM
Primary Min Design CFM	230 CFM
Primary Min Actual CFM	130 CFM

RTU-02/VAV-10 GRD - Supply Outlet Summary

System/Unit	Area Served	Size	AK Factor	Design Velocity	Design CFM	Final Velocity	Final CFM
Outlet-01	1st Floor	24/24	Hood	Hood	300	Hood	50
Outlet-02	1st Floor	24/24	Hood	Hood	300	Hood	40
Outlet-03	1st Floor	24/24	Hood	Hood	80	Hood	30
Totals:	-	-	-	-	680	-	120



PROJECT: PLAINFIELD LIBRARY
LOCATION:
PROJECT #: 7390

DATE: 4/25/2017
CONTACT: Brian Benson

SYSTEM/UNIT: RTU-02/VAV-11

Tested By: Brian Benson
Date: 4/10/2017

Air Test Data	
Full Open CFM	125 CFM
Full Open Sensor	125
Primary Max Design CFM	325 CFM
Primary Min Design CFM	80 CFM
Primary Min Actual CFM	125 CFM

RTU-02/VAV-11 GRD - Supply Outlet Summary

System/Unit	Area Served	Size	AK Factor	Design Velocity	Design CFM	Final Velocity	Final CFM
Outlet-01	1st Floor	24/24	Hood	Hood	325	Hood	125
Totals:	-	-	-	-	325	-	125

SYSTEM/UNIT: RTU-03

Tested By: Brian Benson
Date:

Motor Adjustment	
RTU-03/Fan Sections	
Centerline	15-1/2 in.
In	1-1/2 in.
Out	2-1/2 in.

Drive System	
RTU-03/Fan Sections	
Drive Type	BELT
Fan Pulley	1B5V124
Fan Bushing Size	1-15/16
Motor Sheave	1VP65
Motor Bushing Size	1-18
Belt Size	BX58
Number of Belts	1



PROJECT: PLAINFIELD LIBRARY
LOCATION:
PROJECT #: 7390

DATE: 4/25/2017
CONTACT: Brian Benson

SYSTEM/UNIT: RTU-03/VAV-01

Tested By: Brian Benson
Date: 4/10/2017

Air Test Data	
Full Open CFM	150 CFM
Full Open Sensor	150
Primary Max Design CFM	2660 CFM
Primary Min Design CFM	580 CFM
Primary Min Actual CFM	150 CFM

RTU-03/VAV-01 GRD - Supply Outlet Summary

System/Unit	Area Served	Size	AK Factor	Design Velocity	Design CFM	Final Velocity	Final CFM
Outlet-01	LL	24/24	Hood	Hood	665	Hood	40
Outlet-02	LL	24/24	Hood	Hood	665	Hood	40
Outlet-03	LL	24/24	Hood	Hood	665	Hood	40
Outlet-04	LL	24/24	Hood	Hood	665	Hood	30
Totals:	-	-	-	-	2660	-	150

SYSTEM/UNIT: RTU-03/VAV-02

Tested By: Brian Benson
Date: 4/10/2017

Air Test Data	
Full Open CFM	0 CFM
Full Open Sensor	10
Primary Max Design CFM	1200 CFM
Primary Min Design CFM	230 CFM
Primary Min Actual CFM	10 CFM

RTU-03/VAV-02 GRD - Supply Outlet Summary

System/Unit	Area Served	Size	AK Factor	Design Velocity	Design CFM	Final Velocity	Final CFM
Outlet-01	LL	24/24	Hood	Hood	400	Hood	0
Outlet-02	LL	24/24	Hood	Hood	400	Hood	0
Outlet-03	LL	24/24	Hood	Hood	400	Hood	0
Totals:	-	-	-	-	1200	-	0



PROJECT: PLAINFIELD LIBRARY
LOCATION:
PROJECT #: 7390

DATE: 4/25/2017
CONTACT: Brian Benson

SYSTEM/UNIT: RTU-03/VAV-03

Tested By: Brian Benson
Date: 4/10/2017

Air Test Data	
Full Open CFM	90 CFM
Full Open Sensor	85
Primary Max Design CFM	360 CFM
Primary Min Design CFM	80 CFM
Primary Min Actual CFM	80 CFM

RTU-03/VAV-03 GRD - Supply Outlet Summary

System/Unit	Area Served	Size	AK Factor	Design Velocity	Design CFM	Final Velocity	Final CFM
Outlet-01	LL	24/24	Hood	Hood	180	Hood	50
Outlet-02	LL	24/24	Hood	Hood	180	Hood	40
Totals:	-	-	-	-	360	-	90

SYSTEM/UNIT: RTU-03/VAV-04

Tested By: Brian Benson
Date: 4/10/2017

Air Test Data	
Full Open CFM	80 CFM
Full Open Sensor	77
Primary Max Design CFM	215 CFM
Primary Min Design CFM	45 CFM
Primary Min Actual CFM	45 CFM

RTU-03/VAV-04 GRD - Supply Outlet Summary

System/Unit	Area Served	Size	AK Factor	Design Velocity	Design CFM	Final Velocity	Final CFM
Outlet-01	LL	24/24	Hood	Hood	110	Hood	40
Outlet-02	LL	24/24	Hood	Hood	105	Hood	40
Totals:	-	-	-	-	215	-	80



PROJECT: PLAINFIELD LIBRARY
LOCATION:
PROJECT #: 7390

DATE: 4/25/2017
CONTACT: Brian Benson

SYSTEM/UNIT: RTU-03/VAV-05

Tested By: Brian Benson
Date: 4/10/2017

Air Test Data	
Full Open CFM	70 CFM
Full Open Sensor	60
Primary Max Design CFM	225 CFM
Primary Min Design CFM	45 CFM
Primary Min Actual CFM	60 CFM

RTU-03/VAV-05 GRD - Supply Outlet Summary

System/Unit	Area Served	Size	AK Factor	Design Velocity	Design CFM	Final Velocity	Final CFM
Outlet-01	LL	24/24	Hood	Hood	225	Hood	70
Totals:	-	-	-	-	225	-	70

SYSTEM/UNIT: RTU-03/VAV-06

Tested By: Brian Benson
Date: 4/10/2017

Air Test Data	
Full Open CFM	240 CFM
Full Open Sensor	230
Primary Max Design CFM	1125 CFM
Primary Min Design CFM	230 CFM
Primary Min Actual CFM	230 CFM

RTU-03/VAV-06 GRD - Supply Outlet Summary

System/Unit	Area Served	Size	AK Factor	Design Velocity	Design CFM	Final Velocity	Final CFM
Outlet-01	LL	24/24	Hood	Hood	375	Hood	80
Outlet-02	LL	24/24	Hood	Hood	375	Hood	80
Outlet-03	LL	24/24	Hood	Hood	375	Hood	80
Totals:	-	-	-	-	1125	-	240



PROJECT: PLAINFIELD LIBRARY
LOCATION:
PROJECT #: 7390

DATE: 4/25/2017
CONTACT: Brian Benson

SYSTEM/UNIT: RTU-03/VAV-07

Tested By: Brian Benson
Date: 4/10/2017

Air Test Data	
Full Open CFM	0 CFM
Full Open Sensor	10
Primary Max Design CFM	420 CFM
Primary Min Design CFM	145 CFM
Primary Min Actual CFM	10 CFM

RTU-03/VAV-07 GRD - Supply Outlet Summary

System/Unit	Area Served	Size	AK Factor	Design Velocity	Design CFM	Final Velocity	Final CFM
Outlet-01	LL	24/24	Hood	Hood	250	Hood	0
Outlet-02	LL	24/24	Hood	Hood	170	Hood	0
Totals:	-	-	-	-	420	-	0

SYSTEM/UNIT: RTU-03/VAV-08

Tested By: Brian Benson
Date: 4/10/2017

Air Test Data	
Full Open CFM	40 CFM
Full Open Sensor	50
Primary Max Design CFM	300 CFM
Primary Min Design CFM	80 CFM
Primary Min Actual CFM	10 CFM

RTU-03/VAV-08 GRD - Supply Outlet Summary

System/Unit	Area Served	Size	AK Factor	Design Velocity	Design CFM	Final Velocity	Final CFM
Outlet-01	LL	24/24	Hood	Hood	150	Hood	20
Outlet-02	LL	24/24	Hood	Hood	150	Hood	20
Totals:	-	-	-	-	300	-	40



PROJECT: PLAINFIELD LIBRARY
LOCATION:
PROJECT #: 7390

DATE: 4/25/2017
CONTACT: Brian Benson

SYSTEM/UNIT: RTU-03/VAV-09

Tested By: Brian Benson
Date: 4/10/2017

Air Test Data	
Full Open CFM	80 CFM
Full Open Sensor	75
Primary Max Design CFM	650 CFM
Primary Min Design CFM	145 CFM
Primary Min Actual CFM	75 CFM

RTU-03/VAV-09 GRD - Supply Outlet Summary

System/Unit	Area Served	Size	AK Factor	Design Velocity	Design CFM	Final Velocity	Final CFM
Outlet-01	LL	24/24	Hood	Hood	225	Hood	30
Outlet-02	LL	24/24	Hood	Hood	225	Hood	30
Outlet-03	LL	24/24	Hood	Hood	200	Hood	20
Totals:	-	-	-	-	650	-	80

SYSTEM/UNIT: RTU-04

Tested By: Brian Benson
Date:

Motor Adjustment	
RTU-04/Fan Sections	
Centerline	15-1/2 in.
In	1-1/2 in.
Out	2-1/2 in.

Drive System	
RTU-04/Fan Sections	
Drive Type	BELT
Fan Pulley	1B5V124
Fan Bushing Size	1-15/16
Motor Sheave	1VP65
Motor Bushing Size	1-18
Belt Size	BX58
Number of Belts	1



PROJECT: PLAINFIELD LIBRARY
LOCATION:
PROJECT #: 7390

DATE: 4/25/2017
CONTACT: Brian Benson

SYSTEM/UNIT: RTU-04/VAV-01

Tested By: Brian Benson
Date: 4/10/2017

Air Test Data	
Full Open CFM	1165 CFM
Full Open Sensor	1200
Primary Max Design CFM	1200 CFM
Primary Min Design CFM	230 CFM
Primary Min Actual CFM	230 CFM

RTU-04/VAV-01 GRD - Supply Outlet Summary

System/Unit	Area Served	Size	AK Factor	Design Velocity	Design CFM	Final Velocity	Final CFM
Outlet-01	LL	24/24	Hood	Hood	300	Hood	280
Outlet-02	LL	24/24	Hood	Hood	300	Hood	305
Outlet-03	LL	24/24	Hood	Hood	300	Hood	290
Outlet-04	LL	24/24	Hood	Hood	300	Hood	290
Totals:	-	-	-	-	1200	-	1165

SYSTEM/UNIT: RTU-04/VAV-02

Tested By: Brian Benson
Date: 4/10/2017

Air Test Data	
Full Open CFM	260 CFM
Full Open Sensor	282
Primary Max Design CFM	1200 CFM
Primary Min Design CFM	230 CFM
Primary Min Actual CFM	230 CFM

RTU-04/VAV-02 GRD - Supply Outlet Summary

System/Unit	Area Served	Size	AK Factor	Design Velocity	Design CFM	Final Velocity	Final CFM
Outlet-01	LL	24/24	Hood	Hood	300	Hood	70
Outlet-02	LL	24/24	Hood	Hood	300	Hood	70
Outlet-03	LL	24/24	Hood	Hood	300	Hood	70
Outlet-04	LL	24/24	Hood	Hood	300	Hood	50
Totals:	-	-	-	-	1200	-	260



PROJECT: PLAINFIELD LIBRARY
LOCATION:
PROJECT #: 7390

DATE: 4/25/2017
CONTACT: Brian Benson

SYSTEM/UNIT: RTU-04/VAV-03

Tested By: Brian Benson
Date: 4/10/2017

Air Test Data	
Full Open CFM	420 CFM
Full Open Sensor	450
Primary Max Design CFM	2100 CFM
Primary Min Design CFM	450 CFM
Primary Min Actual CFM	450 CFM

RTU-04/VAV-03 GRD - Supply Outlet Summary

System/Unit	Area Served	Size	AK Factor	Design Velocity	Design CFM	Final Velocity	Final CFM
Outlet-01	LL	24/24	Hood	Hood	200	Hood	60
Outlet-02	LL	24/24	Hood	Hood	200	Hood	40
Outlet-03	LL	24/24	Hood	Hood	200	Hood	40
Outlet-04	LL	24/24	Hood	Hood	200	Hood	30
Outlet-05	LL	24/24	Hood	Hood	200	Hood	50
Outlet-06	LL	24/24	Hood	Hood	275	Hood	50
Outlet-07	LL	24/24	Hood	Hood	275	Hood	40
Outlet-08	LL	24/24	Hood	Hood	275	Hood	60
Outlet-09	LL	24/24	Hood	Hood	275	Hood	50
Totals:	-	-	-	-	2100	-	420

SYSTEM/UNIT: RTU-04/VAV-04

Tested By: Brian Benson
Date: 4/10/2017

Air Test Data	
Full Open CFM	100 CFM
Full Open Sensor	100
Primary Max Design CFM	350 CFM
Primary Min Design CFM	80 CFM
Primary Min Actual CFM	100 CFM

RTU-04/VAV-04 GRD - Supply Outlet Summary

System/Unit	Area Served	Size	AK Factor	Design Velocity	Design CFM	Final Velocity	Final CFM
Outlet-01	LL	12/6	Hood	Hood	175	Hood	40
Outlet-02	LL	12/6	Hood	Hood	175	Hood	60
Totals:	-	-	-	-	350	-	100



PROJECT: PLAINFIELD LIBRARY
LOCATION: 1
PROJECT #: 7390

DATE: 4/25/2017
CONTACT: Brian Benson

SYSTEM/UNIT: RTU-04/VAV-05

Tested By: Brian Benson
Date: 4/10/2017

Air Test Data	
Full Open CFM	280 CFM
Full Open Sensor	275
Primary Max Design CFM	1100 CFM
Primary Min Design CFM	230 CFM
Primary Min Actual CFM	230 CFM

RTU-04/VAV-05 GRD - Supply Outlet Summary

System/Unit	Area Served	Size	AK Factor	Design Velocity	Design CFM	Final Velocity	Final CFM
Outlet-01	LL	24/24	Hood	Hood	285	Hood	80
Outlet-02	LL	24/24	Hood	Hood	275	Hood	70
Outlet-03	LL	24/24	Hood	Hood	275	Hood	60
Outlet-04	LL	24/24	Hood	Hood	275	Hood	70
Totals:	-	-	-	-	1110	-	280

SYSTEM/UNIT: RTU-04/VAV-06

Tested By: Brian Benson
Date: 4/10/2017

Air Test Data	
Full Open CFM	70 CFM
Full Open Sensor	65
Primary Max Design CFM	175 CFM
Primary Min Design CFM	80 CFM
Primary Min Actual CFM	65 CFM

RTU-04/VAV-06 GRD - Supply Outlet Summary

System/Unit	Area Served	Size	AK Factor	Design Velocity	Design CFM	Final Velocity	Final CFM
Outlet-01	LL	12/6	Hood	Hood	175	Hood	70
Totals:	-	-	-	-	175	-	70



PROJECT: PLAINFIELD LIBRARY
LOCATION:
PROJECT #: 7390

DATE: 4/25/2017
CONTACT: Brian Benson

SYSTEM/UNIT: RTU-04/VAV-07

Tested By: Brian Benson
Date: 4/10/2017

Air Test Data	
Full Open CFM	230 CFM
Full Open Sensor	230
Primary Max Design CFM	1000 CFM
Primary Min Design CFM	230 CFM
Primary Min Actual CFM	230 CFM

RTU-04/VAV-07 GRD - Supply Outlet Summary

System/Unit	Area Served	Size	AK Factor	Design Velocity	Design CFM	Final Velocity	Final CFM
Outlet-01	LL	24/24	Hood	Hood	250	Hood	70
Outlet-02	LL	24/24	Hood	Hood	250	Hood	50
Outlet-03	LL	24/24	Hood	Hood	250	Hood	50
Outlet-04	LL	24/24	Hood	Hood	250	Hood	60
Totals:	-	-	-	-	1000	-	230

SYSTEM/UNIT: RTU-04/VAV-08

Tested By: Brian Benson
Date: 4/10/2017

Air Test Data	
Primary Max Design CFM	175 CFM
Primary Min Design CFM	80 CFM
Primary Min Actual CFM	60 CFM

RTU-04/VAV-08 GRD - Supply Outlet Summary

System/Unit	Area Served	Size	AK Factor	Design Velocity	Design CFM	Final Velocity	Final CFM
Outlet-01	LL	24/24	Hood	Hood	175	Hood	60
Totals:	-	-	-	-	175	-	60



PROJECT: PLAINFIELD LIBRARY
LOCATION:
PROJECT #: 7390

DATE: 4/25/2017
CONTACT: Brian Benson

SYSTEM/UNIT: RTU-04/VAV-09

Tested By: Brian Benson
Date: 4/10/2017

Air Test Data	
Full Open CFM	260 CFM
Full Open Sensor	250
Primary Max Design CFM	475 CFM
Primary Min Design CFM	80 CFM
Primary Min Actual CFM	250 CFM

RTU-04/VAV-09 GRD - Supply Outlet Summary

System/Unit	Area Served	Size	AK Factor	Design Velocity	Design CFM	Final Velocity	Final CFM
Outlet-01	LL	8/8	Hood	Hood	150	Hood	90
Outlet-02	LL	8/8	Hood	Hood	150	Hood	80
Outlet-03	LL	24/24	Hood	Hood	175	Hood	90
Totals:	-	-	-	-	475	-	260

Appendix 3 – Mechanical Equipment Reports

The following pages include the detailed reports for the equipment surveyed. Each report contains information taken from nameplates, visual inspections of mechanical and electrical components, startup, and functional performance testing through the BAS.



PROJECT: Plainfield Library
LOCATION: Plainfield, IL
PROJECT #: 201729

DATE: 4/19/2017
CONTACT: Ron Gordon
AUTHOR:

SYSTEM/UNIT: RTU-01

Tested By: Ron Gordon
 Date: 3/30/2017

General Unit Information	
Manufacturer	Carrier
Model number	48A35030-P-52AGS
Serial number	4812U52618
Location	Roof SW
Area served	LL
O/A damper position (min)	1%

Pre-Functional Checks - RTU-01

Verification		Response	Notes	By	Date/Time
1	Casing condition good: no dents, leaks, door gaskets installed	Yes			3/29/17 9:54
2	Access doors close tightly	Yes			3/29/17 9:54
3	Equipment clean and protected	Yes			3/29/17 9:54
4	Equipment tag attached to the unit	Yes			3/29/17 9:54
5	Maintenance access acceptable for unit and components	Yes			3/29/17 9:54
6	Final duct connection to unit complete	Yes			3/29/17 9:54
7	Final piping connection to unit complete	Yes			3/29/17 9:54
8	Vibration isolation equipment installed & released from shipping locks	Yes			3/29/17 9:54
9	Instrumentation installed according to specification	Yes			3/29/17 9:54
10	Insulation properly installed and according to specification	Yes			3/29/17 9:54

Electrical & Controls - RTU-01

Verification		Response	Notes	By	Date/Time
1	Disconnect switch installed	Yes			3/29/17 9:54
2	Proper grounding installed for components and unit	Yes			3/29/17 9:54
3	Starter overload breakers installed and correct size	Yes			3/29/17 9:54
4	All control devices, pneumatic tubing and wiring complete and functional	Yes			3/29/17 9:54



PROJECT: Plainfield Library
LOCATION: Plainfield, IL
PROJECT #: 201729

DATE: 4/19/2017
CONTACT: Ron Gordon
AUTHOR:

SYSTEM/UNIT: RTU-01

Tested By: Ron Gordon
 Date: 3/30/2017

- RTU-01

Verification		Response	Notes	By	Date/Time
1	Building Pressure STPT.	0.02" w.c.			3/28/17 13:20
2	Cooling Occ. STPT.	79 deg F			3/28/17 13:01
3	Cooling Unocc. STPT	85 deg F			3/28/17 13:02
4	Current Schedule - Mon. thru Thurs. 6am-9pm, Fri. thru Sat. 6am-6pm, Sun. 10:30am-6pm.	Yes			3/28/17 13:16
5	Duct Static STPT.	1" w.c.			3/28/17 13:20
6	Heat-Cool Gap	2 deg F			3/28/17 13:02
7	Heating Occ. STPT.	74 deg F			3/28/17 13:03
8	Heating Unocc. STPT.	55 deg F			3/28/17 13:03
9	Supply Air STPT.	55 deg F			3/28/17 13:06
10	The avg. Occ. heating STPT. from the zones + 2.5 deg. F = Current cooling enable STPT. If the avg. temp does not get above this value, the unit will run in vent mode with the economizer at minimum position until the value is reached. The avg. Occ. cooling STPT. is not used for enabling cooling, it's only based on the avg. Occ. heating STPT. The cooling enables when the avg. space temp. from the zones gets above the STPT.	No - stays in Vent mode			3/28/17 13:08



PROJECT: Plainfield Library
 LOCATION: Plainfield, IL
 PROJECT #: 201729

DATE: 4/19/2017
 CONTACT: Ron Gordon
 AUTHOR:

SYSTEM/UNIT: RTU-01/Condensing Unit

Tested By: Ron Gordon
 Date: 3/29/2017

General Unit Information	
Manufacturer	Carrier Package
Refrigerant type	410A
Air or water cooled	Air

Motor Nameplate Information	
Manufacturer	Copeland
Full load amps	(4) @ 23.2
Volts	208/230

Pre-Functional Checks - RTU-01/Condensing Unit

Verification	Response	Notes	By	Date/Time
1 Unit free of damage	Yes			3/29/17 9:55
2 Crankcase heater energized	Not working			3/29/17 9:56
3 Equipment tag attached to the unit	Yes			3/29/17 9:55
4 Coils clean and fins in good condition	Yes			3/29/17 9:55
5 Access to unit acceptable	Yes			3/29/17 9:55
6 No visible leaks	Yes			3/29/17 9:55
7 Hail guards installed	Yes			3/29/17 9:55
8 Relief valve installed	Yes			3/29/17 9:55

Electrical & Controls - RTU-01/Condensing Unit

Verification	Response	Notes	By	Date/Time
1 Disconnect switch installed	Yes			3/29/17 9:55
2 Starter overload breakers in place and operable	Yes			3/29/17 9:55
3 Control system interlocks functional	Yes			3/29/17 9:55

Start Up - RTU-01/Condensing Unit

Verification	Response	Notes	By	Date/Time
1 Fan rotation correct	Yes			3/29/17 9:55
2 Condenser and AHU interlocks functional	Yes			3/29/17 9:55
3 Total refrigerant charge (lbs)	(2) 30.5 (2) 34.3			3/29/17 9:58
4 Volts AB	214			3/29/17 9:58
5 Volts BC	214			3/29/17 9:58
6 Volts AC	215			3/29/17 9:58
7 Condenser fan quantity	2			3/29/17 9:55
8 Condenser fan amps	(6.5) 6.3 avg.			3/29/17 9:58
9 Compressor #1 amps	(23.2) 14.2 avg.			3/29/17 9:58
10 Compressor #2 amps	(23.2) 13.2 avg.			3/29/17 9:58
11 Compressor #3 amps	(23.2) 14.5 avg.			3/29/17 9:58
12 Compressor #4 amps	(23.2) L3 wires burnt			3/29/17 10:07



PROJECT: Plainfield Library
 LOCATION: Plainfield, IL
 PROJECT #: 201729

DATE: 4/19/2017
 CONTACT: Ron Gordon
 AUTHOR:

SYSTEM/UNIT: RTU-01/Power Exhaust

Tested By: Ron Gordon
 Date: 3/29/2017

General Unit Information	
Fan type	Centrifugal

Motor Nameplate Information	
Manufacturer	Genteq
Model number	4- Fans
Horsepower	1
Full load amps	5.9
Service factor	1.15
Volts	208
RPM	1725

Drive System	
Drive type	Direct

Pre-Functional Checks - RTU-01/Power Exhaust

Verification		Response	Notes	By	Date/Time
1	Fan and motor aligned	Yes			3/29/17 10:02
2	Fan protective shrouds for belts in place and secure	Yes			3/29/17 10:02
3	Fan area clean	Yes			3/29/17 10:02
4	Fan spins freely	Yes			3/29/17 10:02

Start Up - RTU-01/Power Exhaust

Verification		Response	Notes	By	Date/Time
1	Amps T1	3.6 avg. each			3/29/17 10:03
2	Volts AB	214 volts			3/29/17 10:02
3	No unusual noise or vibration	Yes			3/29/17 10:02
4	Rotation correct	Yes			3/29/17 10:02



PROJECT: Plainfield Library
 LOCATION: Plainfield, IL
 PROJECT #: 201729

DATE: 4/19/2017
 CONTACT: Ron Gordon
 AUTHOR:

SYSTEM/UNIT: RTU-01/Supply Fan

Tested By: Ron Gordon
 Date: 3/29/2017

General Unit Information	
Fan type	Centrifugal

Motor Nameplate Information	
Manufacturer	Century
Model number	E-Plus 3
Horsepower	15
Full load amps	37.8
Service factor	1.15
Volts	230/460
RPM	1770
Efficiency	89.5
Frame size	S254T
Power factor	76
Enclosure	DP

Drive System	
Drive type	Belt
Belt size	B-62
Belt qty	2

Starter Data	
Starter manufacturer	VFD

Pre-Functional Checks - RTU-01/Supply Fan

Verification	Response	Notes	By	Date/Time
1 Fan and motor aligned	Yes			3/29/17 9:58
2 Fan belt tension & condition good	Yes			3/29/17 9:58
3 Fan area clean	Yes			3/29/17 9:58
4 Fan and motor lubed	Yes			3/29/17 9:58
5 Fan spins freely	Yes			3/29/17 9:58

Start Up - RTU-01/Supply Fan

Verification	Response	Notes	By	Date/Time
1 Amps T1	26			3/29/17 10:01
2 Amps T2	25			3/29/17 10:01
3 Amps T3	27			3/29/17 10:01
4 Volts AB	214			3/29/17 10:01
5 Volts BC	215			3/29/17 10:01
6 Volts AC	214			3/29/17 10:01
7 No unusual noise or vibration	Yes			3/29/17 9:58
8 Rotation correct	Yes			3/29/17 9:58



PROJECT: Plainfield Library
LOCATION: Plainfield, IL
PROJECT #: 201729

DATE: 4/19/2017
CONTACT: Ron Gordon
AUTHOR:

SYSTEM/UNIT: RTU-01/Filter Section

Tested By: Ron Gordon
Date: 3/29/2017

General Unit Information	
Filters installed	Yes
Filter type S1	Pleated
Qty S1	9
Size S1	20 x 20 x 2
MERV rating S1	8
Filter type S2	Pleated
Qty S2	6
Size S2	20 x 25 x 2
MERV rating S2	8



PROJECT: Plainfield Library
LOCATION: Plainfield, IL
PROJECT #: 201729

DATE: 4/19/2017
CONTACT: Ron Gordon
AUTHOR:

SYSTEM/UNIT: RTU-01/Gas Heat

Tested By: Ron Gordon
 Date: 3/30/2017

General Unit Information	
Manufacturer	Carrier
Heating input	262500 min 350000 max
Heating output	283500
Max gas pressure	14" w.c.
Stages of heat	5

Motor Nameplate Information	
Manufacturer	2 Combustion Fans
Horsepower	1/10
Full load amps	1.1
Volts	115

Pre-Functional Checks - RTU-01/Gas Heat

Verification	Response	Notes	By	Date/Time
1 Gas piping complete and pipes properly supported	Yes			3/29/17 10:05
2 Gas shut off valve installed	Yes			3/29/17 10:05
3 Dirt leg installed	Yes			3/29/17 10:05
4 Vent or flue mounted and installed correctly	Yes			3/29/17 10:05
5 Ignition type	spark			3/29/17 10:05

Start Up - RTU-01/Gas Heat

Verification	Response	Notes	By	Date/Time
1 Amps T1	1			3/29/17 10:05
2 Volts AB	120			3/29/17 10:05



PROJECT: Plainfield Library
LOCATION: Plainfield, IL
PROJECT #: 201729

DATE: 4/19/2017
CONTACT: Ron Gordon
AUTHOR:

SYSTEM/UNIT: RTU-02

Tested By: Ron Gordon
 Date: 3/29/2017

General Unit Information	
Manufacturer	Carrier
Model number	48A35030-P-52AGS
Serial number	4812U52617
Location	Roof SE
Area served	LL
O/A damper position (min)	0%

Pre-Functional Checks - RTU-02

Verification		Response	Notes	By	Date/Time
1	Casing condition good: no dents, leaks, door gaskets installed	Yes			3/29/17 11:17
2	Access doors close tightly	Yes			3/29/17 11:17
3	Equipment clean and protected	Yes			3/29/17 11:17
4	Equipment tag attached to the unit	Yes			3/29/17 11:17
5	Maintenance access acceptable for unit and components	Yes			3/29/17 11:17
6	Final duct connection to unit complete	Yes			3/29/17 11:17
7	Final piping connection to unit complete	Yes			3/29/17 11:17
8	Vibration isolation equipment installed & released from shipping locks	Yes			3/29/17 11:17
9	Instrumentation installed according to specification	Yes			3/29/17 11:17
10	Insulation properly installed and according to specification	Yes			3/29/17 11:17

Electrical & Controls - RTU-02

Verification		Response	Notes	By	Date/Time
1	Disconnect switch installed	Yes			3/29/17 11:17
2	Proper grounding installed for components and unit	Yes			3/29/17 11:17
3	Starter overload breakers installed and correct size	Yes			3/29/17 11:17
4	All control devices, pneumatic tubing and wiring complete and functional	Yes			3/29/17 11:17



PROJECT: Plainfield Library
LOCATION: Plainfield, IL
PROJECT #: 201729

DATE: 4/19/2017
CONTACT: Ron Gordon
AUTHOR:

SYSTEM/UNIT: RTU-02

Tested By: Ron Gordon
 Date: 3/29/2017

- RTU-02

	Verification	Response	Notes	By	Date/Time
1	Building Pressure STPT.	0.05" w.c.			3/28/17 13:22
2	Cooling Occ. STPT.	70 deg F			3/28/17 13:26
3	Cooling Unocc. STPT	85 deg F			3/28/17 13:26
4	Current Schedule - Mon. thru Thurs. 6am-9pm, Fri. thru Sat. 6am-6pm, Sun. 10:30am-6pm.	Yes			3/28/17 13:39
5	Duct Static STPT.	1" w.c.			3/28/17 13:23
6	Heat-Cool Gap	2 deg F			3/28/17 13:26
7	Heating Occ. STPT.	68 deg F			3/28/17 13:26
8	Heating Unocc. STPT.	55 deg F			3/28/17 13:26
9	Supply Air STPT.	55 deg F			3/28/17 13:26
10	The avg. Occ. heating STPT. from the zones + 2.5 deg. F = Current cooling enable STPT. If the avg. temp does not get above this value, the unit will run in vent mode with the economizer at minimum position until the value is reached. The avg. Occ. cooling STPT. is not used for enabling cooling, it's only based on the avg. Occ. heating STPT. The cooling enables when the avg. space temp. from the zones gets above the STPT.	Yes - High Cool mode enables			3/28/17 13:25



PROJECT: Plainfield Library
 LOCATION: Plainfield, IL
 PROJECT #: 201729

DATE: 4/19/2017
 CONTACT: Ron Gordon
 AUTHOR:

SYSTEM/UNIT: RTU-02/Condensing Unit

Tested By: Ron Gordon
 Date: 3/29/2017

General Unit Information	
Manufacturer	Carrier Package
Refrigerant type	410A
Air or water cooled	Air

Motor Nameplate Information	
Manufacturer	Copeland
Full load amps	(4) @ 23.2
Volts	208/230

Pre-Functional Checks - RTU-02/Condensing Unit

Verification	Response	Notes	By	Date/Time
1 Unit free of damage	Yes			3/29/17 11:12
2 Crankcase heater energized	Not working on 2,3,4			3/29/17 11:13
3 Equipment tag attached to the unit	Yes			3/29/17 11:12
4 Coils clean and fins in good condition	Yes			3/29/17 11:12
5 Access to unit acceptable	Yes			3/29/17 11:12
6 No visible leaks	Yes			3/29/17 11:12
7 Hail guards installed	Yes			3/29/17 11:12
8 Relief valve installed	Yes			3/29/17 11:12

Electrical & Controls - RTU-02/Condensing Unit

Verification	Response	Notes	By	Date/Time
1 Disconnect switch installed	Yes			3/29/17 11:12
2 Starter overload breakers in place and operable	Yes			3/29/17 11:12
3 Control system interlocks functional	Yes			3/29/17 11:12

Start Up - RTU-02/Condensing Unit

Verification	Response	Notes	By	Date/Time
1 Fan rotation correct	Yes			3/29/17 11:12
2 Condenser and AHU interlocks functional	Yes			3/29/17 11:12
3 Total refrigerant charge (lbs)	(2) 30.5 (2) 34.3			3/29/17 11:12
4 Volts AB	214			3/29/17 11:12
5 Volts BC	214			3/29/17 11:12
6 Volts AC	213			3/29/17 11:13
7 Condenser fan quantity	2			3/29/17 11:12
8 Condenser fan amps	(6.5) 6.2 avg.			3/29/17 11:13
9 Compressor #1 amps	(23.2) 14.1 avg.			3/29/17 11:13
10 Compressor #2 amps	(23.2) 14.2 avg.			3/29/17 11:13
11 Compressor #3 amps	(23.2) 13.5 avg.			3/29/17 11:13
12 Compressor #4 amps	(23.2) 12.8 avg.			3/29/17 11:13



PROJECT: Plainfield Library
 LOCATION: Plainfield, IL
 PROJECT #: 201729

DATE: 4/19/2017
 CONTACT: Ron Gordon
 AUTHOR:

SYSTEM/UNIT: RTU-02/Power Exhaust

Tested By: Ron Gordon
 Date: 3/29/2017

General Unit Information	
Fan type	Centrifugal

Motor Nameplate Information	
Manufacturer	Genteq
Model number	4- Fans
Horsepower	1
Full load amps	5.9
Service factor	1.15
Volts	208
RPM	1725

Drive System	
Drive type	Direct

Pre-Functional Checks - RTU-02/Power Exhaust

Verification		Response	Notes	By	Date/Time
1	Fan and motor aligned	Yes			3/29/17 11:15
2	Fan protective shrouds for belts in place and secure	Yes			3/29/17 11:15
3	Fan area clean	Yes			3/29/17 11:15
4	Fan spins freely	Yes			3/29/17 11:15

Start Up - RTU-02/Power Exhaust

Verification		Response	Notes	By	Date/Time
1	Amps T1	3.1 avg. each			3/29/17 11:15
2	Volts AB	213 volts			3/29/17 11:15
3	No unusual noise or vibration	Yes			3/29/17 11:15
4	Rotation correct	Yes			3/29/17 11:15



PROJECT: Plainfield Library
 LOCATION: Plainfield, IL
 PROJECT #: 201729

DATE: 4/19/2017
 CONTACT: Ron Gordon
 AUTHOR:

SYSTEM/UNIT: RTU-02/Supply Fan

Tested By: Ron Gordon
 Date: 3/29/2017

General Unit Information	
Fan type	Centrifugal

Motor Nameplate Information	
Manufacturer	Century
Model number	E-Plus 3
Horsepower	15
Full load amps	37.8
Service factor	1.15
Volts	230/460
RPM	1770
Efficiency	89.5
Frame size	S254T
Power factor	76
Enclosure	DP

Drive System	
Drive type	Belt
Belt size	B-62
Belt qty	2

Starter Data	
Starter manufacturer	VFD

Pre-Functional Checks - RTU-02/Supply Fan

Verification	Response	Notes	By	Date/Time
1 Fan and motor aligned	Yes			3/29/17 11:14
2 Fan belt tension & condition good	Yes			3/29/17 11:14
3 Fan area clean	Yes			3/29/17 11:14
4 Fan and motor lubed	Yes			3/29/17 11:14
5 Fan spins freely	Yes			3/29/17 11:14

Start Up - RTU-02/Supply Fan

Verification	Response	Notes	By	Date/Time
1 Amps T1	22			3/29/17 11:14
2 Amps T2	23			3/29/17 11:14
3 Amps T3	21			3/29/17 11:14
4 Volts AB	214			3/29/17 11:14
5 Volts BC	213			3/29/17 11:14
6 Volts AC	214			3/29/17 11:14
7 No unusual noise or vibration	Yes			3/29/17 11:14
8 Rotation correct	Yes			3/29/17 11:14



PROJECT: Plainfield Library
LOCATION: Plainfield, IL
PROJECT #: 201729

DATE: 4/19/2017
CONTACT: Ron Gordon
AUTHOR:

SYSTEM/UNIT: RTU-02/Filter Section

Tested By: Ron Gordon
Date: 3/29/2017

General Unit Information	
Filters installed	Yes
Filter type S1	Pleated
Qty S1	9
Size S1	20 x 20 x 2
MERV rating S1	8
Filter type S2	Pleated
Qty S2	6
Size S2	20 x 25 x 2
MERV rating S2	8



PROJECT: Plainfield Library
LOCATION: Plainfield, IL
PROJECT #: 201729

DATE: 4/19/2017
CONTACT: Ron Gordon
AUTHOR:

SYSTEM/UNIT: RTU-02/Gas Heat

Tested By: Ron Gordon
 Date: 3/30/2017

General Unit Information	
Manufacturer	Carrier
Heating input	262500 min 350000 max
Heating output	283500
Max gas pressure	14" w.c.
Stages of heat	5

Motor Nameplate Information	
Manufacturer	2 Combustion Fans
Horsepower	1/10
Full load amps	1.1
Volts	115

Pre-Functional Checks - RTU-02/Gas Heat

Verification	Response	Notes	By	Date/Time
1 Gas piping complete and pipes properly supported	Yes			3/29/17 11:16
2 Gas shut off valve installed	Yes			3/29/17 11:16
3 Dirt leg installed	Yes			3/29/17 11:16
4 Vent or flue mounted and installed correctly	Yes			3/29/17 11:16
5 Ignition type	spark			3/29/17 11:16

Start Up - RTU-02/Gas Heat

Verification	Response	Notes	By	Date/Time
1 Amps T1	1			3/29/17 11:16
2 Volts AB	121			3/29/17 11:16



PROJECT: Plainfield Library
LOCATION: Plainfield, IL
PROJECT #: 201729

DATE: 4/19/2017
CONTACT: Ron Gordon
AUTHOR:

SYSTEM/UNIT: RTU-03

Tested By: Ron Gordon
 Date: 3/30/2017

General Unit Information	
Manufacturer	Carrier
Model number	48A35030-P-52AGS
Serial number	4812U52619
Location	Roof SE
Area served	LL
O/A damper position (min)	1%

Pre-Functional Checks - RTU-03

Verification		Response	Notes	By	Date/Time
1	Casing condition good: no dents, leaks, door gaskets installed	Yes			3/29/17 13:48
2	Access doors close tightly	Yes			3/29/17 13:48
3	Equipment clean and protected	Yes			3/29/17 13:48
4	Equipment tag attached to the unit	Yes			3/29/17 13:48
5	Maintenance access acceptable for unit and components	Yes			3/29/17 13:48
6	Final duct connection to unit complete	Yes			3/29/17 13:48
7	Final piping connection to unit complete	Yes			3/29/17 13:48
8	Vibration isolation equipment installed & released from shipping locks	Yes			3/29/17 13:48
9	Instrumentation installed according to specification	Yes			3/29/17 13:48
10	Insulation properly installed and according to specification	Yes			3/29/17 13:48

Electrical & Controls - RTU-03

Verification		Response	Notes	By	Date/Time
1	Disconnect switch installed	Yes			3/29/17 13:48
2	Proper grounding installed for components and unit	Yes			3/29/17 13:48
3	Starter overload breakers installed and correct size	Yes			3/29/17 13:48
4	All control devices, pneumatic tubing and wiring complete and functional	Yes			3/29/17 13:48



PROJECT: Plainfield Library
LOCATION: Plainfield, IL
PROJECT #: 201729

DATE: 4/19/2017
CONTACT: Ron Gordon
AUTHOR:

SYSTEM/UNIT: RTU-03

Tested By: Ron Gordon
 Date: 3/30/2017

- RTU-03

Verification		Response	Notes	By	Date/Time
1	Building Pressure STPT.	0.25" w.c.			3/28/17 13:25
2	Cooling Occ. STPT.	83 deg F			3/28/17 13:28
3	Cooling Unocc. STPT	85 deg F			3/28/17 13:28
4	Current Schedule - Mon. thru Thurs. 6am-9pm, Fri. thru Sat. 6am-6pm, Sun. 10:30am-6pm.	Yes			3/28/17 13:17
5	Duct Static STPT.	1" w.c.			3/28/17 13:23
6	Heat-Cool Gap	2 deg F			3/28/17 13:28
7	Heating Occ. STPT.	76 deg F			3/28/17 13:28
8	Heating Unocc. STPT.	55 deg F			3/28/17 13:28
9	Supply Air STPT.	55 deg F			3/28/17 13:28
10	The avg. Occ. heating STPT. from the zones + 2.5 deg. F = Current cooling enable STPT. If the avg. temp does not get above this value, the unit will run in vent mode with the economizer at minimum position until the value is reached. The avg. Occ. cooling STPT. is not used for enabling cooling, it's only based on the avg. Occ. heating STPT. The cooling enables when the avg. space temp. from the zones gets above the STPT.	No - stays in Vent mode			3/28/17 13:29



PROJECT: Plainfield Library
 LOCATION: Plainfield, IL
 PROJECT #: 201729

DATE: 4/19/2017
 CONTACT: Ron Gordon
 AUTHOR:

SYSTEM/UNIT: RTU-03/Condensing Unit

Tested By: Ron Gordon
 Date: 3/29/2017

General Unit Information	
Manufacturer	Carrier Package
Refrigerant type	410A
Air or water cooled	Air

Motor Nameplate Information	
Manufacturer	Copeland
Full load amps	(4) @ 23.2
Volts	208/230

Pre-Functional Checks - RTU-03/Condensing Unit

Verification	Response	Notes	By	Date/Time
1 Unit free of damage	Yes			3/29/17 13:25
2 Crankcase heater energized	Not working on 2,3,4			3/29/17 13:25
3 Equipment tag attached to the unit	Yes			3/29/17 13:25
4 Coils clean and fins in good condition	Yes			3/29/17 13:25
5 Access to unit acceptable	Yes			3/29/17 13:25
6 No visible leaks	Yes			3/29/17 13:25
7 Hail guards installed	Yes			3/29/17 13:25
8 Relief valve installed	Yes			3/29/17 13:25

Electrical & Controls - RTU-03/Condensing Unit

Verification	Response	Notes	By	Date/Time
1 Disconnect switch installed	Yes			3/29/17 13:25
2 Starter overload breakers in place and operable	Yes			3/29/17 13:25
3 Control system interlocks functional	Yes			3/29/17 13:25

Start Up - RTU-03/Condensing Unit

Verification	Response	Notes	By	Date/Time
1 Fan rotation correct	Yes			3/29/17 13:25
2 Condenser and AHU interlocks functional	Yes			3/29/17 13:25
3 Total refrigerant charge (lbs)	(2) 30.5 (2) 34.3			3/29/17 13:25
4 Volts AB	214			3/29/17 13:25
5 Volts BC	214			3/29/17 13:25
6 Volts AC	213			3/29/17 13:25
7 Condenser fan quantity	2			3/29/17 13:25
8 Condenser fan amps	(6.5) 6.2 avg.			3/29/17 13:25
9 Compressor #1 amps	(23.2) 14.1 avg.			3/29/17 13:25
10 Compressor #2 amps	(23.2) 14.2 avg.			3/29/17 13:25
11 Compressor #3 amps	(23.2) 13.5 avg.			3/29/17 13:25
12 Compressor #4 amps	(23.2) 12.8 avg.			3/29/17 13:25



PROJECT: Plainfield Library
 LOCATION: Plainfield, IL
 PROJECT #: 201729

DATE: 4/19/2017
 CONTACT: Ron Gordon
 AUTHOR:

SYSTEM/UNIT: RTU-03/Power Exhaust

Tested By: Ron Gordon
 Date: 3/29/2017

General Unit Information	
Fan type	Centrifugal

Motor Nameplate Information	
Manufacturer	Genteq
Model number	4- Fans
Horsepower	1
Full load amps	5.9
Service factor	1.15
Volts	208
RPM	1725

Drive System	
Drive type	Direct

Pre-Functional Checks - RTU-03/Power Exhaust

Verification		Response	Notes	By	Date/Time
1	Fan and motor aligned	Yes			3/29/17 13:29
2	Fan protective shrouds for belts in place and secure	Yes			3/29/17 13:29
3	Fan area clean	Yes			3/29/17 13:29
4	Fan spins freely	Yes			3/29/17 13:29

Start Up - RTU-03/Power Exhaust

Verification		Response	Notes	By	Date/Time
1	Amps T1	3.2 avg. each			3/29/17 13:30
2	Volts AB	214 volts			3/29/17 13:30
3	No unusual noise or vibration	Yes			3/29/17 13:29
4	Rotation correct	Yes			3/29/17 13:29



PROJECT: Plainfield Library
LOCATION: Plainfield, IL
PROJECT #: 201729

DATE: 4/19/2017
CONTACT: Ron Gordon
AUTHOR:

SYSTEM/UNIT: RTU-03/Supply Fan

Tested By: Ron Gordon
 Date: 3/29/2017

General Unit Information	
Fan type	Centrifugal

Motor Nameplate Information	
Manufacturer	Century
Model number	E-Plus 3
Horsepower	15
Full load amps	37.8
Service factor	1.15
Volts	230/460
RPM	1770
Efficiency	89.5
Frame size	S254T
Power factor	76
Enclosure	DP

Drive System	
Drive type	Belt
Belt size	B-62
Belt qty	2

Starter Data	
Starter manufacturer	VFD

Pre-Functional Checks - RTU-03/Supply Fan

Verification	Response	Notes	By	Date/Time
1 Fan and motor aligned	Yes			3/29/17 13:29
2 Fan belt tension & condition good	Yes			3/29/17 13:29
3 Fan area clean	Yes			3/29/17 13:29
4 Fan and motor lubed	Yes			3/29/17 13:29
5 Fan spins freely	Yes			3/29/17 13:29

Start Up - RTU-03/Supply Fan

Verification	Response	Notes	By	Date/Time
1 Amps T1	19			3/29/17 13:29
2 Amps T2	18.6			3/29/17 13:29
3 Amps T3	20.2			3/29/17 13:29
4 Volts AB	214			3/29/17 13:29
5 Volts BC	213			3/29/17 13:29
6 Volts AC	214			3/29/17 13:29
7 No unusual noise or vibration	Yes			3/29/17 13:29
8 Rotation correct	Yes			3/29/17 13:29



PROJECT: Plainfield Library
LOCATION: Plainfield, IL
PROJECT #: 201729

DATE: 4/19/2017
CONTACT: Ron Gordon
AUTHOR:

SYSTEM/UNIT: RTU-03/Filter Section

Tested By: Ron Gordon
Date: 3/29/2017

General Unit Information	
Filters installed	Yes
Filter type S1	Pleated
Qty S1	9
Size S1	20 x 20 x 2
MERV rating S1	8
Filter type S2	Pleated
Qty S2	6
Size S2	20 x 25 x 2
MERV rating S2	8



PROJECT: Plainfield Library
LOCATION: Plainfield, IL
PROJECT #: 201729

DATE: 4/19/2017
CONTACT: Ron Gordon
AUTHOR:

SYSTEM/UNIT: RTU-03/Gas Heat

Tested By: Ron Gordon
 Date: 3/30/2017

General Unit Information	
Manufacturer	Carrier
Heating input	262500 min 350000 max
Heating output	283500
Max gas pressure	14" w.c.
Stages of heat	5

Motor Nameplate Information	
Manufacturer	2 Combustion Fans
Horsepower	1/10
Full load amps	1.1
Volts	115

Pre-Functional Checks - RTU-03/Gas Heat

Verification	Response	Notes	By	Date/Time
1 Gas piping complete and pipes properly supported	Yes			3/29/17 13:30
2 Gas shut off valve installed	Yes			3/29/17 13:30
3 Dirt leg installed	Yes			3/29/17 13:30
4 Vent or flue mounted and installed correctly	Yes			3/29/17 13:30
5 Ignition type	spark			3/29/17 13:30

Start Up - RTU-03/Gas Heat

Verification	Response	Notes	By	Date/Time
1 Amps T1	1			3/29/17 13:30
2 Volts AB	121			3/29/17 13:30



PROJECT: Plainfield Library
LOCATION: Plainfield, IL
PROJECT #: 201729

DATE: 4/19/2017
CONTACT: Ron Gordon
AUTHOR:

SYSTEM/UNIT: RTU-04

Tested By: Ron Gordon
 Date: 3/29/2017

General Unit Information	
Manufacturer	Carrier
Model number	48A3S020-L-52AGS
Serial number	4812U52638
Location	Roof - NE
Area served	LL
O/A damper position (min)	0%

Pre-Functional Checks - RTU-04

Verification		Response	Notes	By	Date/Time
1	Casing condition good: no dents, leaks, door gaskets installed	Yes			3/28/17 8:41
2	Access doors close tightly	Yes			3/28/17 8:41
3	Equipment clean and protected	Yes			3/28/17 8:41
4	Equipment tag attached to the unit	Yes			3/28/17 8:41
5	Maintenance access acceptable for unit and components	Yes			3/28/17 8:41
6	Final duct connection to unit complete	Yes			3/28/17 8:41
7	Final piping connection to unit complete	Yes			3/28/17 8:41
8	Vibration isolation equipment installed & released from shipping locks	Yes			3/28/17 8:41
9	Instrumentation installed according to specification	Yes			3/28/17 8:41
10	Insulation properly installed and according to specification	Yes			3/28/17 8:41

Electrical & Controls - RTU-04

Verification		Response	Notes	By	Date/Time
1	Disconnect switch installed	Yes			3/28/17 8:41
2	Proper grounding installed for components and unit	Yes			3/28/17 8:41
3	Starter overload breakers installed and correct size	Yes			3/28/17 8:41
4	All control devices, pneumatic tubing and wiring complete and functional	Yes			3/28/17 8:41



PROJECT: Plainfield Library
LOCATION: Plainfield, IL
PROJECT #: 201729

DATE: 4/19/2017
CONTACT: Ron Gordon
AUTHOR:

SYSTEM/UNIT: RTU-04

Tested By: Ron Gordon
 Date: 3/29/2017

- RTU-04

	Verification	Response	Notes	By	Date/Time
1	Building Pressure STPT.	0.02" w.c.			3/28/17 13:31
2	Cooling Occ. STPT.	79 deg F			3/28/17 12:31
3	Cooling Unocc. STPT	85 deg F			3/28/17 12:31
4	Current Schedule - Mon. thru Thurs. 6am-9pm, Fri. thru Sat. 6am-6pm, Sun. 10:30am-6pm.	Yes			3/28/17 13:17
5	Duct Static STPT.	1" w.c.			3/28/17 13:30
6	Heat-Cool Gap	2 deg F			3/28/17 12:31
7	Heating Occ. STPT.	74 deg F			3/28/17 12:31
8	Heating Unocc. STPT.	55 deg F			3/28/17 12:31
9	Supply Air STPT.	55 deg F			3/28/17 12:39
10	The avg. Occ. heating STPT. from the zones + 2.5 deg. F = Current cooling enable STPT. If the avg. temp does not get above this value, the unit will run in vent mode with the economizer at minimum position until the value is reached. The avg. Occ. cooling STPT. is not used for enabling cooling, it's only based on the avg. Occ. heating STPT. The cooling enables when the avg. space temp. from the zones gets above the STPT.	Yes - High Cool mode enables			3/28/17 12:39



PROJECT: Plainfield Library
 LOCATION: Plainfield, IL
 PROJECT #: 201729

DATE: 4/19/2017
 CONTACT: Ron Gordon
 AUTHOR:

SYSTEM/UNIT: RTU-04/Condensing Unit

Tested By: Ron Gordon
 Date: 3/28/2017

General Unit Information	
Manufacturer	Carrier Package
Refrigerant type	410A
Air or water cooled	Air

Motor Nameplate Information	
Manufacturer	Copeland
Full load amps	(2) @ 22.4 (1) @ 27.6
Volts	208/230

Pre-Functional Checks - RTU-04/Condensing Unit

Verification	Response	Notes	By	Date/Time
1 Unit free of damage	Yes			3/28/17 8:54
2 Equipment tag attached to the unit	Yes			3/28/17 8:54
3 Coils clean and fins in good condition	Yes			3/28/17 8:54
4 Access to unit acceptable	Yes			3/28/17 8:54
5 No visible leaks	Yes			3/28/17 8:54
6 Hail guards installed	Yes			3/28/17 10:25
7 Relief valve installed	Yes			3/28/17 10:22

Electrical & Controls - RTU-04/Condensing Unit

Verification	Response	Notes	By	Date/Time
1 Disconnect switch installed	Yes			3/28/17 8:54
2 Starter overload breakers in place and operable	Yes			3/28/17 8:54
3 Control system interlocks functional	Yes			3/28/17 8:54

Start Up - RTU-04/Condensing Unit

Verification	Response	Notes	By	Date/Time
1 Fan rotation correct	Yes			3/28/17 8:54
2 Condenser and AHU interlocks functional	Yes			3/28/17 8:54
3 Total refrigerant charge (lbs)	(1) 26.2 (2) 18.8			3/28/17 8:54
4 Volts AB	215			3/28/17 10:22
5 Volts BC	215			3/28/17 10:22
6 Volts AC	214			3/28/17 10:22
7 Condenser fan quantity	2			3/28/17 8:54
8 Condenser fan amps	(6.5) 6.4 avg.			3/29/17 7:25
9 Compressor #1 amps	(22.4) 10.8 avg.			3/29/17 7:25
10 Compressor #2 amps	(22.4) 11.1 avg.			3/29/17 7:25
11 Compressor #3 amps	(27.6) 14.2 avg.			3/29/17 7:25



PROJECT: Plainfield Library
LOCATION: Plainfield, IL
PROJECT #: 201729

DATE: 4/19/2017
CONTACT: Ron Gordon
AUTHOR:

SYSTEM/UNIT: RTU-04/Power Exhaust

Tested By: Ron Gordon
 Date: 3/28/2017

General Unit Information	
Fan type	Centrifugal

Motor Nameplate Information	
Manufacturer	Genteq
Model number	4- Fans
Horsepower	1
Full load amps	5.9
Service factor	1.15
Volts	208
RPM	1725

Drive System	
Drive type	Direct

Pre-Functional Checks - RTU-04/Power Exhaust

Verification		Response	Notes	By	Date/Time
1	Fan and motor aligned	Yes			3/28/17 9:08
2	Fan protective shrouds for belts in place and secure	Yes			3/28/17 9:08
3	Fan area clean	Yes			3/28/17 9:08
4	Fan spins freely	Yes			3/28/17 9:08

Start Up - RTU-04/Power Exhaust

Verification		Response	Notes	By	Date/Time
1	Amps T1	3.9 avg. each			3/28/17 9:08
2	Volts AB	214 volts			3/28/17 10:24
3	No unusual noise or vibration	Yes			3/28/17 9:08
4	Rotation correct	Yes			3/28/17 9:08



PROJECT: Plainfield Library
 LOCATION: Plainfield, IL
 PROJECT #: 201729

DATE: 4/19/2017
 CONTACT: Ron Gordon
 AUTHOR:

SYSTEM/UNIT: RTU-04/Supply Fan

Tested By: Ron Gordon
 Date: 3/29/2017

General Unit Information	
Fan type	Centrifugal

Motor Nameplate Information	
Manufacturer	Century
Model number	E-Plus 3
Horsepower	5
Full load amps	13.6
Service factor	1.15
Volts	230/460
RPM	1760
Efficiency	89.5
Frame size	S184T
Power factor	76
Enclosure	DP

Drive System	
Drive type	Belt
Belt size	B-60
Belt qty	1

Starter Data	
Starter manufacturer	VFD

Pre-Functional Checks - RTU-04/Supply Fan

Verification	Response	Notes	By	Date/Time
1 Fan and motor aligned	Yes			3/28/17 9:04
2 Fan belt tension & condition good	Yes			3/28/17 9:04
3 Fan area clean	Yes			3/28/17 9:04
4 Fan and motor lubed	Yes			3/28/17 9:04
5 Fan spins freely	Yes			3/28/17 9:04

Start Up - RTU-04/Supply Fan

Verification	Response	Notes	By	Date/Time
1 Amps T1	7.7			3/28/17 10:24
2 Amps T2	7.9			3/28/17 10:24
3 Amps T3	7.7			3/28/17 10:24
4 Volts AB	215			3/28/17 10:24
5 Volts BC	214			3/28/17 10:24
6 Volts AC	215			3/28/17 10:24
7 No unusual noise or vibration	Yes			3/28/17 9:04
8 Rotation correct	Yes			3/28/17 9:04



PROJECT: Plainfield Library
LOCATION: Plainfield, IL
PROJECT #: 201729

DATE: 4/19/2017
CONTACT: Ron Gordon
AUTHOR:

SYSTEM/UNIT: RTU-04/Filter Section

Tested By: Ron Gordon
Date: 3/28/2017

General Unit Information	
Filters installed	Yes
Filter type S1	Pleated
Qty S1	10
Size S1	20 x 24 x 2
MERV rating S1	8



PROJECT: Plainfield Library
LOCATION: Plainfield, IL
PROJECT #: 201729

DATE: 4/19/2017
CONTACT: Ron Gordon
AUTHOR:

SYSTEM/UNIT: RTU-04/Gas Heat

Tested By: Ron Gordon
 Date: 3/30/2017

General Unit Information	
Manufacturer	Carrier
Heating input	262500 min 350000 max
Heating output	283500
Max gas pressure	14" w.c.
Stages of heat	5

Motor Nameplate Information	
Manufacturer	2 Combustion Fans
Horsepower	1/10
Full load amps	1.1
Volts	115

Pre-Functional Checks - RTU-04/Gas Heat

Verification	Response	Notes	By	Date/Time
1 Gas piping complete and pipes properly supported	Yes			3/28/17 10:32
2 Gas shut off valve installed	Yes			3/28/17 10:32
3 Dirt leg installed	Yes			3/28/17 10:32
4 Vent or flue mounted and installed correctly	Yes			3/28/17 10:32
5 Ignition type	spark			3/28/17 10:32

Start Up - RTU-04/Gas Heat

Verification	Response	Notes	By	Date/Time
1 Amps T1	1			3/28/17 10:32
2 Volts AB	120			3/28/17 10:32



-Fan-

PROJECT: Plainfield Library
LOCATION: Plainfield, IL
PROJECT #: 201729

DATE: 4/19/2017
CONTACT: Ron Gordon
AUTHOR:

SYSTEM/UNIT: EXF-1

Tested By: Ron Gordon
Date: 3/27/2017

General Unit Information	
Manufacturer	Loran Cook
Model number	066 S29254100 0591
Serial number	135C5B
Location	Roof
Fan type	Mushroom Exhaust
Total design CFM	1200

Motor Nameplate Information	
Manufacturer	Marathon
Horsepower	1/2
Full load amps	7.2
Service factor	1.25
Volts	115
RPM	1725
Frame size	48Z
Class	B

Drive System	
Drive type	Belt
Belt size	4L220
Belt qty	1

Starter Data	
Starter manufacturer	RIB
Indicator lighting functional	No

Pre-Functional Checks - EXF-1

Verification	Response	Notes	By	Date/Time
1 Housing in good condition	Yes			3/27/17 14:09
2 Equipment tag attached to the unit	Yes			3/27/17 14:09
3 Maintenance access acceptable for unit and components	Yes			3/27/17 14:09
4 Fan and motor aligned	Yes			3/27/17 14:09
5 Fan belt tension & condition good	No	See image in project issues.		3/27/17 14:09
6 Fan protective shrouds for belts in place and secure	Yes			3/27/17 14:09
7 Fan area clean	Yes			3/27/17 14:09
8 Fan spins freely	Yes			3/27/17 14:09
9 Bolts and set screws tight	Yes			3/27/17 14:09

Electrical & Controls - EXF-1

Verification	Response	Notes	By	Date/Time
1 Disconnect switch installed	Yes			3/27/17 14:09
2 All electric connections tight	Yes			3/27/17 14:09
3 Proper grounding installed for components and unit	Yes			3/27/17 14:09

Start Up - EXF-1

Verification	Response	Notes	By	Date/Time
1 Amps T1	4.5 amps			3/27/17 14:09
2 Volts AB	124 volts			3/27/17 14:09
3 No unusual noise or vibration	Yes			3/27/17 14:09
4 Rotation correct	Yes			3/27/17 14:09

- EXF-1

Verification	Response	Notes	By	Date/Time
1 Current Schedule - Mon. thru Thurs. 6am-9pm, Fri. thru Sat. 6am-6pm, Sun. 10:30am-6pm	Does not follow schedule.			3/28/17 13:15



PROJECT: Plainfield Library
LOCATION: Plainfield, IL
PROJECT #: 201729

DATE: 4/19/2017
CONTACT: Ron Gordon
AUTHOR:

SYSTEM/UNIT: HW Boiler

Tested By: Ron Gordon
Date: 3/27/2017

General Unit Information

Manufacturer	Bryan - Flex Tube
Model number	CL90-W-FD/BO
Serial number	70816 Built 1991
Location	LL
Boiler type	Hot Water
Burner type	Power
Operating pressure	18 psi
Output BTU	720 MBH
Min gas pressure	0.7" w.c.
Max gas pressure	2" w.c.

Burner Nameplate Info

Manufacturer	Gordon Piatt
Model number	R6-2-G-03
Horsepower	0.33 hp
Full load amps	7
Service factor	1.35
Volts	120
RPM	3450
Frame size	56C
Enclosure	DP



PROJECT: Plainfield Library
LOCATION: Plainfield, IL
PROJECT #: 201729

DATE: 4/19/2017
CONTACT: Ron Gordon
AUTHOR:

SYSTEM/UNIT: HW Boiler

Tested By: Ron Gordon
 Date: 3/27/2017

Pre-Functional Checks - HW Boiler

Verification	Response	Notes	By	Date/Time
1 Housing in good condition	Yes			3/27/17 10:05
2 Gas piping complete and pipes properly supported	Yes			3/27/17 10:05
3 Equipment tag attached to the unit	Yes			3/27/17 10:05
4 Maintenance access acceptable for unit and components	Yes			3/27/17 10:05
5 Verify full size relief valves installed and piped properly	Yes - 30 psi			3/27/17 10:05
6 Verify correct stack installation	Yes			3/27/17 10:05
7 Verify regulator pressure rating	Yes			3/27/17 10:05
8 Limit control set point	180 deg. F			3/27/17 10:05
9 Gas pressure high limit switch set point	N/A			3/27/17 10:05
10 High pressure safety cut-out set point	N/A			3/27/17 10:05
11 Operating set point	180 manual / BAS Reset			3/27/17 10:05
12 Gas pressure low limit switch set point	N/A			3/27/17 10:05
13 Regulator vent piped to atmosphere	Yes			3/27/17 10:05
14 Correct regulator spring installed	Yes			3/27/17 10:05
15 Gas shut off valve installed	Yes			3/27/17 10:05
16 Dirt leg installed	Yes			3/27/17 10:05
17 Vent or flue mounted and installed correctly	Yes			3/27/17 10:05
18 Ignition type	Direct - Flame Rod			3/27/17 10:05
19 Operating gas pressure	1" low fire, 2" high fire			3/27/17 10:05
20 High limit temperature setting	210 deg. F			3/27/17 10:05
21 Combustion air type	Actuator Controlled Dampers			3/27/17 10:05

Electrical & Controls - HW Boiler

Verification	Response	Notes	By	Date/Time
1 Disconnect switch installed	Yes			3/27/17 10:05
2 All electric connections tight	Yes			3/27/17 10:05
3 Proper grounding installed for components and unit	Yes			3/27/17 10:05
4 Safeties in place and operable	Yes			3/27/17 10:05
5 Control system interlocks functional	Yes			3/27/17 10:05



PROJECT: Plainfield Library
LOCATION: Plainfield, IL
PROJECT #: 201729

DATE: 4/19/2017
CONTACT: Ron Gordon
AUTHOR:

SYSTEM/UNIT: HW Boiler

Tested By: Ron Gordon
 Date: 3/27/2017

Start Up - HW Boiler

Verification		Response	Notes	By	Date/Time
1	Verify proper water level	Yes			3/27/17 10:05
2	Check burner damper linkage	Yes			3/27/17 10:05
3	Leak check gas piping & components	Yes			3/27/17 10:05
4	Free rotation of all blower wheels	Yes			3/27/17 10:05
5	Amps T1	6.7 amp			3/27/17 10:05
6	Volts AB	124 volts			3/27/17 10:05
7	Blower rotation correct	Yes			3/27/17 10:05
8	Verify boiler operates to maintain proper supply water set-point.	Yes			3/27/17 10:05
9	Combustion analysis complete	No			3/27/17 10:05
10	Shut down sequence tested	Yes			3/27/17 10:05

- HW Boiler

Verification		Response	Notes	By	Date/Time
1	Current O.A temp. 3/27/17 @ 12:30 pm	55 deg F			3/27/17 12:34
2	Current Schedule - Mon. thru Thurs. 6am-9pm, Fri. thru Sat. 6am-6pm, Sun. 10:30am-6pm.	Yes			3/27/17 12:37
3	Current supply water temp. set point	155 deg F			3/27/17 12:33
4	Freeze protection mode is as follows. The OAT is below the OAT freeze protection set point. The space temp. is below the SPT freeze set point.	55 deg F			3/30/17 10:16
5	High OAT set point	75 deg F			3/27/17 12:32
6	High water supply set point	200 deg F			3/27/17 12:32
7	Low water supply set point	140 deg F			3/27/17 12:32
8	OAT freeze set point	32 deg F			3/27/17 12:32
9	One of the 2 pumps status is proven run.	Yes			3/27/17 12:16
10	Schedule is in occupied mode	Yes			3/27/17 12:16
11	Set points on boiler operator - 180 deg. F. High Fire - 160 deg. F. High Limit 210 deg. F	Yes			3/30/17 13:23
12	The boiler is enabled whenever all of the following conditions are met: outside air temperature is below the high OAT setpoint and the hot water supply temperature is below the HW supply temperature setpoint.	Yes			3/27/17 12:16



PROJECT: Plainfield Library
LOCATION: Plainfield, IL
PROJECT #: 201729

DATE: 4/19/2017
CONTACT: Ron Gordon
AUTHOR:

SYSTEM/UNIT: HWP-1

Tested By: Ron Gordon
 Date: 3/27/2017

General Unit Information	
Manufacturer	B & G
Model number	80 2 x 7B 65/8 BF
Serial number	1681413
Location	LL
System served	HW Loop
Pump GPM	55
Ft / Head	40
Pump RPM	1800

Motor Nameplate Information	
Manufacturer	US Motors
Horsepower	1
Full load amps	3.6
Service factor	1.25
Volts	208
RPM	1745
Frame size	143JM
Class	B
Enclosure	DP

Starter Data	
Starter manufacturer	GE
Overload setting / rating	C149A 3.4/4.01

Pre-Functional Checks - HWP-1

Verification	Response	Notes	By	Date/Time
1 Pump in good condition	Yes			3/27/17 10:34
2 Equipment tag attached to the unit	Yes			3/27/17 10:34
3 Maintenance access acceptable for unit and components	Yes			3/27/17 10:34
4 Final piping connection and trim to unit complete	Yes			3/27/17 10:34
5 Pump alignment correct	Yes			3/27/17 10:34
6 Piping filled and vented	Yes			3/27/17 10:34
7 No visible leaks	Yes			3/27/17 10:34
8 Free rotation	Yes			3/27/17 10:34
9 Bolts and set screws tight	Yes			3/27/17 10:34
10 Pump properly insulated	Yes			3/27/17 10:34

Electrical & Controls - HWP-1

Verification	Response	Notes	By	Date/Time
1 Disconnect switch installed	Yes			3/27/17 10:34
2 All electric connections tight	Yes			3/27/17 10:34
3 Proper grounding installed for components and unit	Yes			3/27/17 10:34
4 Control system interlocks functional	Yes			3/27/17 10:34

Start Up - HWP-1

Verification	Response	Notes	By	Date/Time
1 Amps T1	3.4			3/27/17 10:34
2 Amps T2	3.2			3/27/17 10:34
3 Amps T3	3.3			3/27/17 10:34
4 Volts AB	211			3/27/17 10:34
5 Volts BC	211			3/27/17 10:34
6 Volts AC	210			3/27/17 10:34
7 No unusual noise or vibration	Yes			3/27/17 10:34
8 Rotation correct	Yes			3/27/17 10:34
9 Suction pressure	18			3/27/17 10:34
10 Discharge pressure	30			3/27/17 10:34



-Pump-

PROJECT: Plainfield Library
LOCATION: Plainfield, IL
PROJECT #: 201729

DATE: 4/19/2017
CONTACT: Ron Gordon
AUTHOR:

SYSTEM/UNIT: HWP-1

Tested By: Ron Gordon
Date: 3/27/2017

- HWP-1

Verification		Response	Notes	By	Date/Time
1	Pumps are able to be alternated through the BAS.	Yes			3/30/17 10:18
2	Pumps will enable before the boiler and run as long as the boiler is enabled to run.	Yes			3/27/17 12:17



PROJECT: Plainfield Library
LOCATION: Plainfield, IL
PROJECT #: 201729

DATE: 4/19/2017
CONTACT: Ron Gordon
AUTHOR:

SYSTEM/UNIT: HWP-2

Tested By: Ron Gordon
 Date: 3/27/2017

General Unit Information	
Manufacturer	B & G
Model number	80 2 x 7B 65/8 BF
Serial number	1681412
Location	LL
System served	HW Loop
Pump GPM	55
Ft / Head	40
Pump RPM	1800

Motor Nameplate Information	
Manufacturer	US Motors
Horsepower	1
Full load amps	3.6
Service factor	1.25
Volts	208
RPM	1745
Frame size	143JM
Class	B
Enclosure	DP

Starter Data	
Starter manufacturer	GE
Overload setting / rating	C149A 3.4/4.01

Pre-Functional Checks - HWP-2

Verification	Response	Notes	By	Date/Time
1 Pump in good condition	Yes			3/27/17 10:34
2 Equipment tag attached to the unit	Yes			3/27/17 10:34
3 Maintenance access acceptable for unit and components	Yes			3/27/17 10:34
4 Final piping connection and trim to unit complete	Yes			3/27/17 10:34
5 Pump alignment correct	Yes			3/27/17 10:34
6 Piping filled and vented	Yes			3/27/17 10:34
7 No visible leaks	Yes			3/27/17 10:34
8 Free rotation	Yes			3/27/17 10:34
9 Bolts and set screws tight	Yes			3/27/17 10:34
10 Pump properly insulated	Yes			3/27/17 10:34

Electrical & Controls - HWP-2

Verification	Response	Notes	By	Date/Time
1 Disconnect switch installed	Yes			3/27/17 10:34
2 All electric connections tight	Yes			3/27/17 10:34
3 Proper grounding installed for components and unit	Yes			3/27/17 10:34
4 Control system interlocks functional	Yes			3/27/17 10:34

Start Up - HWP-2

Verification	Response	Notes	By	Date/Time
1 Amps T1	3			3/27/17 10:45
2 Amps T2	3.1			3/27/17 10:45
3 Amps T3	2.8			3/27/17 10:45
4 Volts AB	210			3/27/17 10:45
5 Volts BC	211			3/27/17 10:34
6 Volts AC	210			3/27/17 10:34
7 No unusual noise or vibration	Yes			3/27/17 10:34
8 Rotation correct	Yes			3/27/17 10:34
9 Suction pressure	18			3/27/17 10:34
10 Discharge pressure	30			3/27/17 10:34



PROJECT: Plainfield Library
LOCATION: Plainfield, IL
PROJECT #: 201729

DATE: 4/19/2017
CONTACT: Ron Gordon
AUTHOR:

SYSTEM/UNIT: HWP-2

Tested By: Ron Gordon
Date: 3/27/2017

- HWP-2

Verification		Response	Notes	By	Date/Time
1	Pumps are able to be alternated through the BAS.	Yes			3/30/17 10:18
2	Pumps will enable before the boiler and run as long as the boiler is enabled to run.	Yes			3/27/17 12:18



PROJECT: Plainfield Library
LOCATION: Plainfield, IL
PROJECT #: 201729

DATE: 4/19/2017
CONTACT: Ron Gordon
AUTHOR:

SYSTEM/UNIT: Domestic HW Tank

Tested By: Ron Gordon
 Date: 3/27/2017

General Unit Information	
Manufacturer	A.O Smith
Model number	GCV-50-100
Serial number	EO6A166698 built 5/2006
Location	LL
Boiler type	Domestic
Burner type	Atmospheric
Input BTU	40,000
Output BTU	4" w.c. operating pressure
Min gas pressure	5" w.c.
Max gas pressure	14" w.c.

Pre-Functional Checks - Domestic HW Tank

Verification	Response	Notes	By	Date/Time
1 Housing in good condition	Yes			3/27/17 10:16
2 Gas piping complete and pipes properly supported	Yes			3/27/17 10:16
3 Equipment tag attached to the unit	Yes			3/27/17 10:16
4 Maintenance access acceptable for unit and components	Yes			3/27/17 10:16
5 Verify full size relief valves installed and piped properly	Yes			3/27/17 10:16
6 Verify correct stack installation	Yes			3/27/17 10:16
7 Gas shut off valve installed	Yes			3/27/17 10:14
8 Dirt leg installed	Yes			3/27/17 10:14
9 Vent or flue mounted and installed correctly	Yes			3/27/17 10:14
10 Ignition type	Standing Pilot			3/27/17 10:16
11 Combustion air type	Uses boiler C.A.			3/27/17 10:16

Start Up - Domestic HW Tank

Verification	Response	Notes	By	Date/Time
1 Leak check gas piping & components	Yes			3/27/17 10:16
2 Verify boiler operates to maintain proper supply water set-point.	Yes			3/27/17 10:16
3 Shut down sequence tested	Yes			3/27/17 10:16

Appendix 4 – Thermal Images

The following pages include the thermal images taken inside and outside to highlight any potential problem areas at the library. The Fluke Ti110 Infrared Camera has the ability to “see” heat patterns on the surface of an object and display that information using multi-colored images to locate temperature variations.

There are four main types of heat patterns indicated when inspecting a building:

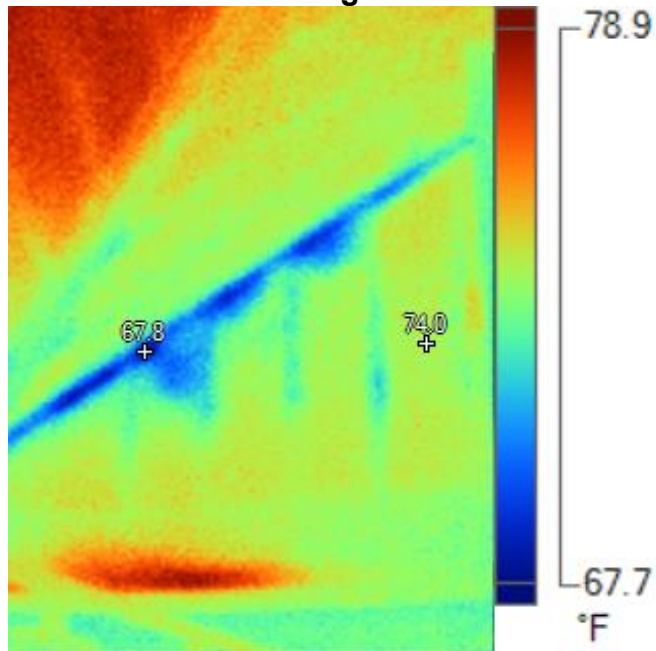
1. A properly sealed and insulated wall. This will appear thermally uniform and consistent indicating no heat loss or gain through that wall.
2. A partially insulated wall. This will appear to have variation in surface temperature. The difference between the un-insulated and insulated areas will have a defined line of separation.
3. Moisture present within the wall. This is generally indicated by an area that appears to be cooler in the thermal images and is caused by conductive cooling.
4. Air infiltration or exfiltration. This pattern originates at an area such as a door or window and presents as wisps of varying temperature. Depending on the temperature inside and out of the building and the pressure the building is operating at, these wisps could appear warmer or cooler in the thermal image.

Each thermal scan contains an infrared and visible light image to show the areas of temperature variation and general building location. For the areas deemed problematic, a brief description of the condition and the possible cause is also included.

At the time of the survey, no significant findings were made on the building exterior. Typical heat losses around the door frames were found and, while some windows may appear to have excessive heat loss compared to other windows, this is most likely due to the perimeter radiators heating the air supplied in those areas. The interior images showed significantly more temperature variances, particularly the stairwell atrium ceiling and the attic. These areas are shown first and should be addressed accordingly to avoid further losses in heating energy and/or damage to electrical components.

Thermal Images – Potential Problem Areas

Stairwell Atrium Facing Southwest



IR004645.IS2

4/5/2017 4:58:48 PM

The ceiling section appears to have excessive heat loss at the above connection, most likely due to missing insulation. This is not as prominent in the other images for the stairwell atrium ceiling.

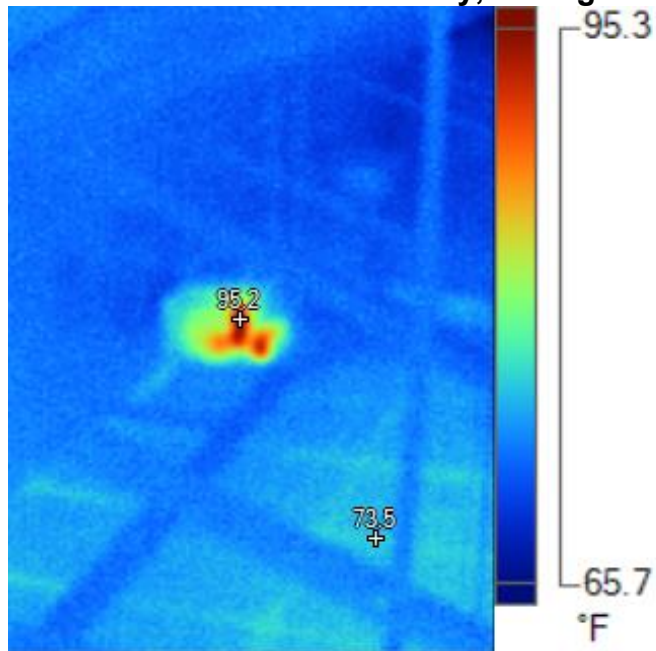


Visible Light Image

Main Image Markers

Name	Temperature
P0	67.8°F
P1	74.0°F

Attic Portion Close to Walkway, Facing West



IR004657.IS2

4/5/2017 5:14:17 PM

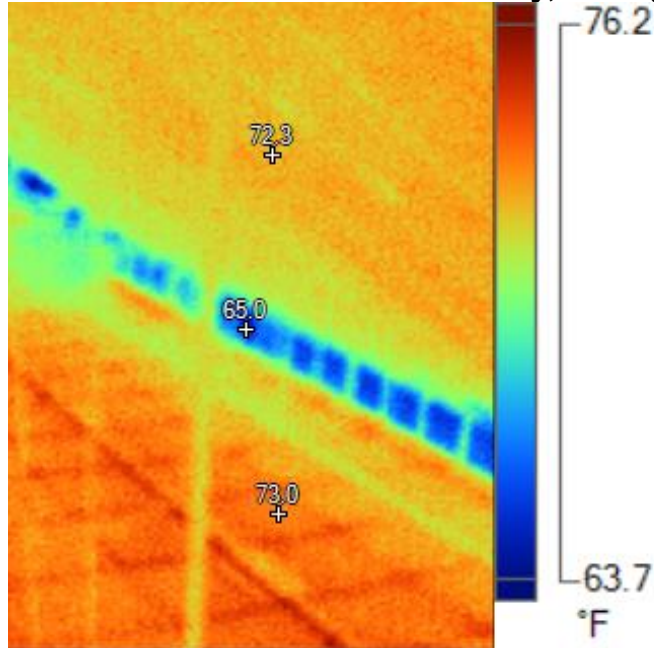
It appears this VAV box controller/actuator is about 10 deg F warmer than other boxes in the attic space. This could be due to a loose electrical connection.

Visible Light Image

Main Image Markers

Name	Temperature
P0	95.2°F
P1	73.5°F

Attic Portion Farther From Walkway, Facing North



IR004660.IS2

4/5/2017 5:15:40 PM

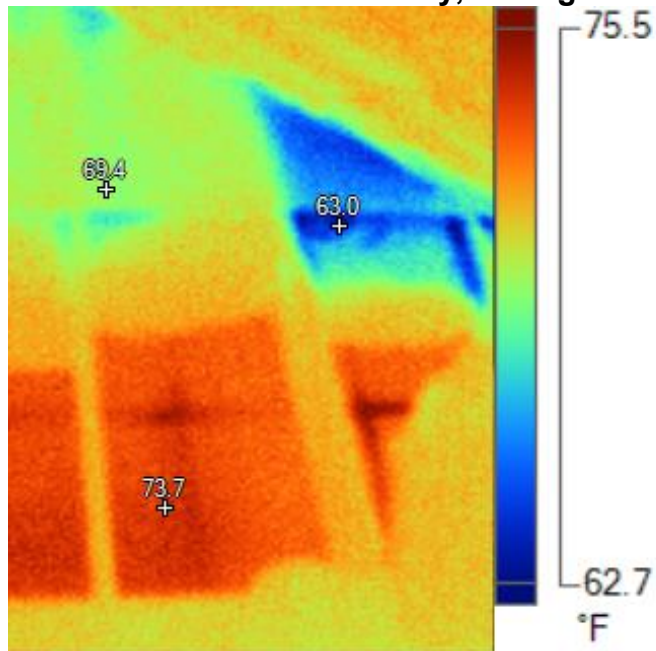
The portion of the wall that extends above the ceiling appears to have excessive, most likely due to missing insulation.

Visible Light Image

Main Image Markers

Name	Temperature
P0	73.0°F
P1	72.3°F
P2	65.0°F

Attic Portion East of Walkway, Facing East



IR004662.IS2

4/5/2017 5:16:22 PM

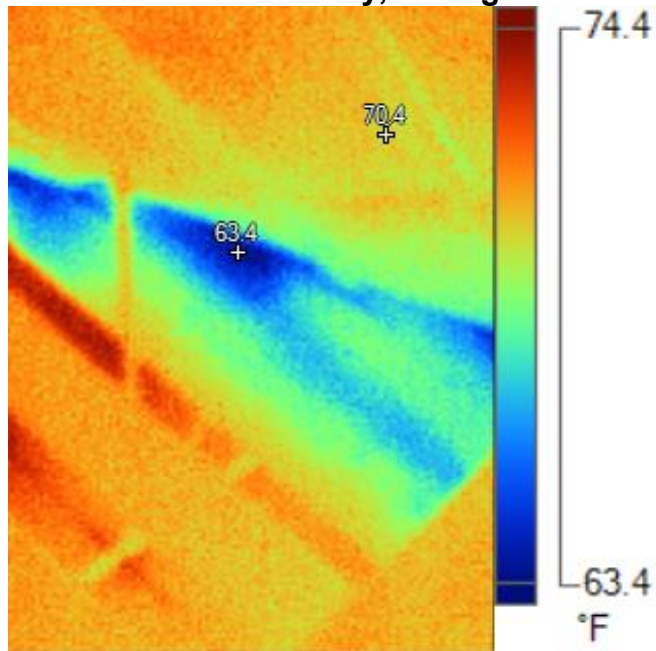
The portion of the wall that extends above the ceiling appears to have excessive, most likely due to missing insulation.

Visible Light Image

Main Image Markers

Name	Temperature
P0	63.0°F
P1	69.4°F
P2	73.7°F

Attic Portion of Walkway, Facing South



IR004663.IS2

4/5/2017 5:16:37 PM

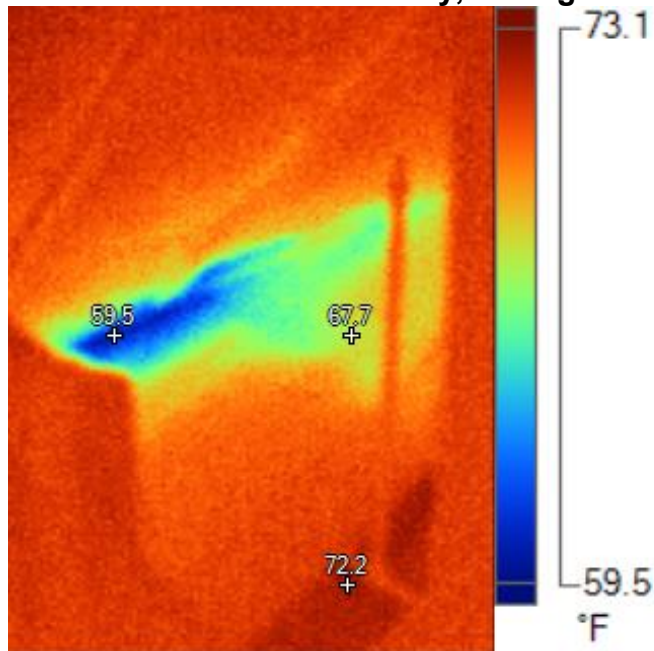
The portion of the wall that extends above the ceiling appears to have excessive, most likely due to missing insulation.

Visible Light Image

Main Image Markers

Name	Temperature
P0	63.4°F
P1	70.4°F

Attic Portion East of Walkway, Facing North



IR004664.IS2

4/5/2017 5:16:46 PM

The portion of the wall that extends above the ceiling appears to have excessive, most likely due to missing insulation.



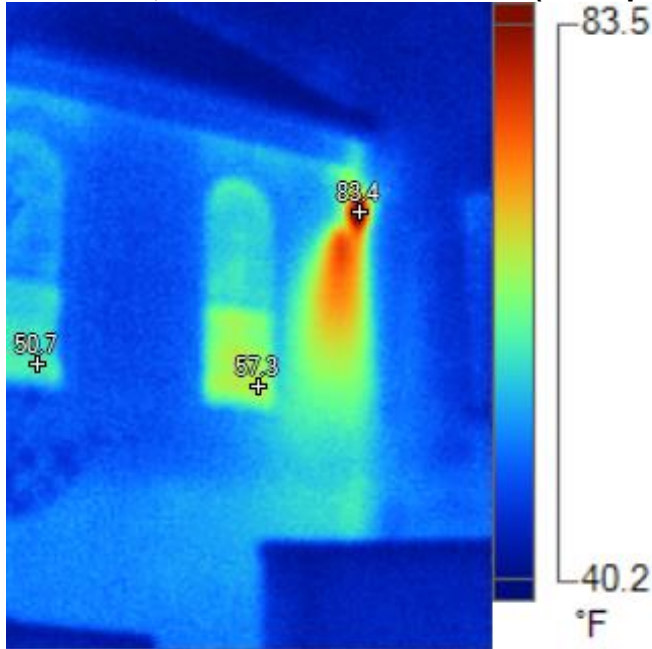
Visible Light Image

Main Image Markers

Name	Temperature
P0	59.5°F
P1	67.7°F
P2	72.2°F

Thermal Images – No Issues

West Wall, North of Main Entrance (Hot Spot is Exhaust Air)



IR004628.IS2
4/5/2017 4:44:37 PM

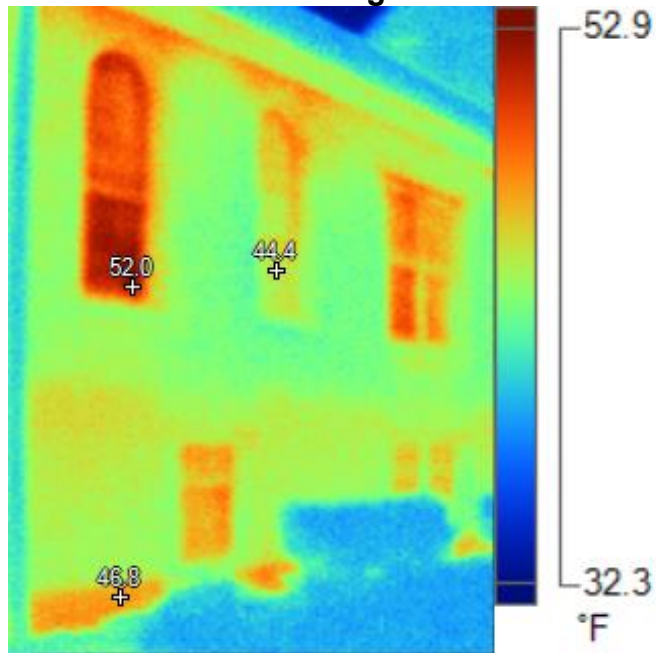


Visible Light Image

Main Image Markers

Name	Temperature
P0	83.4°F
P1	57.3°F
P2	50.7°F

Northwest Corner Facing South



IR004629.IS2
4/5/2017 4:45:09 PM

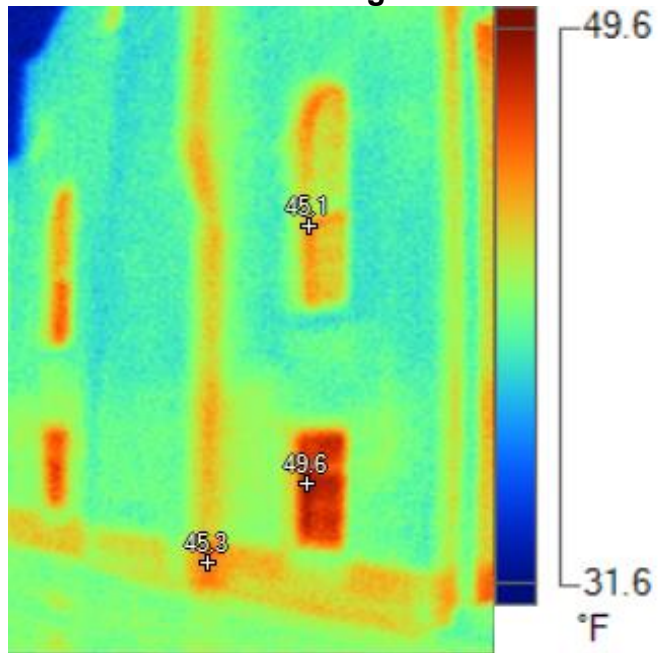


Visible Light Image

Main Image Markers

Name	Temperature
P0	52.0°F
P1	44.4°F
P2	46.8°F

Northwest Corner Facing East



IR004630.IS2
4/5/2017 4:45:40 PM

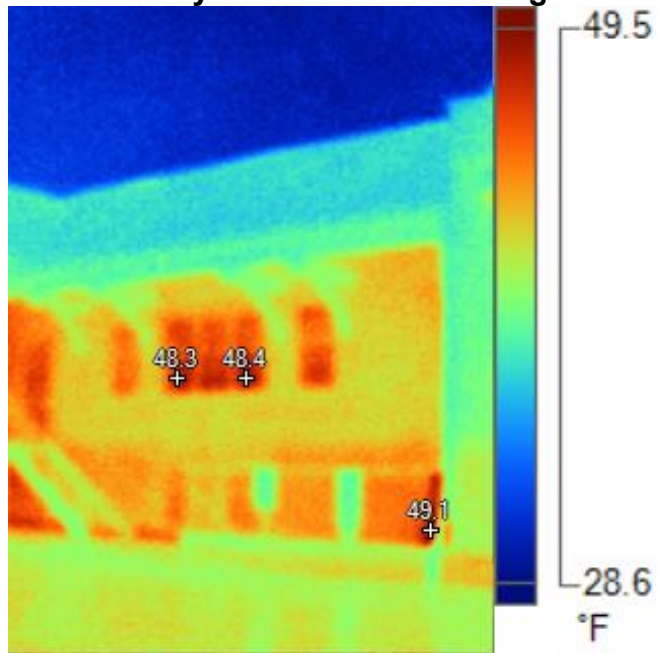


Visible Light Image

Main Image Markers

Name	Temperature
P0	49.6°F
P1	45.1°F
P2	45.3°F

North Wall by Staff Entrance Facing East



IR004631.IS2
4/5/2017 4:46:02 PM

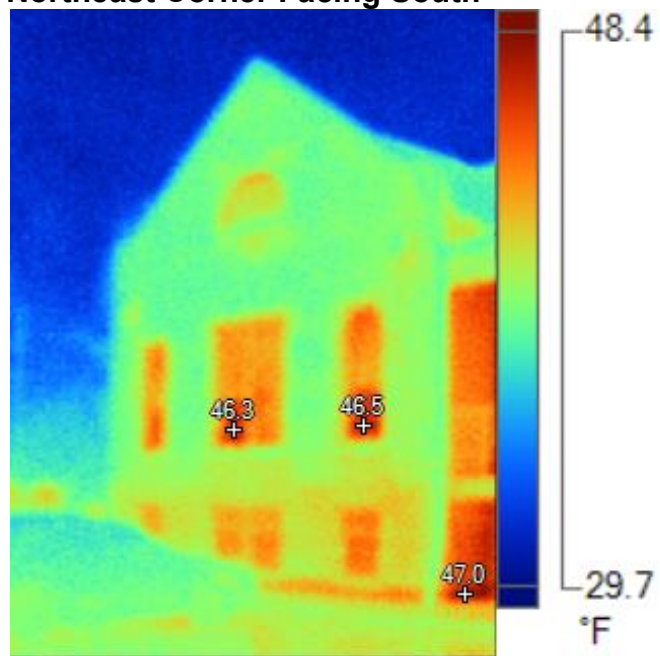


Visible Light Image

Main Image Markers

Name	Temperature
P0	49.1°F
P1	48.4°F
P2	48.3°F

Northeast Corner Facing South



IR004632.IS2
4/5/2017 4:46:15 PM

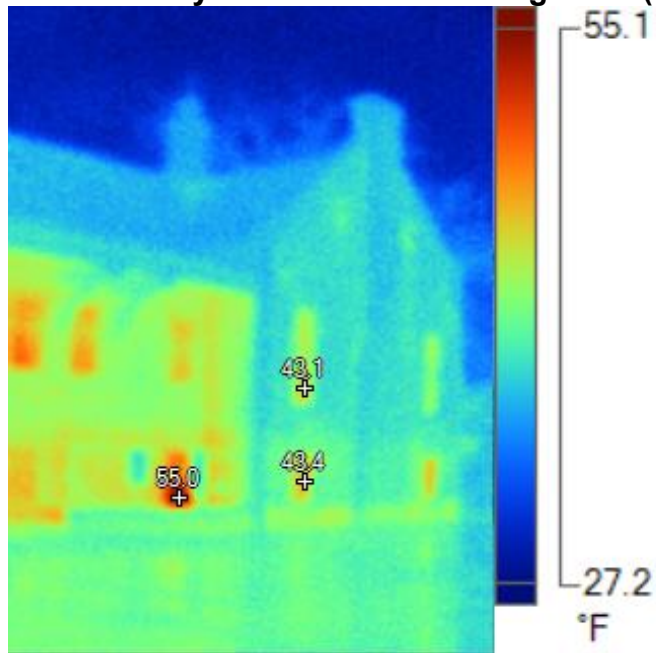


Visible Light Image

Main Image Markers

Name	Temperature
P0	47.0°F
P1	46.5°F
P2	46.3°F

North Wall by Staff Entrance Facing West (Hot Spot is Exhaust Louver)



IR004633.IS2
4/5/2017 4:46:38 PM

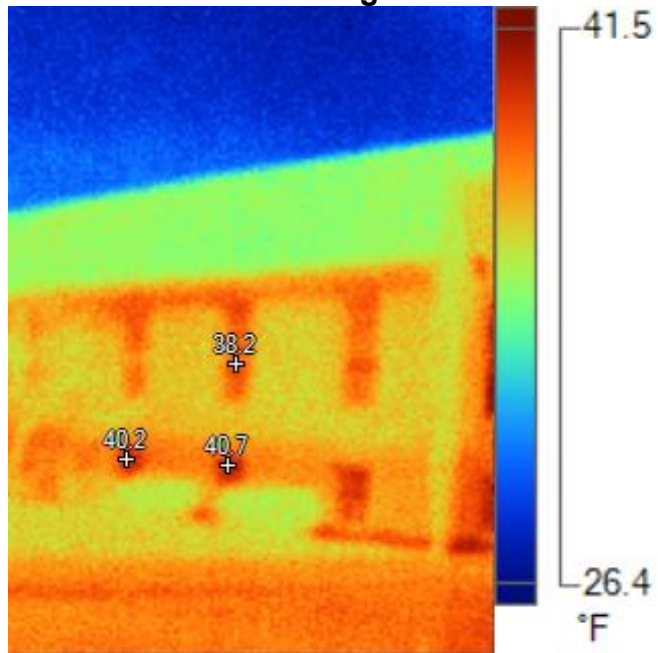


Visible Light Image

Main Image Markers

Name	Temperature
P0	55.0°F
P1	43.4°F
P2	43.1°F

Northeast Corner Facing West



IR004634.IS2
4/5/2017 4:47:10 PM

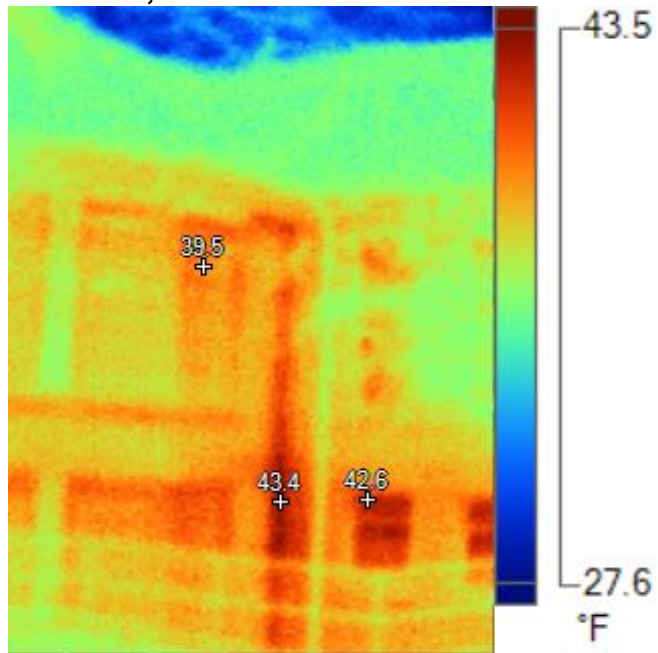


Visible Light Image

Main Image Markers

Name	Temperature
P0	40.7°F
P1	40.2°F
P2	38.2°F

East Wall, North Portion of Arched Section



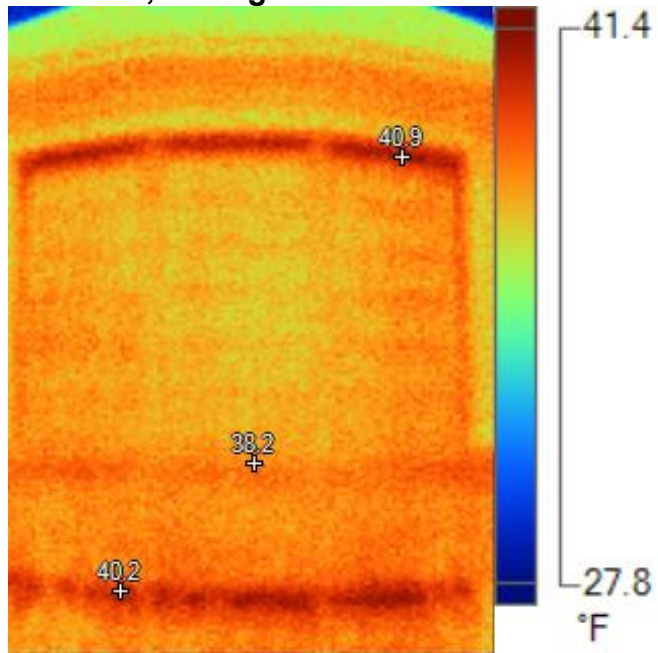
IR004635.IS2
4/5/2017 4:47:36 PM



Main Image Markers

Name	Temperature
P0	43.4°F
P1	42.6°F
P2	39.5°F

East Wall, Facing Arched Section



IR004637.IS2
4/5/2017 4:48:13 PM

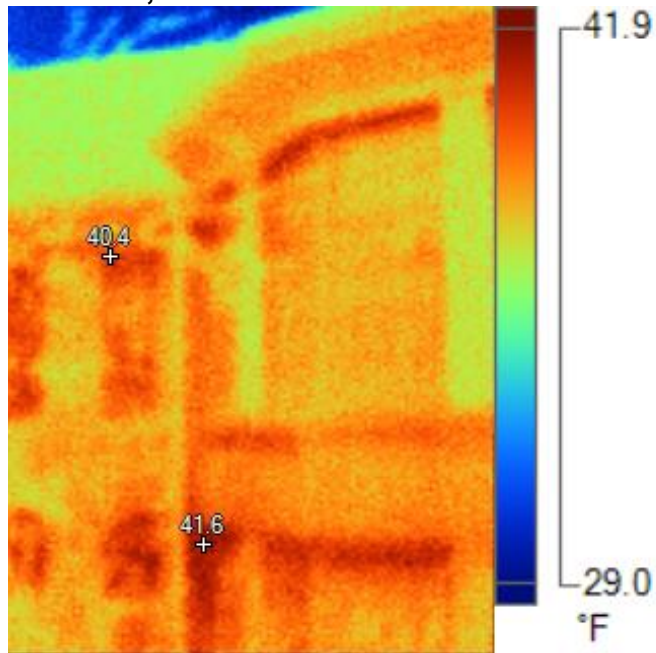


Visible Light Image

Main Image Markers

Name	Temperature
P0	40.9°F
P1	38.2°F
P2	40.2°F

East Wall, South Portion of Arched Section



IR004638.IS2
4/5/2017 4:48:26 PM

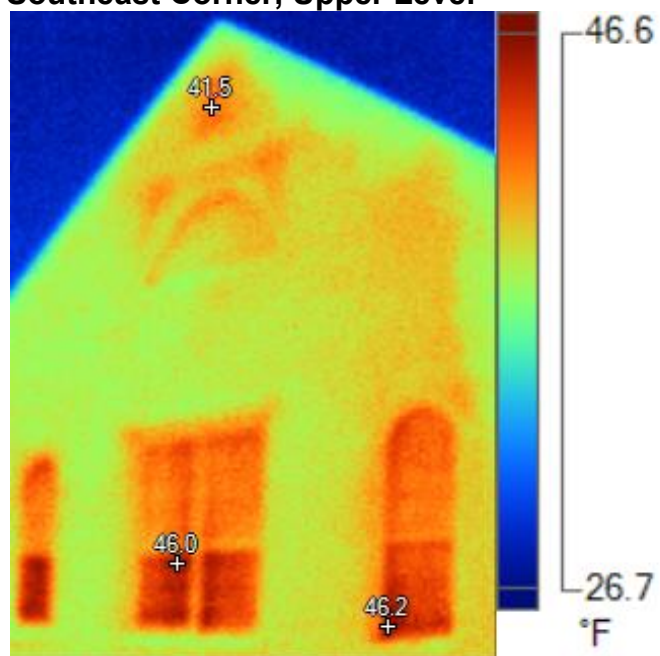


Visible Light Image

Main Image Markers

Name	Temperature
P0	41.6°F
P1	40.4°F

Southeast Corner, Upper Level



IR004639.IS2
4/5/2017 4:49:16 PM

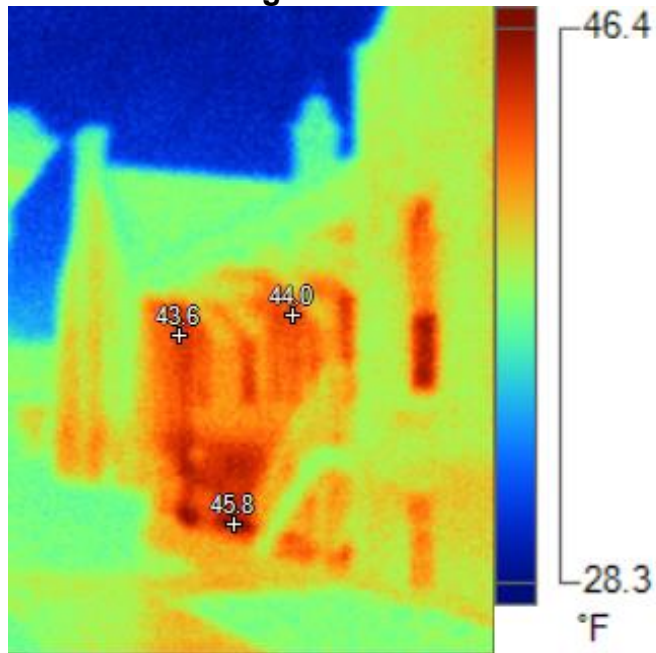


Visible Light Image

Main Image Markers

Name	Temperature
P0	46.2°F
P1	46.0°F
P2	41.5°F

South Wall Facing West



IR004640.IS2
4/5/2017 4:49:34 PM

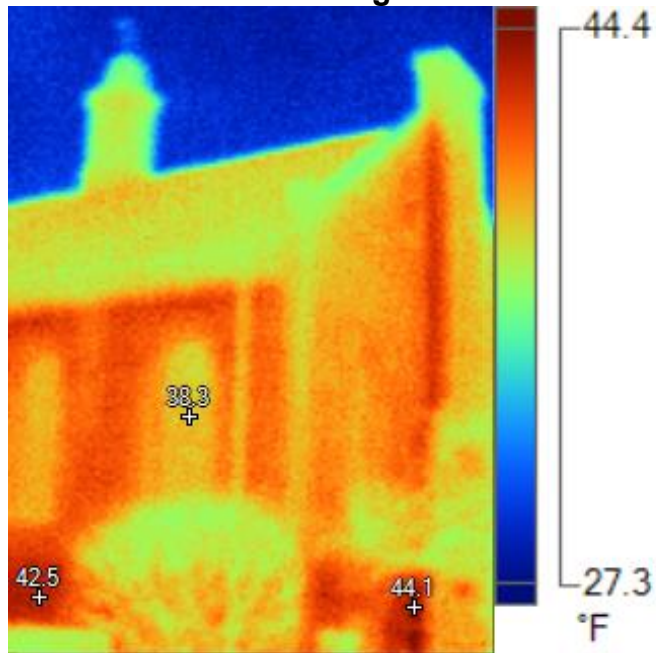


Visible Light Image

Main Image Markers

Name	Temperature
P0	45.8°F
P1	44.0°F
P2	43.6°F

Southwest Corner Facing East



IR004641.IS2
4/5/2017 4:50:56 PM

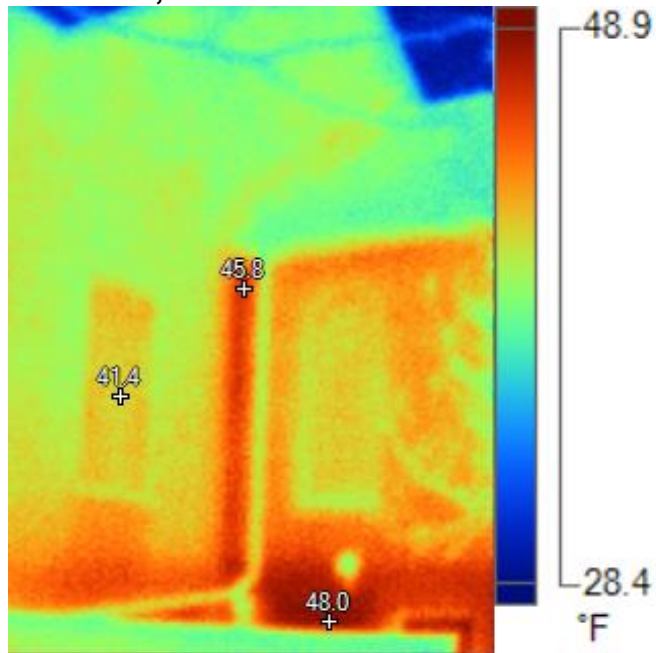


Visible Light Image

Main Image Markers

Name	Temperature
P0	44.1°F
P1	42.5°F
P2	38.3°F

West Wall, South of Main Entrance



IR004642.IS2
4/5/2017 4:51:25 PM

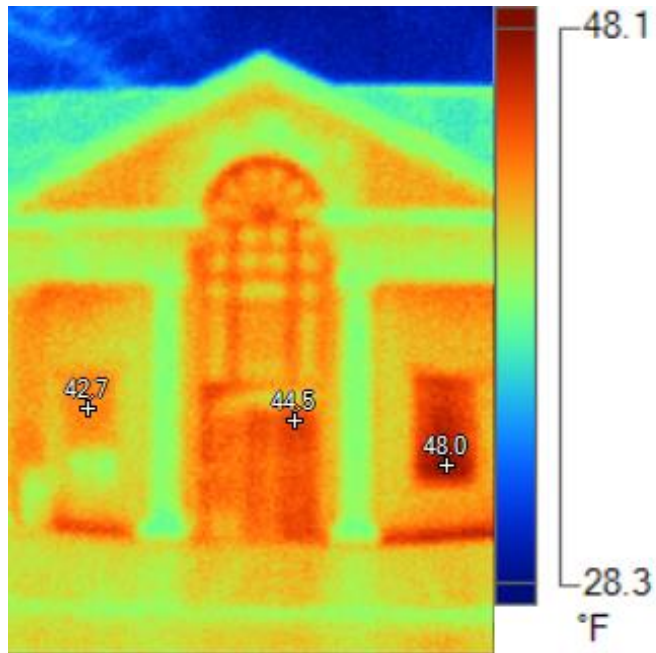


Visible Light Image

Main Image Markers

Name	Temperature
P0	48.0°F
P1	45.8°F
P2	41.4°F

Main Entrance



IR004643.IS2
4/5/2017 4:51:51 PM

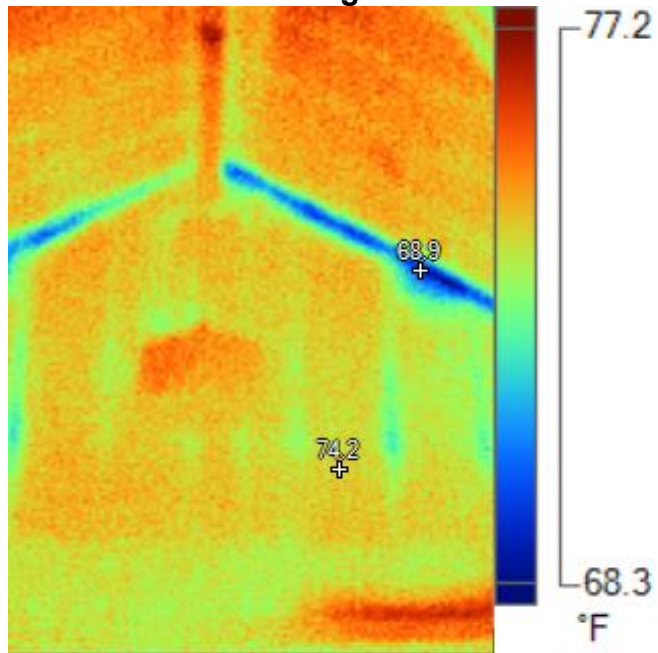


Visible Light Image

Main Image Markers

Name	Temperature
P0	48.0°F
P1	42.7°F
P2	44.5°F

Stairwell Atrium Facing West



IR004646.IS2
4/5/2017 4:58:58 PM

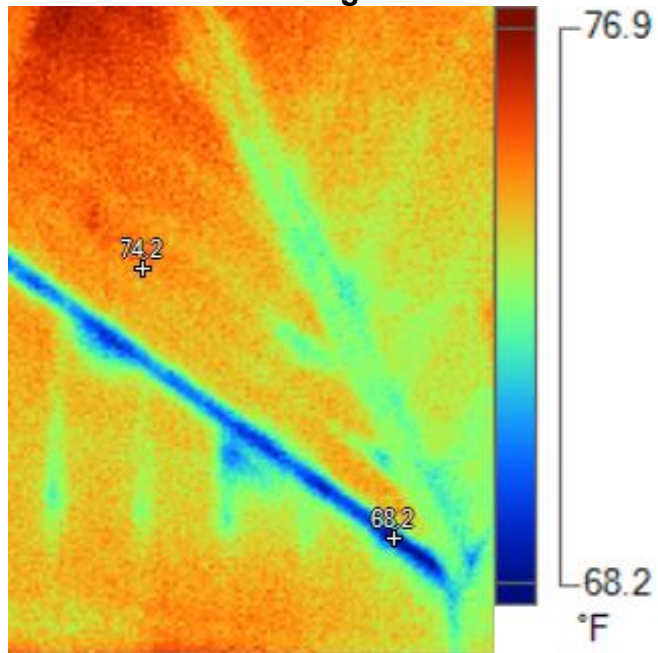


Visible Light Image

Main Image Markers

Name	Temperature
P0	68.9°F
P1	74.2°F

Stairwell Atrium Facing Northwest



IR004647.IS2
4/5/2017 4:59:11 PM

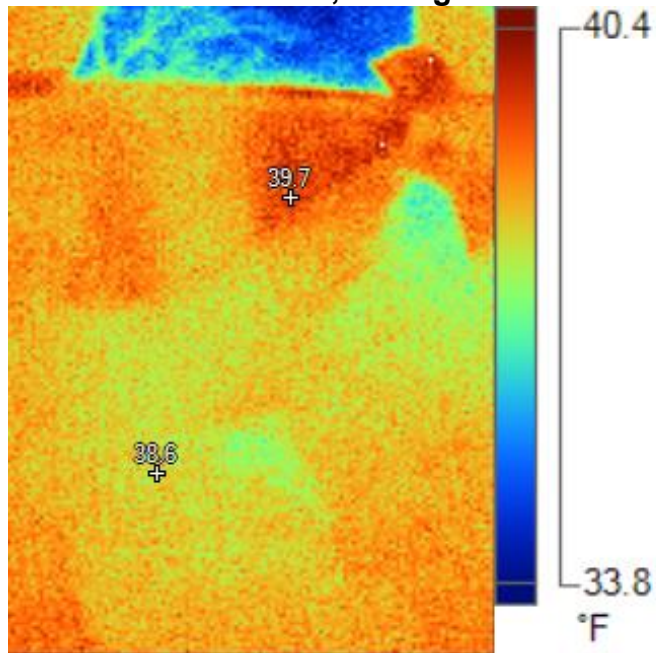


Visible Light Image

Main Image Markers

Name	Temperature
P0	74.2°F
P1	68.2°F

North Portion of Roof, Facing West



IR004648.IS2
4/5/2017 5:08:06 PM

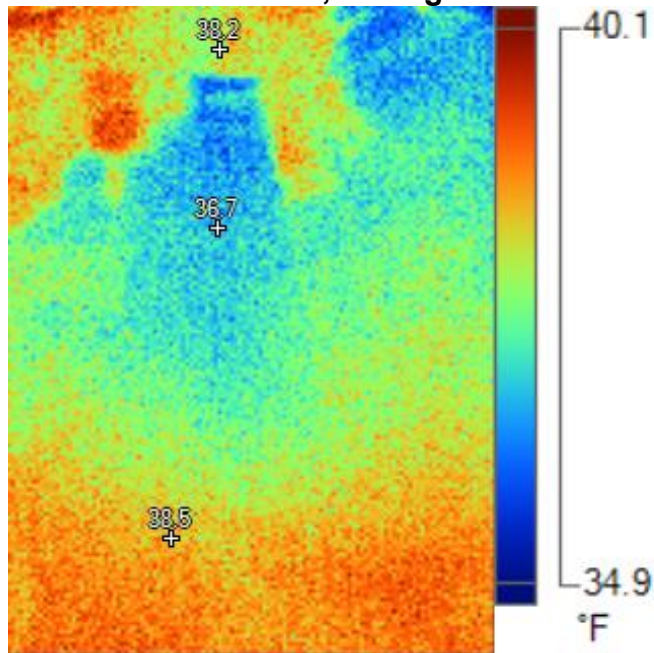


Visible Light Image

Main Image Markers

Name	Temperature
P0	38.6°F
P1	39.7°F

West Portion of Roof, Facing South



IR004649.IS2
4/5/2017 5:08:24 PM

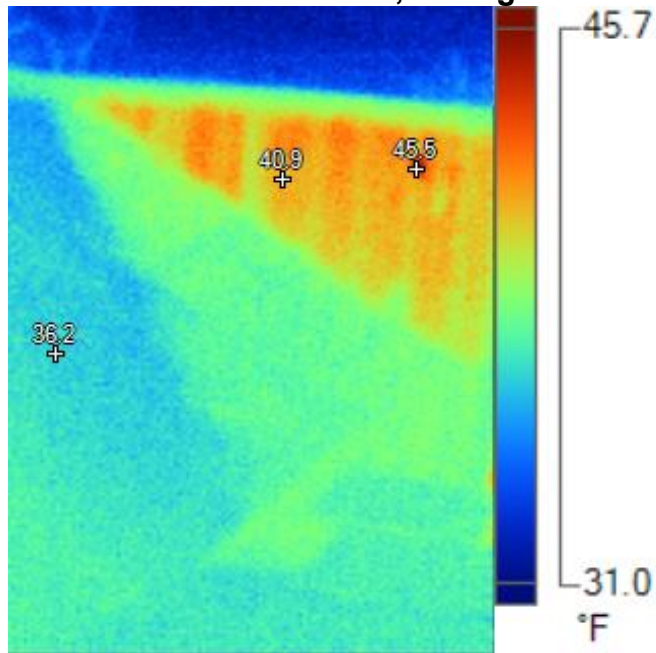


Visible Light Image

Main Image Markers

Name	Temperature
P0	36.7°F
P1	38.5°F
P2	38.2°F

Northwest Corner of Roof, Facing East



IR004651.IS2
4/5/2017 5:08:58 PM

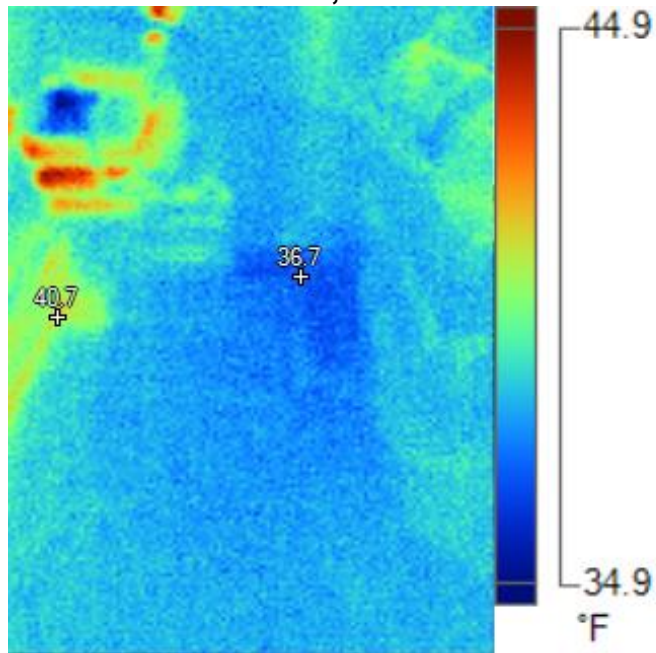


Visible Light Image

Main Image Markers

Name	Temperature
P0	36.2°F
P1	40.9°F
P2	45.5°F

North Portion of Roof, South of RTU's



IR004652.IS2
4/5/2017 5:09:13 PM

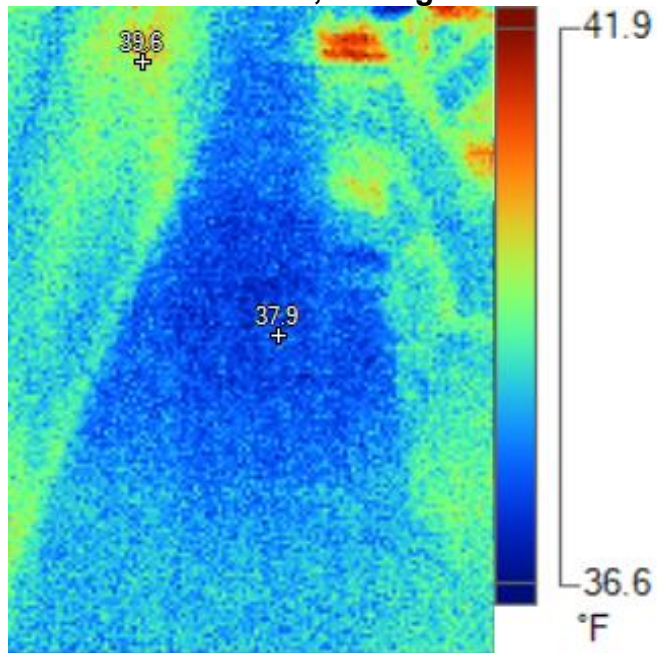


Visible Light Image

Main Image Markers

Name	Temperature
P0	36.7°F
P1	40.7°F

East Portion of Roof, Facing South



IR004653.IS2
4/5/2017 5:09:48 PM

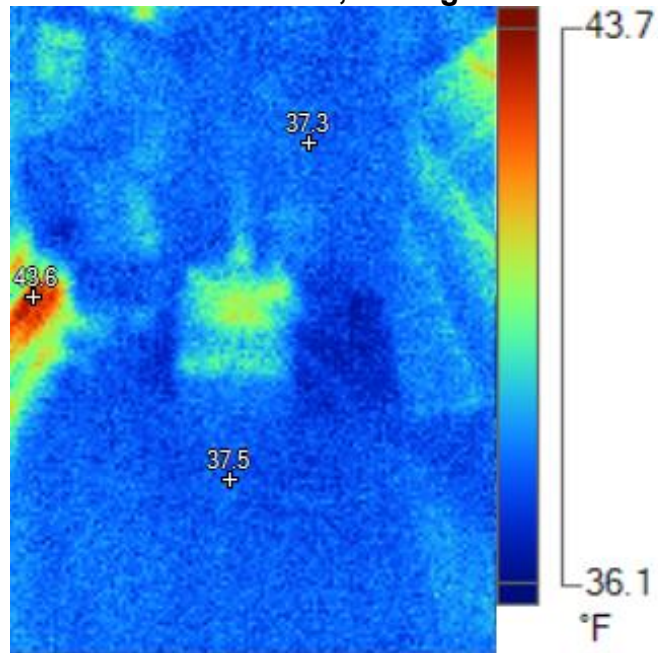


Visible Light Image

Main Image Markers

Name	Temperature
P0	37.9°F
P1	39.6°F

South Portion of Roof, Facing West



IR004654.IS2
4/5/2017 5:10:17 PM

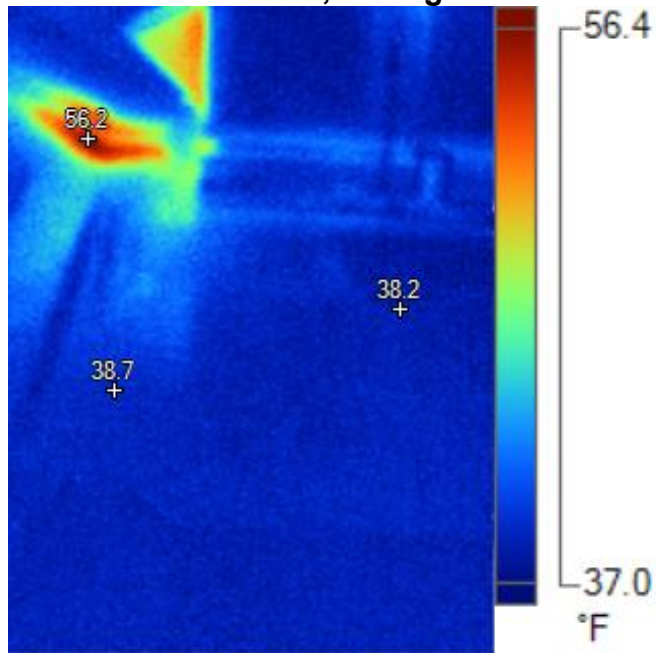


Visible Light Image

Main Image Markers

Name	Temperature
P0	37.5°F
P1	43.6°F
P2	37.3°F

West Portion of Roof, Facing North



IR004655.IS2
4/5/2017 5:10:41 PM

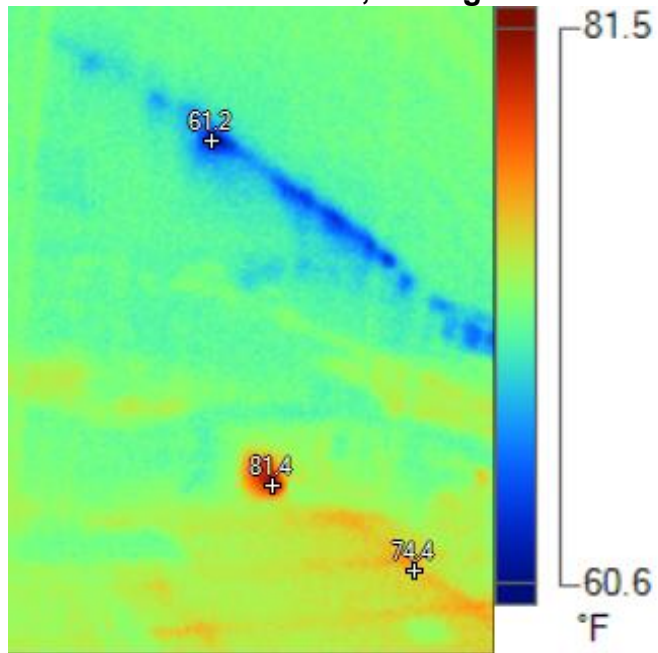


Visible Light Image

Main Image Markers

Name	Temperature
P0	38.7°F
P1	38.2°F
P2	56.2°F

Attic Northwest Portion, Facing West



IR004658.IS2
4/5/2017 5:14:39 PM

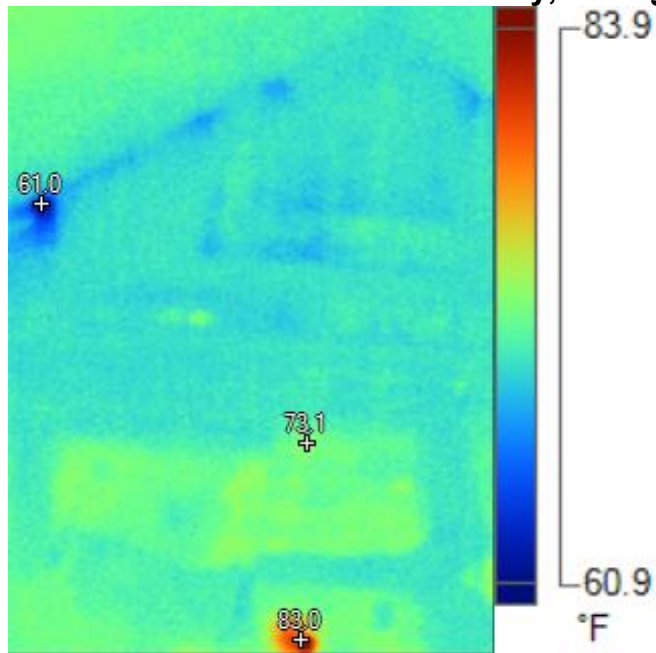


Visible Light Image

Main Image Markers

Name	Temperature
P0	81.4°F
P1	74.4°F
P2	61.2°F

Attic Portion Farther From Walkway, Facing West



IR004659.IS2
4/5/2017 5:15:10 PM

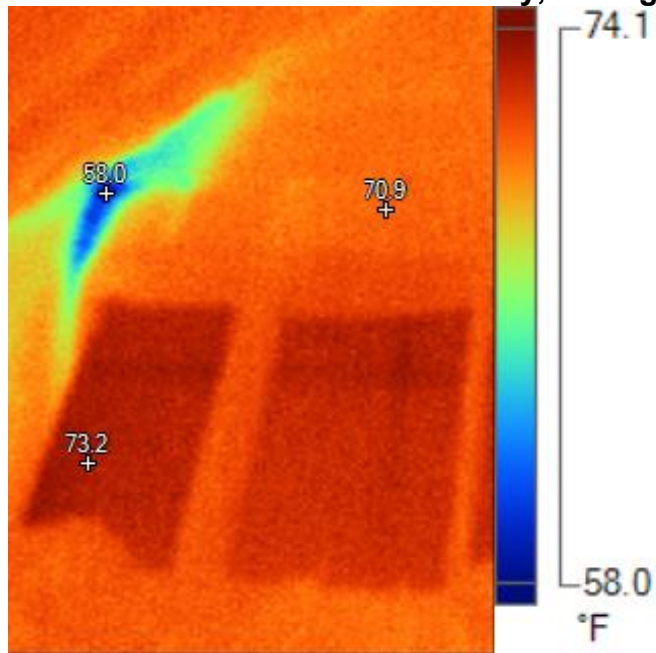


Visible Light Image

Main Image Markers

Name	Temperature
P0	83.0°F
P1	73.1°F
P2	61.0°F

Attic Portion Northeast of Walkway, Facing East



IR004661.IS2
4/5/2017 5:16:12 PM



Visible Light Image

Main Image Markers

Name	Temperature
P0	58.0°F
P1	70.9°F
P2	73.2°F