

# Town of Harvard Energy Advisory Committee

BRIAN SMITH – CHAIR  
DAVID FAY  
PAUL GREEN  
FORREST HODGKINS  
ELLEN SACHS-LEICHER

ASSOCIATE MEMBERS:  
STUDENT MEMBER:  
LIAISONS:

PETER KELLY-JOSEPH  
OPEN  
KARA MINAR, SELECT BOARD  
SUSANMARY REDINGER, SCHOOL COMMITTEE  
SUSANMARY REDINGER, CAPITAL PLANNING  
TBD, FINANCE COMMITTEE

## Meeting Minutes 11/19/2020

Attendees: B. Smith, D. Fay, F. Hodgkins, P. Green, E. Sachs-Leicher, Peter Kelly-Joseph  
Colonial Power – Mark Cappadona, Denise Allard (PT)  
Bromfield Green Team – Joshua Clarke (advisor), Lena Aloise, Annabelle Purcell (PT)  
SusanMary Redinger School Committee (PT)  
Brandon Smithwood (PT)

Location: **This Meeting was held virtually in accordance with the Governor's Executive Order Suspending Certain Provisions of the Open Meeting Law, G.L.c.30A. S.20.;**  
**Zoom Meeting ID: 847 9266 1202**

	Meeting Discussion/Status
Admin	<b>1. The minutes of 10/14/2020 were not voted on.</b>
Schools	<ol style="list-style-type: none"> <li>HES Existing Solar Panels ~6kW – Need a site that is feasible to accept the panels. – <b>Deadline is May 2021. Joshua will see if he can develop a use for the panels, especially if for educational use. DPW is another option. SusanMary will find out the Town procedure for listing the panels for re-use.</b></li> <li>Charging Station – The HES Building project scope includes the infrastructure but not the dual charging station. Brian is working with Horizon Solutions. Brian received a list of questions from Horizon for the HES project team. – <b>No update</b></li> <li><b>Bromfield HVAC Report by RWS dated Oct 13, 2020 and response from Patrick Harrigan – discussed by HEAC:</b> <ol style="list-style-type: none"> <li><b>Outside ventilation flow rates (air exchange) needed to be increased.</b></li> <li><b>A recurring issue is that periodic maintenance being performed is not done properly. Is there additional oversight or verification needed?</b></li> <li><b>Energy use is likely to increase despite some repairs that have eliminated many overheating problems or improved efficiency of equipment. Also, many classrooms have windows open with the heat on to increase ventilation.</b></li> <li><b>Energy Recovery Wheel in HRU units – many need to be replaced and are being disabled to eliminate any air restrictions. The replacement could decrease energy use and increase air exchange.</b></li> <li><b>Another energy reduction project is replacement of actuators for HRU-12 and HRU-17.</b></li> <li><b>HEAC will review with Patrick Harrigan what project are the most likely to qualify as an energy reduction project.</b></li> <li><b>David requested to better understand what deficiencies need to be fixed in the Building Automation Software.</b></li> </ol> </li> <li>HES Solar ~245 kW Behind the Meter project earliest June 2021–             <ol style="list-style-type: none"> <li>Interconnect Application – denied by National Grid to Solect Energy. The Ayer substation requires upgrade in 4-5 years. Solect requesting a written response from NGRID. Solect says to apply to DOER for an award incentive without an I/C approved. HEAC discussed other ways to push NGRID to make this a priority.</li> <li><b>David and Ellen met with Representative Dan Sena to discuss options to prioritize the Ayer substation upgrade by NGRID. They determined</b></li> </ol> </li> </ol>

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	<p><b>questions needed to discuss with NGRID.</b></p> <p>c. <b>Brian to ask DOER for guidance on how to overcome this obstacle.</b></p>
Town Energy Project Updates	<ol style="list-style-type: none"> <li>1. GC Projects – 2019 Competitive Grants – awarded 9/3/19.               <ol style="list-style-type: none"> <li>a. Reporting – <b>Final grant report overdue to DOER - Brian to complete.</b></li> <li>b. <b>GC Annual Report – submitted 11/5 on time.</b></li> <li>c. Need ideas for GC2020 application – TBS Economizer, battery storage, sewer plant and DPW opportunities were mentioned. School Insulation – Brian discussed with RISE Eng and was referred to NGRID. Brian to create a separate list and assign owners. Brian review Police Station lighting (5 lights). Determine projects.- <b>No Update</b></li> </ol> </li> </ol>
Subcommittees/ Initiatives	<ol style="list-style-type: none"> <li>1. Community Resiliency Working group CRWG (Chair Peter Kelly-Joseph)               <ol style="list-style-type: none"> <li>a. Consultant KLA issued a framework for a Climate Action Plan</li> <li>b. MVP Phase 3 – Planning phase for Energy Module – this may involve a battery storage system CRWG would apply for a grant for an Energy Module effort. An Energy strategy or goal would be part of this effort. <b>Discuss the path forward with the Energy Policy and Energy Action Plan with Chris Ryan.</b></li> </ol> </li> <li>2. Energy Policy Subcommittee (Chair Paul Green)– Plan to integrate this into the Climate Action Plan effort.</li> <li>3. Master Plan Status - Residential Energy Conservation Forum – to be considered in the FY21 plans. – <b>On Hold</b></li> <li>4. Community Choice Aggregation – <b>Colonial Power provided a periodic update on the program. Mark C stated there will be an option in 2021-22 for low-income customers to obtain a 2-cent discount – they will be contacted directly. The current plan is 100% national wind RECs. There are 1518 accounts in the program with the term ending in Oct 2022.</b></li> <li>5. Solar in Harvard Historical District – HEAC encourages installation of solar. Need to ensure that the local Harvard Historical Commission is not violating state law. – <b>Brian to contact DOER for guidance since encouraging solar is part of the Green Community program.</b></li> <li>6. <b>HEAC Goals – An updated version of the HEAC goals was provided for all members to review.</b></li> </ol>
	<b>Meeting adjourned 9:45 pm</b>
Future Meetings	<p>2020 Dec 9</p> <p>2021 Jan 13 Feb 10 Mar 10</p> <p>HEAC Meeting Location/Time: Volunteer Government Room, Town Hall 8 pm. – Virtual until further notice</p>

Response to the HVAC Evaluation  
October 13, 2020

What we have done so far:

- Pat cleaned every outdoor filter and they will be cleaned 2X per year
- Pat replaced belts or tightened them where this was needed
- Some exhaust fans are part of an old system and they were disabled many years ago. There is no longer wiring to those units. Pat confirmed this.
- All filters internal to the HVAC units have been changed.
- HV-1 was programed for 30% and is now programed at 80%
- EF-G1 exhaust for the gym is back online new belts adjusted and oiled
- EF-G2 Exhaust for gym has new motor and belt adjusted and oiled back online
- HV-2 fan was turned off in the back of the kitchen and it is now turned back on adjusted belts and lubricated
- HV-4 needs a motor and one is ordered/ motor has been installed and working on VFD drive should be back online by the end of 10/23
- HV-5 the motor recently came in, fans are working
- HRU-11 Dave and Pat worked on this unit and repaired shorted wiring and bad fuses and also repaired dampers
- RTU-4 /HRU-3 units are now running with a new actuator part ordered. Pat and Dave changed bad fuses adjusted belts
- HRU- 8 broken belt replaced and changed bad motor and repaired dampers
- HRU-16 changed bad motor & fuses adjusted belts and repaired the damper.
- HRU-17 needs new actuator but adjusted dampers for proper air flow
- HRU-12 Needs new actuator and repaired damper
- Univents in classrooms were all cleaned, filters replaced and repaired all overheating issues so rooms are comfortable
- HV-7&8 girls and boys locker rooms has been serviced belts adjusted coils cleaned filters changed and is working well
- HRU-5 was tripped off reset and is working to its full capacity
- VAV boxes have all been checked and are working properly. They do not have belts or filters
- FCU's several units were shut off in the rooms they are all working and have been serviced as well as filters changed and adjusted temp on hot rooms all are comfortable.
- Pat met with technicians from BCM controls. They spent 2 days going over our system and stated we have some programming issues as well as some very old equipment that needs to be updated. Overall with mechanical adjustments the system is working to its capability. Pat is working on new updates for our school.

- Since receiving this report, Ambient, our mechanical company has been working on all of our units to make sure everything is working as was built.

What still needs to be done:

- Pat is setting up a water treatment before the winter as recommended by the report
- Pat is going to ask BCM to schedule the air exchange units to start earlier in the AM as recommended
- \$150K was requested as a capital expense to replace HVAC units and this request will be voted on by community members at the All Town Meeting in the spring
- Another \$150K will be requested next year
- Money for repairs and service will be requested from the School Committee on October 26, 2020
- We will continue to replace the units that are identified as 18+ years old while adding air conditioning to also improve air quality
- Pat has contacted Buckley associates about unit upgrades and A/C for the purpose of what systems should be on the replacement cycle with the controls updates on new units being planned at the same time. They will be working with an HVAC engineering firm as well. This will give us good information to move forward and a cost to the upgrades.



**HVAC**

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**Electrical**

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**Plumbing**

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**Fire Protection**

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**Code**

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**Commissioning**

# **HVAC Evaluation**

## **The Bromfield School**

**October 13, 2020**

**Prepared for:**

**Harvard Public Schools  
14 Massachusetts Ave.  
Harvard, MA 01451**

**R.W. Sullivan  
Engineering**

**617.523.8227  
www.rwsullivan.com**

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## Introduction



Commissioning is the process of verifying all the heating, ventilating and air conditioning systems operate efficiently as intended by the manufacturer and as designed by the building architects and engineers. RW Sullivan has offered Harvard Schools a comprehensive verification and documentation process and we have provided a HVAC performance and evaluation review.

This final HVAC performance and evaluation report is provided by RW Sullivan and the scope of work, results, and supporting documentation have been compiled for simplicity intended for the building engineers. This report will be presented to the superintendent and maintenance personnel and should be kept alongside throughout the corrective process as an informative and resource document.

The scope of work was inclusive of the Bromfield School which serves approximately 655 students from grades 6-12. This school is approximately 75,000 square feet with a café, gymnasium, teachers lounge, classrooms and other functioning spaces. Harvard requested this assessment for planning the HVAC lifecycle and determine the quality of the system operations. The review included the age and condition of the equipment, operations and air filtration.

Following the onsite review and inspections, RW Sullivan also reviewed the facilities heating operations since the ventilation rates will more than likely be increased from keeping windows open during fall. Maintenance was discussed with Patrick Harrigan as the preparation begins for the colder weather.

Below is a summary of the equipment and the areas served:

Equipment Designation	Equipment Age	Equipment Type	Area Served
HV-1	18	Heating and Ventilating Unit	Gymnasium
HV-2	18	Heating and Ventilating Unit	Gymnasium
HV-3	18	Heating and Ventilating Unit	Boiler Room
HV-4	18	Heating and Ventilating Unit	Common Areas
HV-5	18	Heating and Ventilating Unit	Auditorium

HV-6	18	Heating and Ventilating Unit	Mechanic Shop
HV-7	18	Heating and Ventilating Unit	Girls Locker Room
HV-8	18	Heating and Ventilating Unit	Boys Locker Room
RTU-1 & HRU-12	22 and 18	Rooftop Unit and Energy Recovery Unit	Room 390 South Areas
RTU-2 & HRU-13	22 and 18	Rooftop Unit and Energy Recovery Unit	Library and A118 Areas
RTU-3 & HRU-11	22 and 18	Rooftop Unit and Energy Recovery Unit	Room 393 Areas
RTU-4 & HRU-11	22 and 18	Rooftop Unit and Energy Recovery Unit	Teachers Lounge, Elevator Lobby
RTU-5 & HRU-8	22 and 18	Rooftop Unit and Energy Recovery Unit	Room 321 and Room 320 Areas
RTU-6 & HRU-16	22 and 18	Rooftop Unit and Energy Recovery Unit	
RTU-7 & HRU-20	22 and 18	Rooftop Unit and Energy Recovery Unit	Room 203, 204, 205, 202, Main Office and Room 206-209
HRU-1	18	Heat Recovery Unit	Common Halls
HRU-2	18	Heat Recovery Unit	Common Areas near Room 289
HRU-4	2	Heat Recovery Unit	Hallway and Room 265 Areas
HRU-5	2	Heat Recovery Unit	Chem Labs 281 to 287
HRU-6	2	Heat Recovery Unit	Library
HRU-7	2	Heat Recovery Unit	Rooms 321, 322, 330, 340, 342, 230, 232, 101
HRU-9	18	Heat Recovery Unit	East Wing Room 234, 236, Restrooms 344, 346, 334, 336
HRU-10	18	Heat Recovery Unit	Room 238, 248, 349, 338, 348
HRU-14	18	Heat Recovery Unit	Room 251 Area
HRU-15	18	Heat Recovery Unit	Café
HRU-17	18	Heat Recovery Unit	Music Room
HRU-18	18	Heat Recovery Unit	Common Area by Library
HRU-19	18	Heat Recovery Unit	Weight Room
HRU-21	18	Heat Recovery Unit	Room 279 Area
HRU-22	18	Heat Recovery Unit	Chem Labs Room 269
VAV's	18	Variable Air Volume Units	Office Areas
EF's	22	Exhaust Fans	Various Classrooms / Bathrooms
FCU's	18	Fan Coil Units	Various Classrooms



## Overall Summary

The following general recommendations should be considered for modifying the building mechanical systems:

- Outside air flow rates are substantially low throughout most of the mechanical equipment. This was an energy conservation programming done through the building management system that saved money. However, some of the minimum outside air positions are as low as 5% which do not provide proper air change rates. Each individual piece of equipment should be confirmed for the heating capacity and the minimum amount of fresh air that should be provided to the space.
- MERV Filter changes need to be maintained. Improving the restriction of airflow will help increase the air change rates within the HVAC equipment. Harvard School system subcontracts this work out, but we found multiple units that were not properly maintained.
- Outdoor Filter changes need to be maintained. Improving the restriction of airflow will help increase the air change rates within the HVAC equipment.
- Belt tightening needs to be maintained. Maintaining tensions of the pulley systems will maintain the design capacity for the HVAC equipment, thus maintaining the air change rates. Harvard School system subcontracts this work out, but we found multiple units that were not properly maintained.
- Energy recovery wheels are used in the HRU units. These energy wheels have exceeded their life expectancy and could possibly be creating airflow restrictions in the system. Replacement of wheels could increase air change rates within the HVAC equipment. However, in the short term, disabling the energy recovery ventilation has been recommended by ASHRAE.
- Exhaust fans installed throughout the building should be verified for operations. All the fans were not involved in this scope of work, but most were found to be inoperable.
- Increasing ventilation for the building can be completed numerous ways:
  - The HVAC equipment can be used more often than the current building management schedule. Schedules in the building management system
- The following graph provides insight to the Tier rating under each piece of equipment in Appendix A: The Bromfield School

Tier Level (High)	Requires immediate attention
Tier Level (Mid)	Requires attention
Tier Level (Low)	Requires minimal attention

## Commissioning Scope

The description of services is based on the Bromfield School. This HVAC review is to investigate the existing equipment and functionality. RW Sullivan will provide real time data for equipment operations.

**Systems Reviewed**

The systems commissioned by RW Sullivan were:

Heating, ventilating, and air conditioning (HVAC) systems

- ✓ HV-1 ~ 8 (Bromfield School)
- ✓ RTU-1 ~ 7 (Bromfield School)
- ✓ HRU-1 ~ 10, HRU-14 ~ 19, HRU-21, HRU-22
- ✓ MAU-1, EF-1
- ✓ All HVAC controls shall be reviewed during investigation.



## APPENDIX A: THE BROMFIELD SCHOOL

<b>Project Name:</b>	Bromfield Elementary School	<b>Date of Report:</b>	10/2/20
<b>Project Number:</b>	200269	<b>Date Visited:</b>	9/29/20
<b>Location:</b>	Harvard, MA	<b>Report By:</b>	Brandon Dervishian
<b>Architect:</b>	-	<b>Attention:</b>	Patrick Harrigan

Item #	Status / Issue
BMS CONTROLS	<ul style="list-style-type: none"><li>Outdoor air relative humidity sensor is reading 100% relative humidity, when it is not raining outside. Recommend replacing sensor. If any sequences are written to enthalpy control, this will not work correctly.</li><li>Recommend adding a legend for Java language commands 0=OFF / 1=ON. Or adjust overrides to allow simple on/off commands.</li><li>Found when the HV (7, 8) units were commanded off, the mixed air dampers were closing, and outside air dampers are opening. This should be the opposite when units are off.</li><li>Recommend adding sequencing to open outside air dampers two hours before / two hours after building starts-up/shuts down.</li></ul>
HV-1	<ul style="list-style-type: none"><li>Minimum outside air damper position is currently programmed for 80%. However, HV-1 outside air actuator is not wired. Could not adjust damper positions through BMS. The outside air damper is open 24/7. Potential freeze in the winter.</li><li>Rib relay is not illuminating. Need to confirm if this is affecting any operations.</li><li>Could not prove damper sequences of operations for the controls system, but the operations of the outside air dampers do not appear to be accurate.</li></ul> <p><u>TIER LEVEL (Low):</u> Fresh air is provided to the space.</p>
HV-2	<ul style="list-style-type: none"><li>Could not prove damper sequences of operations for the controls system, but the operations of the outside air dampers do not appear to be accurate.</li><li>EF-G2 is not operating in conjunction with HV-2. The start and stop status is "on", but the motor is off. The fan motor may need to be replaced.</li></ul> <p><u>TIER LEVEL (Low):</u> Fresh air is provided to the space.</p>
HV-3	<ul style="list-style-type: none"><li>Freeze-stat was tripped. Unit was not operational at the beginning of the inspection. Recommend reviewing setpoint.</li><li>EF-2 is controlled by the start/stop point for the boilers.</li><li>Could not verify operations of HV-3 since unit is currently tripped.</li><li>Could not prove damper sequences of operations for the controls system.</li></ul> <p><u>TIER LEVEL (Low):</u> No air change rates are occurring inside of the mechanical space. Exhaust Fan and HV unit should operate in unison.</p>
HV-4	<ul style="list-style-type: none"><li>Minimum outside air damper position was not confirmed to maintain constant air change rates.</li><li>Supply airflow speed is set to 30% of maximum speed. Recommend removing energy conservation measure and run the fan to full speed to increase air changes.</li><li>Equipment was running in economizer mode when it did not make sense for this to occur.</li><li>Motor is extremely noisy and needs service. Is something stuck inside of the prop?</li></ul>

	<ul style="list-style-type: none"> <li>When the unit was transitioned from bypass to drive, the drive blew up. Replacement parts for the drive will be needed and is expected to be installed the week of 10/19/2020.</li> <li>Could not prove damper sequences of operations for the controls system, but the operations of the outside air dampers do not appear to be accurate.</li> </ul> <p><u>TIER LEVEL (High):</u> No air change rates are occurring inside of the serviced space. The equipment is currently down and requires service.</p>
HV-5	<ul style="list-style-type: none"> <li>Minimum outside air damper position is currently programmed for .5%. Minimum outside air damper position was not confirmed to maintain constant air change rates.</li> <li>Supply airflow speed is set to 30% (typical) for the gym. RWS could not confirm if this is a programmed airflow drive speed value set by the testing and balancing contractor or energy conservation measure. Recommend removing energy conservation measure and run the fan to full speed to increase air changes.</li> <li>Equipment was not operational since it was missing belts for the motor to operate. Replacement parts for the equipment will be needed and is expected to be installed the week of 10/19/2020.</li> <li>The actuator motor that controls the return and outside air was not connected and was removed.</li> <li>Could not prove damper sequences of operations for the controls system, but the operations of the outside air dampers do not appear to be accurate.</li> </ul> <p><u>TIER LEVEL (High):</u> No air change rates are occurring inside of the serviced space. The equipment is currently down and requires service.</p>
HV-6	<ul style="list-style-type: none"> <li>Minimum outside air is set for 50%.</li> <li>No fan speed is provided. No amperages were provided.</li> <li>Could not prove damper sequences of operations for the controls system, but the operations of the outside air dampers do not appear to be accurate.</li> </ul> <p><u>TIER LEVEL (Low):</u> Fresh air is provided to the space.</p>
HV-7	<ul style="list-style-type: none"> <li>Minimum outside air is set for 5%.</li> <li>No fan speed is provided. No amperages were provided.</li> <li>Need to verify minimum outside air position.</li> <li>Could not prove damper sequences of operations for the controls system, but the operations of the outside air dampers do not appear to be accurate.</li> <li>Evaporator coil is clogged with dust and dirt.</li> </ul> <p><u>TIER LEVEL (High):</u> No air change rates are occurring inside of the serviced space. The equipment is currently down and requires service.</p>
HV-8	<ul style="list-style-type: none"> <li>Minimum outside air is set for 5%, but the mixed air damper is open 100%.</li> <li>No fan status provided.</li> <li>Could not prove damper sequences of operations for the controls system, but the operations of the outside air dampers do not appear to be accurate.</li> </ul> <p><u>TIER LEVEL (High):</u> No air change rates are occurring inside of the serviced space. The equipment is currently down and requires service.</p>

RTU-1 & ERU-12	<ul style="list-style-type: none"> <li>Unit appears to be operating correctly.</li> </ul> <p><u>TIER LEVEL (Low)</u>: Fresh air is provided to the space.</p>
RTU-2 & HRU-13	<ul style="list-style-type: none"> <li>Controls - Cooling stage 1 cooling on. SAT is 74°F, MAT is 73°F. Compressor not actually running. Current sensor issue? Mechanical issue with compressor.</li> </ul> <p><u>TIER LEVEL (Low)</u>: Fresh air is provided to the space.</p>
RTU-3 & HRU-11	<ul style="list-style-type: none"> <li>RTU-3 supply fan is running but outside air damper wiring is disconnected. Outside airflow provided by HRU-11.</li> </ul> <p><u>TIER LEVEL (Low)</u>: Fresh air is provided to the space.</p>
RTU-4 & HRU-12	<ul style="list-style-type: none"> <li>Graphics are different from all other RTU's / HRU's. Fan locations shown differently, but the equipment is the same as the rest.</li> <li>Exhaust Fan is mislabeled as Return Fan.</li> <li>Exhaust Fan is commanded on, but the status is off. Relay is energized, needs mechanical attention.</li> <li>Outside air and exhaust air louvers are broken obstructing the air change rates for the spaces. Mechanical issue</li> </ul> <p><u>TIER LEVEL (High)</u>: No air change rates are occurring inside of the serviced space. The equipment is currently down and requires service.</p>
RTU-5 & HRU-8	<ul style="list-style-type: none"> <li>Damper minimum 5% open.</li> <li>Exhaust Fan is commanded on, but the status is off. Fan is confirmed off. Relay is energized, mechanical issue.</li> <li>Static Pressure setpoint is .8"wc, not achieving 1.5"wc setpoint. The VAV's are not operating correctly and this duct static setpoint seems inaccurate.</li> <li>Outside air damper bypass shown on graphics. The system is a motorized barometric relief fan for over pressurizing the space. Recommend reviewing this graphic.</li> </ul> <p><u>TIER LEVEL (High)</u>: No air change rates are occurring inside of the serviced space. The equipment is currently down and requires service.</p>
RTU-6 & HRU-16	<ul style="list-style-type: none"> <li>SF (S/S) on, status is off. EF (S/S) on, status is off. Relay is energized, mechanical issue.</li> <li>No outside air damper information on the BMS. Economizer control box disconnected.</li> <li>HRU is not functioning. No fresh air is being provided to the building.</li> </ul> <p><u>TIER LEVEL (High)</u>: No air change rates are occurring inside of the serviced space. The equipment is currently down and requires service.</p>
RTU-7 & HRU-20	<ul style="list-style-type: none"> <li>No outside air damper information on the BMS. Economizer control box disconnected.</li> </ul> <p><u>TIER LEVEL (Low)</u>: Fresh air is provided to the space.</p>
HRU-1	<ul style="list-style-type: none"> <li>Unit fans operating</li> </ul> <p><u>TIER LEVEL (Low)</u>: Fresh air is provided to the space.</p>

HRU-2	<ul style="list-style-type: none"> <li>Unit fans operating</li> </ul> <p><u>TIER LEVEL (Low):</u> Fresh air is provided to the space.</p>
HRU-4	<ul style="list-style-type: none"> <li>RH=5? / CO2=2? Some control points are not reading correctly and should be investigated.</li> <li>Unit fans operating</li> </ul> <p><u>TIER LEVEL (Mid):</u> Fresh air is provided to the space should be dictated by occupancy rates.</p>
HRU-5	<ul style="list-style-type: none"> <li>RH=1 for outside air. Some control points are not reading correctly and should be investigated.</li> <li>RH=0 for return air / CO2=10. Some control points are not reading correctly and should be investigated.</li> <li>Start/Stop is "Started" but the Start/Stop Status is off.</li> </ul> <p><u>TIER LEVEL (Mid):</u> Fresh air is provided to the space should be dictated by occupancy rates.</p>
HRU-6	<u>TIER LEVEL (Low):</u> Fresh air is provided to the space.
HRU-7	<u>TIER LEVEL (Low):</u> Fresh air is provided to the space.
HRU-9	<ul style="list-style-type: none"> <li>Unit fans operating</li> </ul> <p><u>TIER LEVEL (Low):</u> Fresh air is provided to the space.</p>
HRU-10	<ul style="list-style-type: none"> <li>Unit fans operating</li> </ul> <p><u>TIER LEVEL (Low):</u> Fresh air is provided to the space.</p>
HRU-14	<ul style="list-style-type: none"> <li>Unit fans operating</li> </ul> <p><u>TIER LEVEL (Low):</u> Fresh air is provided to the space.</p>
HRU-15	<ul style="list-style-type: none"> <li>Unit fans operating</li> </ul> <p><u>TIER LEVEL (Low):</u> Fresh air is provided to the space.</p>
HRU-17	<ul style="list-style-type: none"> <li>Fresh air intake is not opening during unit operation.</li> </ul> <p><u>TIER LEVEL (High):</u> No air change rates are occurring inside of the serviced space. The equipment is currently down and requires service.</p>
HRU-18	<ul style="list-style-type: none"> <li>Unit fans operating</li> </ul> <p><u>TIER LEVEL (Low):</u> Fresh air is provided to the space.</p>
HRU-19	<ul style="list-style-type: none"> <li>Unit fans operating</li> </ul> <p><u>TIER LEVEL (Low):</u> Fresh air is provided to the space.</p>
HRU-21	<ul style="list-style-type: none"> <li>Unit fans operating</li> </ul> <p><u>TIER LEVEL (Low):</u> Fresh air is provided to the space.</p>
HRU-22	<ul style="list-style-type: none"> <li>Unit fans operating</li> </ul> <p><u>TIER LEVEL (Low):</u> Fresh air is provided to the space.</p>
General	<ul style="list-style-type: none"> <li>Multiple units are noted as having "optimal run times". However, some are dated as 1/1/1989 and others are blank.</li> </ul>

Comment	<ul style="list-style-type: none"> <li>• FCU's and VAV boxes were spot checked. Contractor should verify all filters are changed and all motorized dampers are functioning properly. Locations: Lower Level West, Lower Level Mid, Middle Level Mid, Lower Level East.</li> <li>• RTU-5 serving low pressure boxes does not appear to be setup properly. VAV flow min/max cfm's do not match design parameters. Static Pressure is starving. RWS Adjust box CFM values but review below for issues.</li> <li>• VAV-5 should be checked for operations. Damper is indicating 0% position, but still achieving 87cfm.</li> <li>• FCU-293 appears to have a bad thermostat. The fan is not providing any fresh air into the space from HRU-1.</li> <li>• Prep for Winter: Water Quality has a substantial amount of sediment in the water. Recommend treating the water after the leak is repaired in preparation for more fresh air to be introduced into the hot water coil.</li> </ul>
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**E = Electrical · P = Plumbing · H = HVAC · S = Sprinkler · ALL = All Trades · GC = General Contractor  
ATC = Automatic Temperature Controls · TAB = Test and Balance**

**NOTE: ALL ITEMS NOTED AS ISSUES WILL BE TRANSFERRED TO THE COMMISSIONING ISSUES LOG AND WILL REMAIN ON THE LOG UNTIL RWS HAS RECEIVED SIGN-OFF BY CONTRACTOR.**

#### **STATUS OF PROJECT:**

Building is operational with personnel inside of the building.

This site visit shall not be construed as an exhaustive or continuous on-site inspection or to be considered all-inclusive. The observations identified during this visit are not intended to indicate that RWS has inspected all the work for conformance to the contract documents and should not be construed as indicating that the construction is complete or correct. This list does not contain any hidden defects and RWS shall not be responsible for such. RWS reserves the right to re-observe portions of the project and may find additional deficiencies. This is only a cursory observation and does not in any way relieve the General Contractor of their obligation to insure that construction is in accordance with all local and federal codes and the contract documents including plans, specifications and all of the project requirements.