BERKSHIRE COUNTY SUPERIOR COURT
HVAC SYSTEM EVALUATION SUMMARY

Visited October 2, 2020. While on-site, inspected the air handling units and other associated heating and cooling equipment and toured the building's occupied portions to determine if the spaces generally matched usage noted on the architectural plans. The courthouse is a four-story building (including basement), constructed in 1871, with a floor area of approximately 25,000 gross square feet. The most recent major HVAC system renovation occurred in 1962. HVAC improvements have been made on a smaller scale since then. In 2010, the law library rooftop unit (RTU) was replaced, ventilation was added to areas via a small energy recovery ventilator (ERV), and wall-mounted heat pump air conditioning (AC) units were added to many areas. The controls for the courtroom air handling unit AHU) have also been upgraded to electronic controls.

1.0 Airflow Rate per Person (Reduced Occupancy)

		Total Air		*Outdoor Air*	
Courtroom	*Total People (Reduced Occupancy)*	*Supply Airflow (CFM)*	*Airflow Rate (CFM/Person)*	*Outside Airflow (CFM)*	*Airflow Rate (CFM/Person)*
Jury Pool Break Room**	16	500	31	500	31
Jury Pool Room*	20	500	25	500	25
Main Courtroom	35	5,500	157	2,750	79
Small Courtroom*	18	500	28	500	28

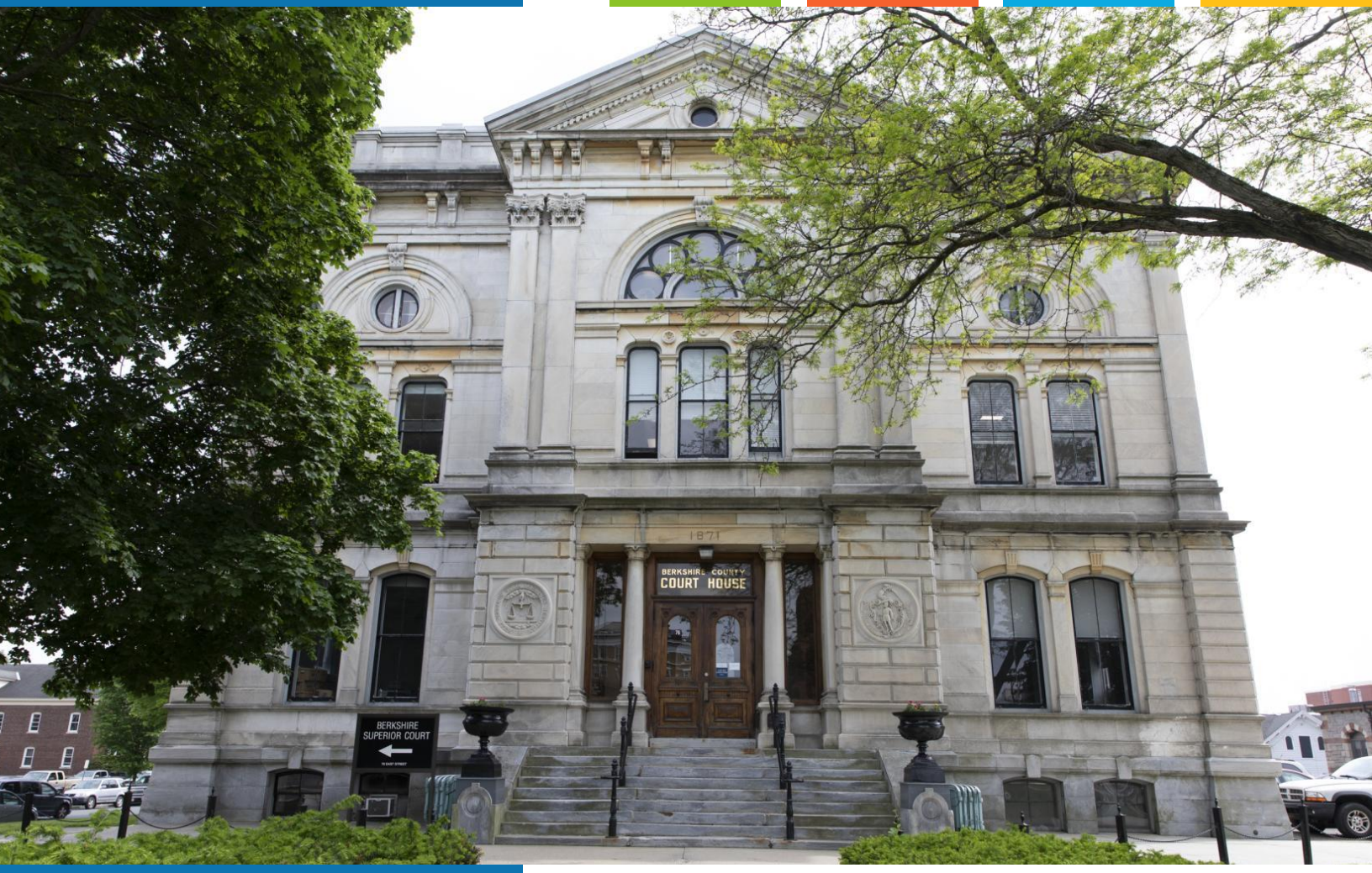
* The unit ventilators serving this space are not functional

** The unit ventilators serving this space only provide minimal outdoor air in their current condition and do not provide the amount shown

2.0 Recommendations

Section	Recommendation/Finding	Action
2.1	Filtration Efficiency	
RF-1	Install MERV 13 filters in cabinet heaters	Complete
RF-3	Install a differential pressure sensor across the filter banks	In-progress
RF-3b	Display pressure sensor and connect to BMS	In-progress
2.2	Testing and Balancing	
RTB-1	Test and rebalance air handling unit supply air and minimum outside air flow rates	Complete
RTB-2	Rebalance system return and/or exhaust flow rate	Complete
RTB-3	Increase outside air flow rate beyond minimum under non-peak conditions for AHU1 and RTU1	Complete
RTB-5	Test and balance all air inlets and outlets in lockup areas	N/A
2.3	Equipment Maintenance and Upgrades	
RE-1	Test existing air handling system dampers and actuators for proper operation	Complete

2.4	Control System	
RC-1	Implement a pre and post-occupancy flush sequence	Complete
RC-2	Install controls to introduce outside air beyond the minimum requirements for AHU-1 and RTU-1	Complete
RC-4	Confirm the economizer control sequence is operational	Complete
2.5	Additional Filtration and Air Cleaning	
RFC-1	Install portable HEPA filters in high traffic areas – *if courthouse is to operate at a high occupancy (i.e. 50-75% or greater), install portable HEPA filters in high traffic areas.*	Complete
2.6	Humidity Control	
	No actionable items listed – continuous monitoring for seasonal changes	On-going
2.7	Other Recommendations	
2.7.1	Run the supply fan on RTU1 continuously during occupied hours	Complete
2.7.2	Replace unit ventilators	Deferred - included in 5-year Capital Plan
2.7.3	Install new dedicated outdoor air ventilation systems for areas without ventilation	Deferred - included in 5-year Capital Plan
2.7.4	Verify toilet exhaust fans and controls are working and replace as necessary	Complete
2.7.5	Replace AHU1	Deferred - included in 5-year Capital Plan



Berkshire County Superior Court
Pittsfield, MA

HVAC SYSTEM EVALUATIONS COVID-19

Office of Court Management

May 11, 2021

Tighe&Bond

100% Recyclable

Section 1
Existing Conditions and Site Observations

Tighe & Bond visited the Pittsfield Superior Court on October 2, 2020. While on site, we inspected the air handling units and other associated heating and cooling equipment and toured the occupied portions of the building to determine if the spaces generally matched usage noted on the architectural plans.

Site Visit Attendees:

- Office of Court Management:
    - Michael Briggs, Facilities
- Tighe & Bond:
    - Sean Pringle, PE, Project Mechanical Engineer

1.1 Existing Ventilation System Description

The courthouse is a four-story building (including basement), constructed in 1871, with a floor area of approximately 25,000 gross square feet.

The most recent major HVAC system renovation occurred in 1962. HVAC improvements have been made on a smaller scale since then. In 2010, the law library rooftop unit (RTU) was replaced, ventilation was added to areas via a small energy recovery ventilator (ERV), and wall-mounted heat pump air conditioning (AC) units were added to many areas. The controls for the courtroom air handling unit (AHU) have also been upgraded to electronic controls.

Most areas of the building (excluding the main courtroom, law library, lockup, and areas served by the ERV) do not have any mechanical ventilation. While the wall AC units in many rooms do re-circulate air to provide heating and cooling, they do not provide any outdoor ventilation air, and the filtration provided by these units is minimal. Building areas without adequate ventilation and filtration significantly increase the risk of spreading viruses like COVID-19, especially areas with high occupant density and where people occupy the same space for relatively long periods of time. Consider significantly reducing occupancy or relocating occupants to other areas with adequate ventilation.

The above grade perimeter rooms generally have large windows with operable sashes. The basement windows also have operable sashes, but they are much smaller.

The building is heated with steam fed from the District Court building. Most areas are heated with steam radiators controlled by local pneumatic thermostats. Cooling is provided by various wall or window AC units in areas not served by air handling units. Condensing units are located on the roof.

The main courtroom is heated, cooled, and ventilated by a constant volume air handling unit (AHU-1) located in the attic. This AHU has a steam heating coil with face and bypass dampers, a DX cooling coil in the downstream ductwork, and an associated exhaust fan exhausting directly from the space. The unit appears to be from the 1962 renovation.

While very old and well beyond its useful life, the unit is in fair condition, appears to be well maintained, and has updated electrical controls.

The law library is heated with perimeter radiators and cooled with a cooling-only rooftop air conditioning unit RTU-1. The unit is in good condition and is approximately 5-10 years old. This unit can provide minimum ventilation air as well as 100% outside air during economizer operation. The fan currently only runs when there is a call for cooling. As a result, the law library is without any ventilation throughout the winter and shoulder seasons and is only ventilated when a call for cooling is present.

An energy recovery ventilator (ERV-1) located in a closet in the law library provides ventilation air to two conference rooms (M03 and M04) on the mezzanine level, and two offices (112 and 113) on the first floor. At the time of the visit, the unit was not running as the staff were not aware of its intended purpose. It was turned on during the visit and appeared be in working condition.

Several rooms have unit ventilators that at one point provided outside air through ductwork connected through the wall to intake air louvers. These units have steam heating coils and no cooling capability. These were observed in the jury pool room, jury break room, grand jury room, and the 1st floor housing court. These units are in poor condition and most of them are no longer functional. Many of the outside air ducts have been disconnected and filled with insulation. According to staff, the unit in the jury break room is still working and drawing in some outside air.

The second floor lockup area was renovated in 2000. This area is ventilated with a 100% outside air fan coil unit, FC-1. Air is supplied directly into the cells and exhausted from the cells. The exhaust rate is slightly greater than the supply, to maintain an airflow pattern that flows from the corridor into the cells.

There are several private toilet rooms that are exhausted via rooftop and wall exhaust fans. Toilet room 114 did not appear to be operational at the time of the visit. Other toilet rooms that were checked were operational.

Table 1 summaries the air handling units' designed airflow rates, the MERV rating of the filters and the condition.

TABLE 1
Existing Air Handling Units

Unit	Original Design Airflow (CFM)	Original Design Min. O.A. (CFM)	Filters	Condition
AHU-1	5,500	2,750	2" MERV 13	Fair
RTU-1	2,800	300	2" MERV 8	Good
Unit Ventilators (typical)	500	500	Not Observed	Poor to Non-functional
ERV-1	Unknown	Unknown	Not Observed	Good
FC-1	205	205	Not Observed	Not Observed

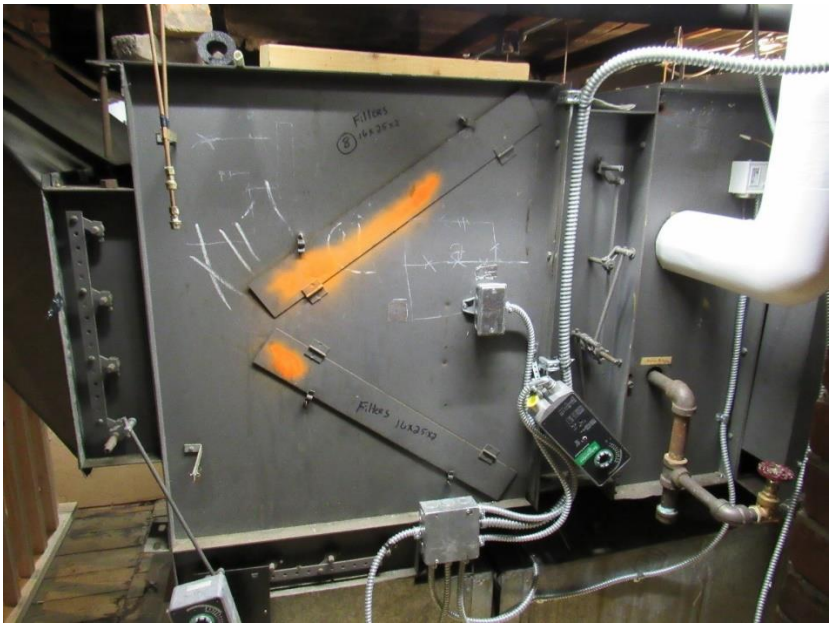


Photo 1 –Attic Air Handler

1.2 Existing Control System

The courthouse has a limited building management system (BMS) that controls AHU-1, RTU-1, and monitors temperatures within the space. This system serves all three Pittsfield courthouses. We understand that the system provides the following controls:

1. RTU-1
    a. Cooling call based on space temperature.
2. AHU-1
    a. Start/stop based on an occupancy schedule.
    b. Economizer mode – 100% outdoor air.
    c. Supply air temperature control and supply temperature reset.
    d. Other: Safeties and alarms.

The steam radiators and unit ventilators utilize pneumatic controls, including pneumatic thermostats. According to facilities staff, the pneumatic controls for the unit ventilators are mostly non-functional. Freeze protection and outside air damper controls are no longer operational.

The window air conditioners and wall mounted heat pump units use local thermostats.

Section 2
Recommendations

Below is a list of recommendations that we propose for the Pittsfield Superior Courthouse. Please refer to the "Master Recommendation List" for further explanation and requirements of the stated recommendations.

2.1 Filtration Efficiency Recommendations

We recommend the following measures be implemented for the existing air handling equipment.

RF-1: *Replace filters with a MERV-13 filter.*

The Testing and Balancing (TAB) Contractor and Engineer shall verify that the existing air handlers can accommodate MERV-13 filters. Replace filters in RTU-1, ERV-1, FC-1, unit ventilators, and cabinet unit heaters with 1" or 2" pleated MERV 13 filters as applicable. The filters in AHU-1 have already been changed to MERV-13.

RF-3: *Install a differential pressure sensor (switch) across the filter banks.*

This measure is only practical for AHU-1.

RF-3b: *Pressure sensor (switch) shall have a display and be connected to the BMS system*

2.2 Testing & Balancing Recommendations

It is unknown to Tighe & Bond when the last time the units were tested and balanced. Also, the code required outside air flow rates that were used to design the system in 1962 are different than the 2015 International Mechanical Code (IMC) and ASHRAE Standard 62.1. Prior to any rebalancing efforts, all controls including dampers, actuators, and pneumatic systems should be tested to ensure they are operating correctly.

We recommend the following measures be implemented:

RTB-1: *Test and rebalance air handling unit supply air and minimum outside air flow rates.*

For the areas with ventilation systems, we recommend rebalancing the equipment to the values shown in Table 2. After rebalancing, the spaces should be monitored during peak heating and cooling conditions to confirm space temperature can be maintained.

TABLE 2
Recommended Air Handler O.A. Flow Rates

Unit	Original Supply Airflow (CFM)	Original Design Min. O.A. (CFM)	Current Code Min. O.A. Requirements (CFM)	Recommended Minimum O.A. (CFM)
AHU-1	5,500	2,750	1,320	2,750
RTU-1	2,800	300	325	325
Unit Ventilators (typical)	500	500	175-325	500
ERV-1	Unknown	Unknown	112	115
FC-1	205	205	160	205

Where the outside airflows calculated by Tighe & Bond are less than the original design values, we recommend using the original designed values, as these exceed the calculated code minimums and will likely result in improved indoor air quality (IAQ).

Since many of the unit ventilators are inoperable and do not have functioning freeze protection, the units should be replaced. At a minimum the controls should be repaired prior to rebalancing and outside air ductwork reconnected. However, this is not a permanent solution and replacement will be needed in the near future.

The airflow rate per person is shown below in Table 3. These values are based on the recommended outdoor airflow and the original design supply airflow rates shown in Table 2 above. Only the areas with ventilation are shown. This table assumes the unit ventilators are operational.

TABLE 3
Average Airflow Rate Per Person

	All Spaces	***Main Courtroom***	***Small Courtroom***	***Non-Courtroom spaces***
Total Occupancy (People)	350	180	53	115
Total Supply Air (CFM/Person)	30	31	9	40
Outdoor Air (CFM/Person)	15	15	9	18

The airflow rate per person for each Courtroom and the Jury Pool is shown below in Table 4. These values are based on full occupancy without taking diversity into account, the original design supply airflow rate, and the recommended outdoor airflow rate. The airflow rate per person assumes the full supply and outdoor airflow is being delivered to the room, and the equipment is operational.

TABLE 4
Airflow Rate per Person (Full Occupancy)

		Total Air		Outdoor Air	
Courtroom	Total People	Supply Airflow (CFM)	Airflow Rate (CFM/Person)	Outside Airflow (CFM)	Airflow Rate (CFM/Person)
Jury Pool Break Room**	27	500	15	500	15
Jury Pool Room*	34	500	15	500	15
Main Courtroom	180	5,500	30	2,750	15
Small Courtroom*	53	500	9	500	9

Note: Courtroom occupant density is based on 70 people/1,000 square feet, per the 2015 International Mechanical Code.
*The unit ventilators serving this space are not functional.
**The unit ventilators serving this space only provide minimal outdoor in their current condition and do not provide the amount shown.

The airflow rate per person for each Courtroom and the Jury Pool Room, based on a reduced occupancy schedule determined by the Office of Court Management, is shown below in Table 4a. The airflow rate per person assumes the full supply and outdoor airflow is being delivered to the room, and the equipment is operational.

TABLE 4a
Airflow Rate per Person (Reduced Occupancy)

		Total Air		Outdoor Air	
Courtroom	Total People	Supply Airflow (CFM)	Airflow Rate (CFM/Person)	Outside Airflow (CFM)	Airflow Rate (CFM/Person)
Jury Pool Break Room**	16	500	31	500	31
Jury Pool Room*	20	500	25	500	25
Main Courtroom	35	5,500	157	2,750	79
Small Courtroom*	18	500	28	500	28

Note: If occupancy is further reduced, the airflow rate per person will increase, assuming full airflow is being delivered to the space.
*The unit ventilators serving this space are not functional.
**The unit ventilators serving this space only provide minimal outdoor in their current condition and do not provide the amount shown.

RTB-2: *Rebalance system return and/or exhaust flow rate*

After all repairs are made and equipment providing ventilation air has been balanced, re-balance the exhaust fan associated with AHU-1 so that the courtroom space is slightly positive relative to the outdoors with all equipment operating.

RTB-3: *Increase outside air flow rate beyond minimum under non-peak conditions*

This measure is recommended for AHU-1 and RTU-1 only.

RTB-5: *Test and balance air inlets and outlets*

This measure is recommended for the lockup areas only. The lockup ventilation strategy is based on maintaining a slight airflow deficit in the cells relative to the corridors in the lockup area. To reduce the risk of one prisoner infecting others, it is important that the air balance is correct. If any exhaust grilles have been accidently closed or if the supply air flow is too high in these areas, the likelihood of cross contamination increases. Balance to match the airflows shown on the 2000 design drawings.

2.3 Equipment Maintenance & Upgrades

RE-1: *Test existing air handling system dampers and actuators for proper operation*

Replace dampers and actuators that are not functioning.

2.4 Control System

We recommend the following control system strategies be implemented into the existing control system:

RC-1: *Implement a pre- and post-occupancy flush sequence*

Adjust the occupancy schedule in the BMS for AHU-1 and RTU-1. For manually operated equipment, turn on three hours prior occupancy, and off three hours after occupancy.

Consider adding controls to automate the scheduled operation of toilet exhausts, unit ventilators, and other equipment that is currently manually operated.

RC-2: *Install controls required to introduce outside air beyond the minimum requirements*

This measure is recommended for AHU-1 and RTU-1 only.

RC-4: *Confirm the economizer control sequence is operational.*

2.5 Additional Filtration and Air Cleaning

Based on conversations with the client, we understand that they would prefer to prioritize improving existing ventilation systems to the extent possible over portable filtration or air cleaning devices such as bipolar ionization or UVGI.

RFC-1: *Install portable HEPA filters.*

If the Courthouse is to operate at a high capacity (i.e. 50% occupancy or greater), we recommend installing portable HEPA filters in high traffic areas, such as entrance lobbies. They should also be considered for any areas without mechanical ventilation where people gather or work in close proximity, depending on the occupancy of the room and how much noise is generated from the filters. The noise levels will vary depending on the manufacturer and unit capacity.

2.2 Humidity Control

Installing duct mounted or portable humidifiers can help maintain the relative humidity levels recommended by ASHRAE. The feasibility of adding active humidification is determined by the building envelope. Buildings that were not designed to operate with active humidification can potentially be damaged due to a lack of a vapor barrier, adequate insulation, and air tightness.

Duct mounted humidifiers must be engineered, integrated into the building control system, tested, and commissioned. They are available in many configurations but require substantial maintenance and additional controls. They also run the risk of adversely affecting IAQ from growing microorganisms, or leaking water through poorly sealed ductwork damaging insulation and ceilings. Portable humidifiers are easier to install and require less maintenance, but still have the potential to damage the building envelope.

While active humidification is not recommended as a whole building solution due to high installation costs, operational costs, potential to damage the building envelope and adversely affect poor IAQ, it may be warranted as a temporary solution in specific areas where individuals with an increased health risk, as defined by the CDC, are required to be at work.

The lockup area may present an increased risk and benefit from local humidification. The lockup area is a 100% outside air system. This lockup area has a relatively high ventilation rate and will tend to have a lower humidity than other areas. Studies indicate that as relative humidity is reduced below 40%, susceptibility to viruses such as COVID-19 progressively increases.

2.7 Other Recommendations

2.7.1 Run Ventilation Fans Continuously During Occupied Hours

This applies to RTU-1 only. For systems where the fans cycle on and off in response to thermal demand, we recommend running the supply fans continuously during occupied hours to provide mechanical ventilation at all times, as code requires. Implementing this strategy may result in occupant comfort control issues. When the fan continuously runs, the cooling coils will turn on and off based on the space temperature. Comfort issues may arise if the existing units do not have multiple stages of cooling that would otherwise handle load fluctuations more effectively than single stage heating or cooling units.

With the small percentage of outdoor air this unit provides, this impact will likely be limited. However, running the fan continuously with increased quantities of outdoor air will be more likely to cause the issues above. Since this unit serves a library, the introduction of humid outdoor air into the space during the summer and shoulder seasons may not be desirable. Further system analysis and improvements are required to execute this recommendation.

2.7.2 Replace Unit Ventilators

Several high occupant density areas are served by unit ventilators, many of which are inoperable or not connected to outdoor air louvers. Because of the age and condition of the equipment and controls, we recommend replacing the existing units, rather than

making repairs. We recommend the new units be connected to the BMS system for better controllability and the ability to implement an occupancy schedule.

Consider adding additional unit ventilators to serve additional high occupant density areas without ventilation, such as the jury deliberation room on the second floor.

If the unit ventilators are not replaced in the short term, at a minimum, they will require significant control improvements before they will be useable for outside air ventilation.

2.7.3 Install New Dedicated Outdoor Air Ventilation Systems for Areas Without Ventilation

Much of the building is without any mechanical ventilation. However, the existing air conditioning and steam heating systems appear to be in good condition. Consider the addition of a dedicated outdoor air system (DOAS) to provide the code-required ventilation to each space. The use of energy recovery as part of this system can reduce the operating cost to provide the required ventilation air.

Depending on the available space for ductwork, it may be more practical to serve high occupant density areas with unit ventilators.

The addition of a DOAS (or any whole building ventilation system) will require a substantial and invasive construction project. New ductwork would be required to serve perimeter rooms. Due to the constraints of the existing building construction, adding new ductwork may be difficult. The use of a DOAS reduces the size of the ductwork and may reduce the impact to finished areas.

2.7.4 Replace Toilet Exhaust Fans and Controls

At the time of the visit, at least one toilet room exhaust did not appear to be working and requires replacement. We recommend verifying which exhaust fans work and to replace the fans that are inoperable. Where existing registers do not have balancing dampers, install similar registers with integral opposed blade dampers.

If all new ventilation systems are provided for the Courthouse, a more energy efficient option is to route the toilet exhausts through a heat recovery system, if possible, and eliminate individual exhaust fans. This will eliminate several exhaust fans, reducing fan maintenance, and allow the toilet exhaust air to precondition supply air, saving on heating and cooling costs.

2.7.5 Replace AHU-1 and EF-1

While still operational and in fair condition, this AHU-1 is approximately 70 years old and far beyond its expected useful life. Consider replacing this unit in the short term. Replacing this unit with a more energy efficient unit will result in reduced operating costs. Consider the use of energy recovery and/or demand-controlled ventilation with any new system.

Section 3
Testing & Balancing Results

On November 10, 2020 Wing's Testing & Balancing visited the Pittsfield Superior Courthouse to test the airflow rates of the air handling units and the exhaust fans. A summary of the tested airflow rates versus the design airflow rates are shown below in Tables 5 and 6. Their full testing and balancing report is attached.

TABLE 5
Air Handler Testing & Balancing Results

	Design			Actual		
Unit	Total Supply Fan Airflow (CFM)	Recommended Outdoor Airflow (CFM)	Return Airflow (CFM)	Supply Fan Airflow (CFM)	Outdoor Airflow (CFM)	Return Airflow (CFM)
AHU-1	5500	2750	2750	4224	2094	2130
RTU-1	2800	325	2475	N/T	510	N/T
ERV-1	125	125	125	121	121	124
FC-1	205	205	N/A	N/T	N/T	N/T
UV-Jury	500	500	N/A	N/T	N/T	N/T

N/S: Not Specified N/T: Not Tested N/A: Not Applicable

TABLE 6
Exhaust Fan Testing & Balancing Results

Unit	Serving	Design Return/Exhaust Airflow (CFM)	Actual Return/Exhaust Airflow (CFM)
EF-1	Courtroom	N/S	1100

In reviewing the airflow report data, the following should be noted:

1. AHU-1 is underperforming. The supply and outdoor air are 23% below the design airflow. The motor is operating near maximum current and the sheave is fully closed. If the motor were changed to a 2 HP motor, and the pulleys were changed, the airflow should be able to meet the required airflow. Also consider checking and cleaning the coils if needed, including the downstream DX coil.
2. RTU-1 was found to be providing adequate outdoor air. The total supply air could not be checked as a suitable measurement point was not available.
3. ERV-1 is operating within the acceptable range
4. FC-1 & EF-1 serving the lockup area were not operating and could not be tested. This system should be repaired and retested.
5. The unit ventilators serving the jury room and jury break rooms were not tested.

Wings Testing and Balancing also noted the following findings in their report:

1. RTU-1 was found to be operating above the motor's full load current. The belt sheave was seized and could not be adjusted. The sheave should be freed or replaced, and the motor slowed down so that the current is below the full load current.

Disclaimer

Tighe and Bond cannot in anyway guarantee the effectiveness of the proposed recommendations to reduce the presence or transmission of viral infection. Our scope of work is intended to inform the Office of Court Management on recommendations for best practices based on the guidelines published by ASHRAE and the CDC. Please note that these recommendations are measures that may help reduce the risk of airborne exposure to COVID-19, but cannot eliminate the exposure or the threat of the virus. Implementing the proposed recommendations will not guarantee the safety of building occupants. Tighe & Bond will not be held responsible should building occupants contract the virus. The Office of Court Management should refer to other guidelines, published by the CDC and other governing entities, such as social distancing, wearing face masks, cleaning and disinfecting surfaces, reducing occupancy levels, etc. to help reduce the risk of exposure of COVID-19 to building occupants.

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WING'S TESTING & BALANCING CO., INC.

Berkshire County Courthouse
HVAC/Ventilation Survey

* * * *

Tighe & Bond
Attn: Jason Urso
53 Southampton Road
Westfield, MA 01085

November 10, 2020

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WING'S TESTING & BALANCING CO., INC.

Tighe & Bond
Attn: Jason Urso
53 Southampton Road
Westfield, MA 01085

November 10, 2020

Re: Berkshire County Courthouse/HVAC Ventilation Study

Dear Jason,

The testing and balancing of the above referenced location have been completed. While onsite, we worked with the in-house technicians. The following are our results.

- AHU-1 is at 77% of design CFM. Outside air damper minimum position was set to 50%. OA was set proportionally to total design. Courtroom Exhaust Fan is at 1102 CFM and courtroom is positive.
- RTU-1 had no access to measure unit total. The motor was found to be running above full load amperage. We attempted to slow the unit down to full load amperage. Belt is overly tight and motor sheave is seized and could not be opened. Due to these issues the motor could not be slowed down.
- ERV-1 is operating at design flow for both supply and exhaust.
- FC-1/EF-1 does not appear on BMS. Unit is not running and could not be tested.

Recommendations

- Repair motor mount for RTU-1. Seized sheave needs to be freed. Motor should then be slowed down so it stops running over amperage.
- Have FC-1/EF-1 repaired and properly operational so it can be tested.

This report has been updated to include Brake Horsepower (BHP) calculations. When a motor has a VFD, we take the amperage measurements from there. When we calculate from volts and amps, it means there has to be a nameplate on the motor. Many times, these are missing or illegible. If BHP is not listed for an individual motor, this is because we do not have enough information to calculate it. It should be noted that that the older a motor is, the less likely it is to follow the affinity laws for BHP- since the efficiency degrades over time. We have used accepted constants for efficiency and the power factor, which should result in fairly close calculations, but are not as accurate for older motors.

November 10, 2020
Berkshire County Courthouse

The following pages are your record of current operating conditions. If you have any questions, or if we can be of further service, please do not hesitate to call.

Very truly yours,
Wing's Testing & Balancing Co., Inc.
ICB Certified Contractor for:
TABB—Commissioning—Fire/Life Safety L1&L2—Sound & Vibration

Nick Carrano

Nicholas Carrano
Certified TABB Technician BB1160780T

SUPPLY FAN REPORT

PROJECT: Berkshire County Courthouse					**DATE:** 11/10/20	
AREA SERVED: Various					**TECH:** NC	
FAN DATA						
FAN NUMBER	RTU-1		ERV-1 Supply		ERV-1 Exhaust	
LOCATION	Rooftop		Library Closet		Library Closet	
AREA SERVED	Law Library-Cooling (1)		NA		Library Closet	
MANUFACTURER	Trane		Renew Aire		Renew Aire	
MODEL OR SIZE	WSC090ER0A05G0C0A		BR130		BR130	
	DESIGN	**ACTUAL**	**DESIGN**	**ACTUAL**	**DESIGN**	**ACTUAL**
TOTAL CFM	2800	NA	125	121	125	124
RETURN AIR	2475	NA	---	---	---	---
OUTSIDE AIR	325	510	125	121	---	---
DISCH. STATIC	---	+0.1"	---	+0.1"	---	-0.025"
SUCTION STATIC	---	-1.6"	---	-0.65"	---	-0.81"
TOTAL STATIC	ND	1.7"	ND	0.75"	ND	0.835"
FAN RPM	ND	---	ND	NA	ND	---
PULLEY O.D.	AK64x1"		DD		DD	
ESP	NA		NA		NA	
VFD SPEED	NA		NA		NA	
O.A.D.MIN POS	100% closed		NA		NA	
MOTOR DATA						
MANUFACTURER	Marathon		NA (3)		NA (3)	
MODEL OR FR.	56		NA (3)		NA (3)	
HORSEPOWER	1.5	1	0.1	(3)	---	---
MOTOR RPM	1725	1725	ND	NA	---	---
VOLTAGE / PH.	230/3	230/3	120/1	120/1	---	---
AMPS LEG 1	3.5	5.3	1.3	1.3	---	---
AMPS LEG 2	3.5	5.4	---	---	---	---
AMPS LEG 3	3.5	5.4	---	---	---	---
SHEAVE O.D.	1VL 40 x 5/8" (2)		DD			
BELTS - QTY / SIZE	1/A33		DD			
SHEAVE POSITION	100% Closed		DD			
BHP	2.3					

REMARKS

(1) Cooling unit, only runs during summer
(2) Sheave seized and motor mount slide plate gearing is broken
(3) One motor serves both sides of ERV
NA-Not Available
ND-No Design DD-Direct Drive

SUPPLY FAN REPORT

PROJECT: Berkshire County Courthouse	**DATE:** 11/10/20
AREA SERVED: Courtroom	**TECH:** BS

FAN DATA						
FAN NUMBER	AHU-1					
LOCATION	Attic					
AREA SERVED	Courtroom					
MANUFACTURER	Trane					
MODEL OR SIZE	T14					
	DESIGN	**ACTUAL**	**DESIGN**	**ACTUAL**	**DESIGN**	**ACTUAL**
TOTAL CFM	5500	4224				
RETURN AIR	2750	2130				
OUTSIDE AIR	2750	2094				
DISCH. STATIC	---	+0.16"	---		---	
SUCTION STATIC	---	-0.36"	---		---	
TOTAL STATIC	ND	0.52"				
FAN RPM	ND	---				
PULLEY O.D.	14.0"					
ESP	NA					
VFD SPEED	NA					
O.A.D.MIN POS	50%					
MOTOR DATA						
MANUFACTURER	GE					
MODEL OR FR.	184					
HORSEPOWER	1.5	1.5				
MOTOR RPM	1730	1730				
VOLTAGE / PH.	460/3	230/3				
AMPS LEG 1	5.0	4.0				
AMPS LEG 2	---	3.9	---		---	
AMPS LEG 3	---	3.9	---		---	
SHEAVE O.D.	4.0"					
BELTS - QTY / SIZE	1/Ax75					
SHEAVE POSITION	100% Closed					
BHP	1.2					

REMARKS

NA-Not Available
ND-No Design DD-Direct Drive

VELOCITY PRESSURE READINGS

PROJECT: Berkshire County Courthouse | **DATE:** 11/10/20

AREA SERVED: Various | **TECH:** NC BS

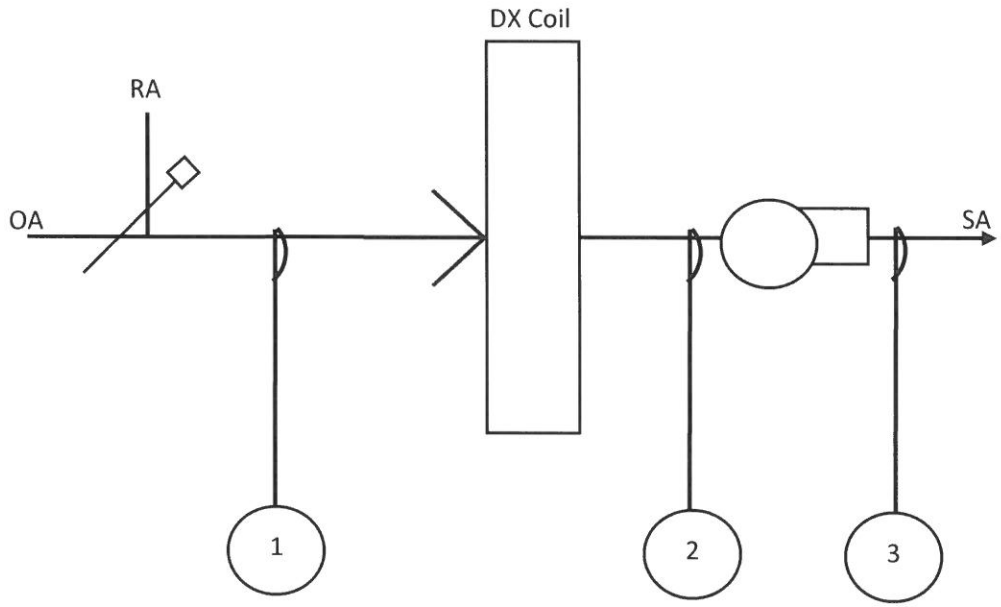
TRAVERSE LOCATIONS	DUCT SIZE "	AREA SQ.FT.	DESIGN		CENTERLINE STATIC PRES."	TEST		NOTES
			FPM	CFM		FPM	CFM	
RTU-1								
O.A. Minimum	36" x 15"	3.75	87	325	w/velgrid	136	510	(1)
ERV-1								
Supply	10" x 6"	0.42	298	125	+0.1"	289	121	
Exhaust	6" x 6"	0.2	625	125	Animometer	619	124	
AHU-1								
Supply Total	48" x 18"	6	917	5500	+0.13"	704	4224	
O.A. Minimum	30" x 30"	6.25	440	2750	-0.03"	335	2094	
Courtroom EF	23" x 23"	3.67	ND	ND	-0.06"	300	1102	

REMARKS

(1) O.A. damper 100% closed

SYSTEM STATIC PRESSURE PROFILE

PROJECT: Berkshire County Courthouse	**DATE:** 11/10/20
SYSTEM/AREA SERV: RTU-1 Law Library	**TECH:** NC



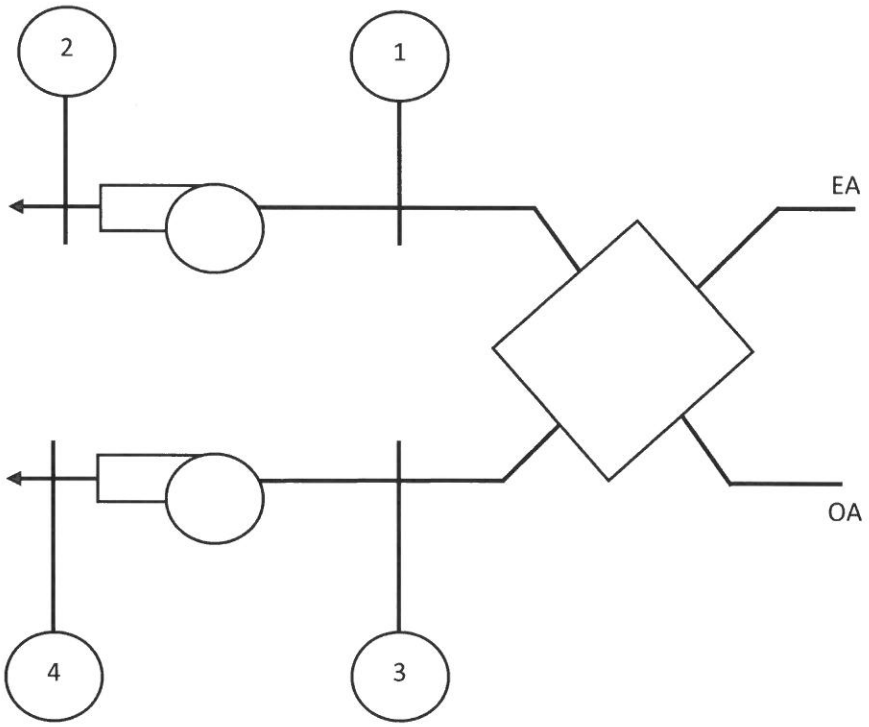
STATIC PRESSURE READINGS "wc

POS. (+) / NEG.(-)	1	2	3	4	5	6	7	NOTES
RTU-1	-1.3"	-1.6"	+0.1"					

REMARKS

SYSTEM STATIC PRESSURE PROFILE

PROJECT: Berkshire County Courthouse	**DATE:** 11/10/20
SYSTEM/AREA SERV: ERV-1	**TECH:** BS



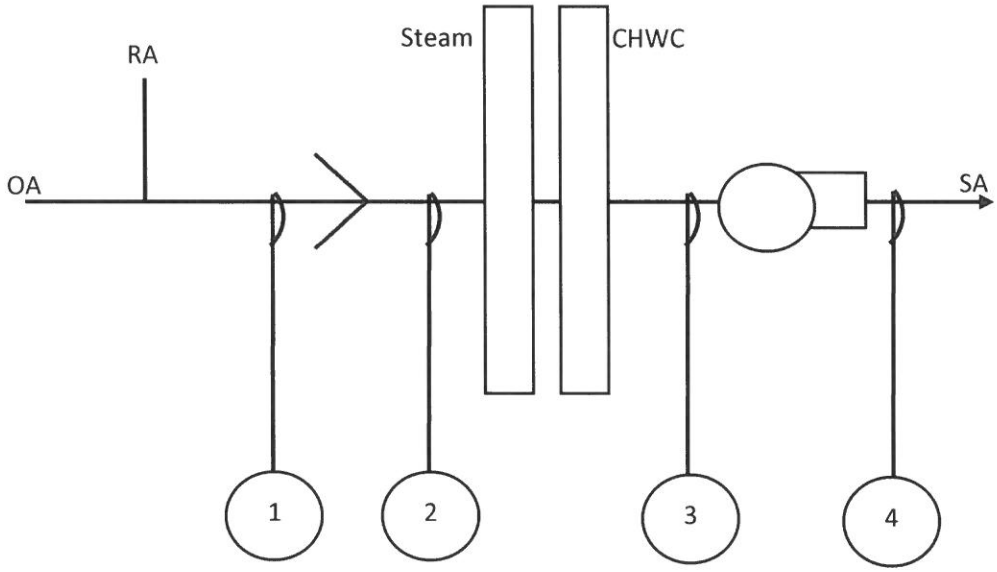
STATIC PRESSURE READINGS "wc

POS. (+) / NEG.(-)	1	2	3	4	5	6	7	NOTES
Supply	0.65"	+0.1"						
Exhaust			-0.81"	-0.025"				

REMARKS

SYSTEM STATIC PRESSURE PROFILE

PROJECT: Berkshire County Courthouse	**DATE:** 11/10/20
SYSTEM/AREA SERV: RTU-1 Law Library	**TECH:** BS



STATIC PRESSURE READINGS "wc

POS. (+) / NEG.(-)	1	2	3	4	5	6	7	NOTES
AHU-1	-0.05"	-0.2"	0.36"	+0.16"				

REMARKS