PITTSFIELD DISTRICT COURT
HVAC SYSTEM EVALUATION SUMMARY

Visited October 14, 2020. While on site, inspected the air handling equipment located in the mechanical rooms and toured the facility to determine if the spaces generally matched usages noted on the architectural plans. Pittsfield District Court was constructed in 1927 and is approximately 20,500 square feet in size. One Trane indoor air handling unit (HVAC-1) located in the basement serves the basement, and one Carrier rooftop air handling unit (RTU-1) serves Courtroom 206. HVAC-1 contains DX (refrigerant) cooling and a steam heating coil. RTU-1 contains DX cooling and electric heat. Both units contain one 2", MERV 10 filter. RTU-1 is in excellent condition.

1.0 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)*
Courtroom 106	17	0	0	0	0
Courtroom 117	13	0	0	0	0
Courtroom 206	20	2,800	140	300	15

2.0 Recommendations

Section	Recommendation/Finding	Action
2.1	**Filtration Efficiency**	
RF-1	Replace filters with MERV 13	Complete
RF-3	Install a differential pressure sensor (switch) 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
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
2.5	**Additional Filtration and Air Cleaning**	
RFC-1	Install portable HEPA filters.	In-progress
2.6	**Humidity Control**	
	No actionable items listed – continuous monitoring for seasonal changes	Ongoing
2.7	**Other Recommendations**	
2.7.1	Mechanical Ventilation Feasibility Study	Deferred – 2 years

Pittsfield District Courthouse
Pittsfield, MA

HVAC SYSTEM EVALUATIONS COVID-19

Office of Court Management

March 10, 2021

Tighe&Bond

100% Recyclable

Section 1
Existing Conditions & Site Observations

Tighe & Bond visited Pittsfield District Court on October 14, 2020. While on site we inspected the air handling equipment located in the mechanical rooms and toured the facility to determine if the spaces generally matched usages noted on the architectural plans. The HVAC drawings provided to Tighe & Bond was very limited in nature.

Site Visit Attendees:

- *Office of Court Management:*
  - Marc Latimer Courthouse Facilities Staff
- *Tighe & Bond*
  - Jason R. Urso, PE, Mechanical Engineer

1.1 Existing Ventilation System

Pittsfield District Court was constructed in 1927 and is approximately 20,500 square feet in size. One Trane indoor air handling unit (HVAC-1) located in the basement serves the basement and one Carrier rooftop air handling unit (RTU-1) serves Courtroom 206 on the second floor. HVAC-1 contains DX (refrigerant) cooling and a steam heating coil. RTU-1 only contains DX cooling. Both units contain one 2", MERV 10 filter. RTU-1 is in excellent condition.

Air handling unit HVAC-1 appears to have been installed during a 2000 renovation and is in fair condition. The duct mounted outdoor air damper and actuator appear to be in good condition, but the damper appeared to be closed or mostly closed during our site visit. According to the design drawings, this unit supplies air to basement areas such as the holding areas, Control Room, Attorney Conference Room, hallway, entry vestibule, and a holding room on the first floor. An inline exhaust fan, located in the basement, exhausts the holding areas at a slightly higher airflow rate than is supplied, creating an overall negative airflow pattern in each cell.

There is no mechanical ventilation in the other areas of the building, including the first floor Courtrooms and office space. There are large wall mounted grilles in Courtroom 117, however we could not confirm what these grilles are connected to. There are large gravity vents on the roof that may connect to these openings, possibly acting as a natural ventilation system. Courtroom 117 is air conditioned with a ductless mini split air conditioner.

Rooms along the exterior of the building have operable windows and are heated with either steam radiators or hot water fan coil units. A fan coil unit in Small Claims Court 106 was inspected and was found to contain a 1" clean filter and clean hot water coil. It appears the fan coil units were at one time connected to an outdoor air louver through the wall however, the wall was infilled with insulation behind the fan coil unit. The toilet room in the first floor Judges Chambers does not contain an exhaust fan. Some office spaces are cooled with window air conditioning units.

Two exhaust fans on the roof were in excellent condition and were operating at the time of our visit.

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

TABLE 1
Existing Air Handling Units

Unit	Original Design Airflow (CFM)	Original Design Min. O.A. (CFM)	Filters	Condition
HVAC-1	1,400	750	MERV 10	Fair
RTU-1	2,800	300	MERV 10	Excellent

Two HB Smith steam boilers, model 28HE-7 provide steam to radiators and to air handler HVAC-1. A steam to hot water heat exchanger serves a hot water loop that serves perimeter fan coil units.

Photo 1 – RTU-1

Photo 2 – HVAC-1

1.2 Existing Control System

The Courthouse has a very limited building management control system (BMS). According to facilities staff, they only have the ability to control space temperature setpoints.

Section 2
Recommendations

Below is a list of recommendations that we propose for Pittsfield District Court. 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 the existing air handling equipment.

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

We recommend replacing the MERV 10 filters in both air handlers with MERV 13 filters. Prior to installing the filters, we recommend that a testing and balancing contractor test and document the static pressure profile of the units, as outlined in recommendation RF-1 in the *Master HVAC System Recommendation List*. This will help determine if the units can accommodate an increase in system static pressure.

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

Installing a differential pressure sensor across the filters will help facility staff identify when filters should be changed.

RF-3b: *Pressure sensor shall have a display and be connected to the BMS system and/or a local alarm.*

2.2 Testing & Balancing Recommendations

According to the HVAC design drawings, air handling unit HVAC-1 is approximately 20 years old and RTU-1 is approximately 10 years old. It is unknown to Tighe & Bond when the last time the units were tested and balanced. Also, the code requirements to determine the outside air flow rates that were used to design the original system were different than the 2015 International Mechanical Code (IMC) and current ASHRAE Standard 62.1 requirements.

We recommend the following testing and balancing measures be implemented:

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

We recommend testing and balancing the outdoor air flow rates for all air handling units to the recommended minimum O.A. rates listed in Table 2.

HVAC-1 which serves the holding areas is exceeding the code required outdoor air. However, RTU-1 serving the second floor Courtroom is providing 520 CFM less air than is required by code. The 2010 design drawings where RTU-1 was specified, do not indicate the entering air temperature requirements on the "Packaged Heat Pump Unit" schedule, therefore we cannot confirm the potential outdoor air capacity of this unit. The potential occupancy Courtroom 206 can accommodate

with 300 CFM is 30 people. The Office of Court Management is limiting occupancy of Courtroom 206 to 20 people.

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)
HVAC-1	1,400	750	250	**750**
RTU-1	2,800	300	820	**300**

The average airflow rate per person for only the spaces that are mechanically ventilated is shown below in Table 3. These values are based on the original design supply airflow rate and the recommended outdoor air flow rates shown in Table 2 above. The airflow rate per person assumes a diversity factor of 70% meaning the maximum number of occupants assumed to be in all zones at all times equates to 70% of the code required occupancy.

TABLE 3
Average Airflow Rate per Person – Areas served by HVAC-1 and RTU-1 Only

	All spaces	***Courtroom 206***	***Holding Areas***
Total Occupancy (People)	97	78	26
Total Supply Air (CFM/Person)	43	36	54
Outdoor Air (CFM/Person)	11	4	29

The airflow rate per person for each Courtroom is shown below in Table 4. These values are based on full occupancy without taking diversity into account, the original design supply airflow rate, if any, and the recommended outdoor airflow rate. The airflow rate per person assumes the full supply airflow is being delivered to the room. At times when the supply airflow is reduced due to the space temperature being satisfied, the airflow rate per person will also be reduced.

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)
Courtroom 106	85	0	0	0	0
Courtroom 117	82	0	0	0	0
Courtroom 206	112	2,800	25	300	3

Note: Courtroom occupant density is based on 70 people/1,000 square feet, per the 2015 International Mechanical Code

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 airflow is being delivered to the room. At times when the supply airflow is reduced due to the space temperature being satisfied, the airflow rate per person will also be reduced.

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)
Courtroom 106	17	0	0	0	0
Courtroom 117	13	0	0	0	0
Courtroom 206	20	2,800	140	300	15

We do not recommend increasing the outdoor airflow rate for HVAC-1 and RTU-1 above the minimum under non-peak conditions. These are simple systems and it may be difficult for them to accommodate excess outdoor air. A more economical approach is to limit the occupancy of Courtroom 206.

2.3 Equipment Maintenance & Upgrades

We recommend the following equipment maintenance and upgrades:

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

We recommend testing the outdoor air damper serving HVAC-1 and to replace dampers and/or actuators that are not functioning properly.

2.4 Control System Recommendations

We recommend the following for the control system:

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

Our understanding of the extent of the control system is minimal, but the system is very limited in nature. The system can be expanded to increase automation of the existing system.

2.5 Additional Filtration and Air Cleaning

We recommend the installation of the following air cleaning devices:

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 Courtrooms, depending on the occupancy of the room and how much noise is generated from the filters. The noise levels will vary depending on the capacity of the unit and the manufacturer.

2.6 Humidity Control

Installing duct mounted or portable humidifiers can help maintain the relative humidity levels recommended by ASHRAE. The feasibility of using duct mounted humidification or portable humidifiers 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. We are not aware if this building was constructed to handle a humidification system.

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 some areas.

2.7 Other Recommendations

2.7.1 Mechanical Ventilation Feasibility Study

Most of the Courthouse is not mechanically ventilated. Operable windows do exist and natural ventilation is acceptable per code, however in reality windows are typically not opened during cold or hot outdoor air temperatures. We recommend a study of the Courthouse to determine how feasible it is to install mechanical ventilation in all occupied spaces.

Section 3
Testing & Balancing Results

Wings Testing & Balancing, LLC visited the Pittsfield District Courthouse on January 21, 2021 to test the airflow rates of the air handling units and the exhaust fans. The Office of Court Management's Automatic Temperature Controls (ATC) Contractor was also on site to assist in the balancing process. A summary of the tested airflow rates versus the design airflow rates are shown below in Tables 5 and 6. The 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 Fan Airflow (CFM)**	**Supply Fan Airflow (CFM)**	**Outdoor Airflow (CFM)**	**Return Fan Airflow (CFM)**
HVAC-1	1,400	750	650	1,443	718	725
RTU-1	2,800	300	2,500	2,762	580	2,187

TABLE 6
Exhaust Fan Testing & Balancing Results

Unit	**Serving**	**Design Return/Exhaust Airflow (CFM)**	**Actual Return/Exhaust Airflow (CFM)**
EF-1	Holding Cells	750	634
EF-?	Men's Restroom (On Roof)	Unknown	449
EF-?	Women's Restroom (On Roof)	Unknown	453

We do not have documentation that describes what the two roof mounted exhaust fans serve, therefore we cannot identify what the designed exhaust airflow rate is or should be. Further field investigation is required to trace the ductwork from these fans to each location they serve in order to determine the airflow rates these fans should be operating at.

Typical balancing tolerances for air systems is ±10% of the design airflow. In reviewing the airflow report data, the following should be noted:

1. Both air handlers are performing within acceptable range, however RTU is over ventilating with outdoor air. The TAB report notes the actuator serving the OA damper in RTU is in the fully closed position. We recommend the actuator be

fixed to allow the damper to completely closed. Additional airflow testing may be required after the damper is fixed to rebalance the damper to the proper position.
2. EF-1, serving the holding cells is underperforming by 15%.
3. Since the units contain steam heat and refrigerant cooling, water coil flow rates cannot be documented.

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, etc. to help reduce the risk of exposure of COVID-19 to building occupants.

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WING'S TESTING & BALANCING CO., INC.

Pittsfield District Courthouse
HVAC/Ventilation Survey

* * * *

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

January 21, 2021

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WING'S TESTING & BALANCING CO., INC.

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

January 21, 2021

Re: Pittsfield District Courthouse/HVAC Ventilation Survey

Dear Jason,

We have completed our HVAC/Fresh Air Survey for the above referenced. Through our testing we found that the outside air set up for RTU-1 is packaged and can not be changed by the maintenance crew. The hot water loop is steam and the cooling is direct expansion, so there was no place to take water readings.

This report includes 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.

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

Barry Stratos
Certified TABB Technician BB996928T

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SUPPLY FAN REPORT

PROJECT: Pittsfield District Courthouse				**DATE:** 1/21/21		
AREA SERVED: Various				**TECH:** BS		
FAN DATA						
FAN NUMBER	HVAC-1		RTU-1			
LOCATION	Basement		Roof			
AREA SERVED	Lock Up		Courtroom 2			
MANUFACTURER	Trane		Carrier			
MODEL OR SIZE	LPCAA030		50 HC-D09			
	DESIGN	**ACTUAL**	**DESIGN**	**ACTUAL**	**DESIGN**	**ACTUAL**
TOTAL CFM	1400	1443	2800	2762		
RETURN AIR	650	725	2500	2187		
OUTSIDE AIR	750	718	300	580 (1)		
DISCH. STATIC	---	---	---	---	---	
SUCTION STATIC	---	---	---	---	---	
TOTAL STATIC	---	---	---	---		
FAN RPM	---	1516	---	694		
PULLEY O.D.	2 3/4" x 3/4"		7 1/2" x 1"			
ESP	---		---			
VFD SPEED	No VFD		No VFD			
O.A.D. MIN POS	70%		20%			
MOTOR DATA						
MANUFACTURER	Baldor		Marathon			
MODEL OR FR.	56H		56Y			
HORSEPOWER	1	1	NA	NA		
MOTOR RPM	1725	1725	1725	1725		
VOLTAGE / PH.	208/3	208/3	208/3	208/3		
AMPS LEG 1	3.1	2.9	5.2	4.5		
AMPS LEG 2	---	2.8	---	4.5	---	
AMPS LEG 3	---	2.8	---	4.5	---	
SHEAVE O.D.	3.0" x 3/4"		4 1/4" x 5/8"			
BELTS - QTY / SIZE	1/A38		1/Ax48			
SHEAVE POSITION	75% Open		100% Open			
BHP	0.9		NA			
FILTERS	1/20"x25"x2"		4/20"x20"x2"			

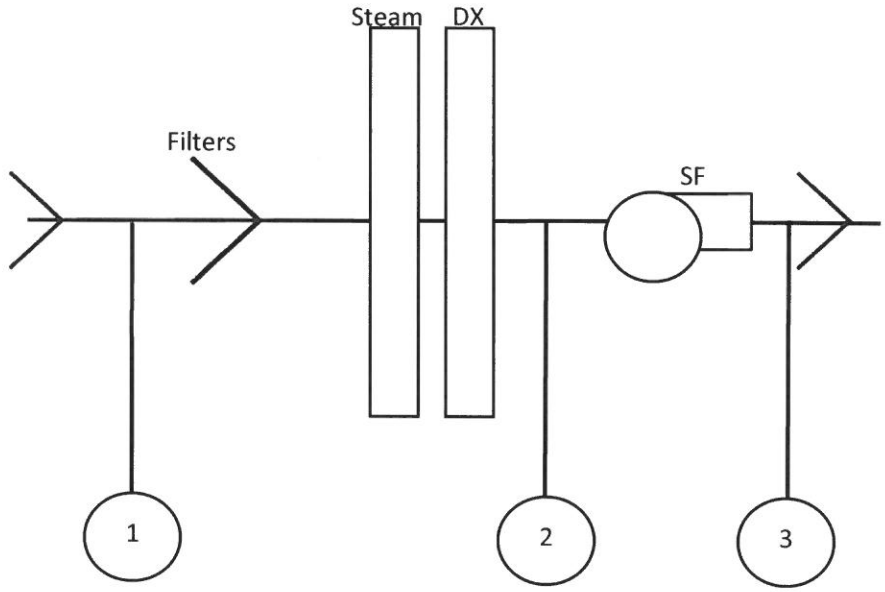
REMARKS

(1) This is at the fully closed position on the OA actuator

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

SYSTEM STATIC PRESSURE PROFILE

PROJECT: Pittsfield District Courthouse	**DATE:** 1/21/21
SYSTEM/AREA SERV: Various	**TECH:** BS



STATIC PRESSURE READINGS "wc

POS. (+) / NEG.(-)	1	2	3	4	5	6	7	NOTES
HVAC-1	-0.27"	-0.86"	+2.02"					
RTU-1	-0.29"	-0.89"	+1.49"					

REMARKS

VELOCITY PRESSURE READINGS

PROJECT: Pittsfield District Courthouse | **DATE:** 1/21/21

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

TRAVERSE LOCATIONS	DUCT SIZE "	AREA SQ.FT.	DESIGN		CENTERLINE STATIC PRES."	TEST		NOTES
			FPM	CFM		FPM	CFM	
RTU-1								
Total	33 1/2" x 23 1/2"	5.47	512	2800	w/velgrid	505	2762	
OA	33 1/2" x 23 1/2"	5.47	55	300	w/velgrid	106	580	(1)
HVAC-1								
Total	9" x 10 1/2"	0.66	2121	1400	+2.36	2186	1443	
OA	16" x 9"	1.0	750	750	-0.04	718	718	
Lock Up Exhaust Fan	16" x 9"	1.0	---	ND	+0.017	634	634	

REMARKS

(1) The outside air set up for this unit is packaged and not able to be controlled by the maintenance crew

EXHAUST FAN REPORT

PROJECT: Pittsfield District Courthouse					**DATE:** 1/21/21	
AREA SERVED: Various					**TECH:** BS	
FAN DATA						
FAN NUMBER		EF-1	Men's Restroom	Womens RestRm		
LOCATION		Basement	Roof	Roof		
AREA SERVED		Lock Up	---	---		
MANUFACTURER		Cook	Dayton	Dayton		
MODEL OR SIZE		DB8	4YC66G	4YC66G		
TOTAL	DESIGN	ND	ND	ND		
CFM	ACTUAL	634	449	453		
FAN	DESIGN	DD	DD	DD		
RPM	ACTUAL	DD	DD	DD		
PULLEY	O.D.	DD	DD	DD		
SERVICE						
MOTOR DATA						
MANUFACTURER		Cook	Dayton	Dayton		
MODEL NUMBER		NA	4YU34	4YU34		
MOTOR	DESIGN	1/6	1/8	1/8		
HP	ACTUAL	1/6	1/8	1/8		
MOTOR RPM		1725	1550	1550		
VOLTAGE/PHASE		115/1	115/1	115/1		
	DESIGN	NA	2.6	2.6		
MOTOR	ACT. LEG 1	6.3	2.3	2.3		
AMPS	ACT. LEG 2	---	---	---		
	ACT. LEG 3	---	---	---		
SHEAVE		DD	DD	DD		
BELTS-QTY/SIZE		DD	DD	DD		
SHEAVE POSITION		DD	DD	DD		
BHP						
REMARKS						