Hampshire County Probate and Family Court
Northampton, MA

HVAC SYSTEM EVALUATIONS COVID-19

Office of Court Management

June 14, 2022

Tighe&Bond

100% Recyclable

Existing Conditions & Site Observations

Tighe & Bond visited the Hampshire County Probate and Family Court on September 17, 2021. While on site, we inspected the air handling equipment located on the roof and toured the occupied portions for the building to determine if the spaces generally matched the expected layout and usage noted on the architectural plans.

Site Visit Attendees:

- *Courthouse Facilities Staff:*
  - Travis Ward, Development Associates
- *Tighe & Bond*
  - Todd Holland, PE, Senior Mechanical Engineer

1.1 Existing Ventilation System

The Hampshire Probate and Family Court occupies the ground floor, and a small interior storage space on the second floor, for a total area of approximately 22,000 square feet of a three-story building built in 2018. This is a leased space in a privately-owned building.

This courthouse spaces are conditioned by four packaged rooftop units (RTUs) that provide heating, cooling, and ventilation air to the building. Each unit contains a supply fan, indirect-fired natural gas furnace, electric direct expansion (DX) cooling coil, 2" thick MERV-13 filter, economizer that allows 100% outdoor air "free" cooling when conditions permit, and power exhaust fans that operate with the economizer.

All four RTUs were new in 2018 and appear to be in very good condition. The OA dampers and actuators, furnaces, and DX coils appeared to be clean and fully functional. However, the outdoor air dampers on all units were fully closed, even though the units were on and the supply fans were running. The design documents do indicate, "At the start of the occupied mode the outdoor air dampers shall be open to the minimum position." However, the minimum position was not designated on the documents that we reviewed.

Each RTU has variable volume and temperature (VVT) controls, which varies airflow delivered to the space while the airflow through the unit remains constant. Zone dampers vary the airflow to individual spaces, and bypass dampers short-circuit supply air back to the return duct when supply air volume is reduced as space temperatures are satisfied. Zone dampers, which are not true variable air volume (VAV) terminals, do have minimum flow settings but do not measure airflow delivered to the space.

The minimum airflows shown on the drawings or schedules range from to 26% to 48%, averaging 30%. This is to ensure adequate room air circulation and outdoor air ventilation as zone loads are reduced.

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

TABLE 1
Existing Air Handling Units

Unit	Original Design Airflow (CFM)	Original Design Min. OA (CFM)	Pre/Final Filters	Condition
RTU-1	4,900	Unknown	2" MERV-13	Very Good
RTU-2	4,300	Unknown	2" MERV-13	Very Good
RTU-3	5,200	Unknown	2" MERV-13	Very Good
RTU-4	4,800	Unknown	2" MERV-13	Very Good

Photo 1 – Representative RTU

1.2 Existing Control System

The HVAC equipment is controlled by a Carrier i-Vu Building Management System (BMS). The RTUs, zone dampers, bypass dampers, and exhaust fans are all tied into the system. CO_2 sensors were shown in the return air streams of the RTUs on the control drawings, but these do not appear on the BMS control screens and were not seen in the field.

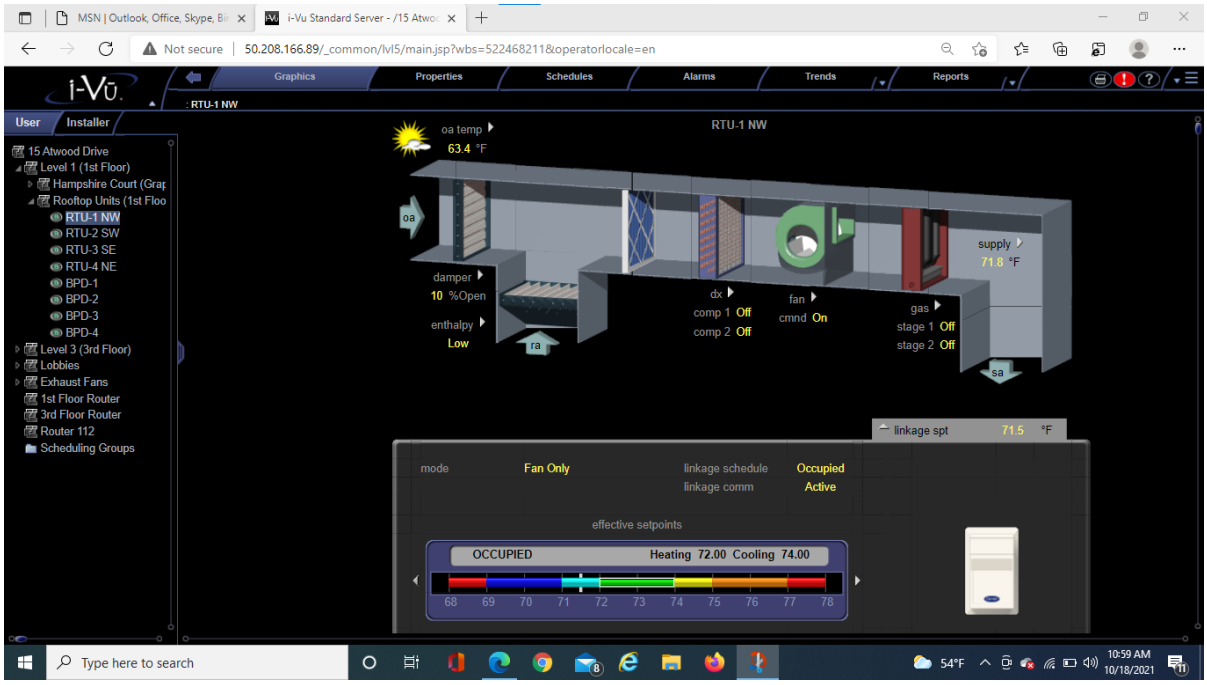

Photo 2 – Representative BMS Control Screen – RTU-1

Photo 3 – Representative BMS Control Screen – Zone Damper 1-3

Section 2
Recommendations

Below is a list of recommendations for the Hampshire Probate and Family Court. Please refer to the "Overview of Recommendations" report for further explanation and requirements of the stated recommendations.

2.1 Filtration Efficiency Recommendations

The filters in the air handlers were already upgraded with 2" thick MERV-13 filters, and just changed at the end of August 2021. MERV-13 meets the minimum ASHRAE recommendations for filtration during the pandemic. We recommend that a testing and balancing contractor test and document the airflow and static pressure profile of all air handlers, as outlined in recommendation RF-1 in the Overview of Recommendations document. This will help determine if the equipment can accommodate the increase in system static pressure associated with the addition of the MERV-13 filters.

We recommend the following measures be implemented for the existing air handling units:

RF-1: *Continue to use MERV-13 filters.*

Filter racks should be inspected and adjusted to ensure that filters fit tightly and that end spacers are in place to minimize filter bypass.

RF-3: *Install a differential pressure sensor with a display across the filter bank.*

RF-3a: *Connect the pressure sensor to the BMS system.*

Maximum differential pressure should be set per manufacturer's recommendation based on air velocity to ensure filters are within their service lives. Typically this is not more than 1.0" w.g.

2.2 Testing & Balancing Recommendations

The air handling units are approximately three years old and it is unknown to Tighe & Bond when the last time the units were tested and balanced. Also, the code requirements to determine the outdoor air flow rates that were used to design the original system may be 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 balance air handling unit supply air and minimum outdoor air flow rates.*

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

TABLE 2
Recommended Air Handler OA Flow Rates

Unit	Original Supply Airflow (CFM)	Original Design Min. OA (CFM)	Current Code Min. OA Requirements (CFM)	Recommended Minimum OA (CFM)
RTU-1	4,900	Unknown	1,090	**1,100**
RTU-2	4,300	Unknown	992	**1,000**
RTU-3	5,200	Unknown	596	**1,100**
RTU-4	4,800	Unknown	1,059	**1,100**

Note: Although the ASHRAE Position Document on Infectious Aerosols recommends using the latest published standards and codes as a baseline for minimum ventilation, the mechanical code in effect at the time the HVAC systems were designed and constructed is what governs the required outdoor air flowrate for the HVAC equipment, if there have been no additions, renovations, alterations or changes in occupancy to the building. The 2015 International Mechanical Code does not prevent the continued use of existing systems.

Our ventilation air analysis discovered that some spaces were not receiving the correct quantity of outdoor air based on today's code requirements at full occupancy. Our calculations showed that the code-required quantity of outdoor air would be likely exceed the capacity of the packaged rooftop units. We recommend temporarily reducing the occupancy of the spaces that are not receiving the code-required ventilation air. Table 3 lists the spaces that would require a reduced occupancy. The recommended outdoor air flow rates listed in Table 2 reflect the outdoor air requirements based on a reduced occupancy shown in Table 3.

TABLE 3
Recommended Occupancy During COVID-19 Pandemic

Room & Associated AHU	***2015 IMC Permitted Occupancy (# of People)***	***Recommended Occupancy (# of People)***
RTU-1		
Courtroom #2	84	45
Conference Room 125	9	3
RTU-2		
Staff Lunchroom 116	23	10
Conference Room 118	35	24
RTU-4		
Courtroom #1	81	40
Break Room 149	8	2
Judges' Kitchen 156A	8	1

Using our recommendations for outdoor air volumes, it appears the cooling and heating capacities are adequate to provide supply air conditions under peak outdoor air conditions, assuming the coils are clean, and their performance has not degraded significantly over time. Supply air temperatures during the heating and

cooling season should be monitored to ensure they are adequate to handle the loads in the spaces.

The average airflow rate per person is shown below in Table 3. These values are based on the original full design supply airflow rate and the recommended outdoor airflow rates shown in Table 2. 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

	All Spaces	***Courtrooms***	***Non-Courtroom Spaces***
Total Occupancy (People)	225	116	109
Total Supply Air (CFM/Person)	85	26	148
Outdoor Air (CFM/Person)	19	6	33

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 full design supply airflow rate, and the recommended outdoor airflow rate. The airflow rates per person assumes the full supply and code minimum outdoor airflows are 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)***	***Outdoor Airflow (CFM)***	***Airflow Rate (CFM/Person)***
Courtroom #1	81	1,800	22	413	5
Courtroom #2	84	1,200	14	267	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, 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)***	***Outdoor Airflow (CFM)***	***Airflow Rate (CFM/Person)***
Courtroom #1	17	1,800	106	413	24
Courtroom #2	17	1,200	71	267	16

Note: If occupancy is further reduced, the airflow rate per person will increase, assuming full airflow is being delivered to the space.

RTB-4: *Test and balance zone damper airflow rates.*

We recommend testing and balancing the zone dampers to ensure each space is being supplied the proper quantity of air.

Upon reviewing the BMS control screens, we discovered that many of the zone dampers have had their minimum airflows reset. The total minimum airflow for zones served by RTU-1 has been reduced from 1,450 to 400 cfm, and the total minimum airflow for RTU-4 zones has been reduced from 1,385 to 550 cfm. A summary of the design minimum airflows and the actual occupied minimum airflows is shown below in Table 5.

TABLE 5
Zone Damper Minimum Airflow Settings

				Difference	
Tag	***Area Served***	***Design Min. CFM***	***Occupied Min. CFM***	***CFM***	***Percent***
ZD 1-1	West Offices	500	50	(450)	**-90%**
ZD 1-2	Probation	475	100	(375)	**-79%**
ZD 1-3	Courtroom #2	475	250	(225)	**-47%**
ZD 2-4	Conference Room	360	250	(110)	**-31%**
ZD 2-5	Lunchroom	250	250	-	-
ZD 2-6	File Storage	360	360	-	-
ZD 2-7	Probate	250	300	50	+20%
ZD 3-8	East Offices	490	490	-	-
ZD 3-9	Central Offices	400	400	-	-
ZD 3-10	Lobby	450	450	-	-
ZD 3-11	2nd Floor Storage	265	265	-	-
ZD 4-12	Judges' Offices	360	150	(210)	**-58%**
ZD 4-13	Courtroom #1	490	100	(390)	**-80%**
ZD 4-14	North Offices	285	150	(135)	**-47%**
ZD 4-15	Central Offices	250	150	(100)	**-40%**

It is likely that these minimum settings were revised to address comfort complaints, from overheating or overcooling when space temperatures are satisfied. However, a major reduction in the minimum occupied airflow also reduces ventilation air. Tighe & Bond strongly recommends resetting these minimums to the design values, and addressing comfort complaints in a manner that does not reduce ventilation air.

2.3 Equipment Maintenance & Upgrades

We recommend the following equipment maintenance and upgrades:

RE-1: *Test existing rooftop unit dampers and actuators for proper operation*.

Repair or replace dampers and actuators that are not functioning properly.

2.4 Control System Recommendations

We recommend the following for the control system:

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

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

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 Hampshire Probate and Family Court 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 manufacturer. Refer to the "Overview of Recommendations" document for further guidance on installing portable HEPA filters.

Due to high occupancy in the areas below, we recommend the use of portable HEPA filters or similar air purification approaches if these areas are to be occupied in the near term. While all spaces benefit from additional air filtration, this measure is likely not necessary for single occupant offices.

- Courtroom #1
- Probate Workstations 107
- Judges' Workstations 156
- Conference Rm. 125
- Courtroom #2
- Probation Workstations 122
- Conference Rm. 118
- Lobby 101

2.6 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 some areas.

2.7 Other Recommendations

Tighe & Bond has no other recommendations for this facility at this time.

2.8 Hampshire Probate and Family Court Recommendations Checklist

Recommended Immediate Actions

1. ☐ Reset all zone damper minimum airflows based on code minimum ventilation

Recommended Actions

2. ☐ RF-1: Continue to use MERV-13 filters
3. ☐ RF-3: Install a differential pressure sensor across filter banks
4. ☐ RF-3a: Connect filter pressure sensor to BMS
5. ✓ RTB-1: Test and balance air handling unit airflow rates
6. ☐ RTB-4: Test and balance zone damper airflow rates
7. ☐ RE-1: Test rooftop unit dampers and actuators for proper operation
8. ☐ RC-1: Implement pre-occupancy flush sequence
9. ☐ RC-4: Confirm economizer control sequence is operational
10. ☐ RFC-1: Install portable HEPA filters

Disclaimer

Tighe and Bond cannot in any way 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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Section 3
Testing & Balancing Results

Wing's Testing and Balancing Co. visited the Hampshire Probate Courthouse on February 28 to March 2, 2022 to test the airflow rates of the air handling units and exhaust fans. Summaries of the tested airflow rates versus the design airflow rates are shown below in Tables 6 and 7. The full testing and balancing report is attached.

TABLE 6
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)
RTU-1	4,900	1,100	3,800	5,201	1,102	4,099
RTU-2	4,300	1,000	3,300	4,407	1,038	3,369
RTU-3	5,200	1,100	4,100	5,355	1,111	4,244
RTU-4	4,800	1,100	3,700	4,696	1,165	3,531

TABLE 7
Exhaust Fan Testing & Balancing Results

Unit	Serving	Design Return/Exhaust Airflow (CFM)	Actual Return/Exhaust Airflow (CFM)
EF-2	Toilet Rooms	400	636
EF-3	Toilet Rooms and Holding Cells	700	639

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

1. RTUs 1-4 are performing within the acceptable airflow range.
2. Toilet exhaust fan EF-2 is performing outside the acceptable range, roughly 60% greater than design airflow. This unit serves six toilet rooms with one or two fixtures each. Two of these rooms, 113 and 118, have more than double the design flow. We recommend reducing the exhaust airflow down closer to the design rate of 400 CFM.
3. Two rooms served by EF-3, Holding Cells 142 and 144, are receiving 50% to 60% less than design exhaust airflow. Toilet Rooms 147 and 148 are running at 16% to 18% over design values. We recommend rebalancing the system to bring the holding cells up to the acceptable range.

WING'S TESTING & BALANCING CO., INC.

Hampshire Probate Court

HVAC Survey

* * * *

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

February 28th, 2022

94 North Branford Road • Suite One • Branford, CT 06405
(203) 481-4988 • Fax (203) 488-5634 • wings@wingstesting.com
SM-1 License #6803
www.wingstesting.com

WING'S TESTING & BALANCING CO., INC.

February 28th, 2022

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

Re: Hampshire Probate Court / HVAC Ventilation Study

Dear Jason,

Wing's has completed the HVAC / Fresh Air Survey for the above referenced location. The results are as follows:

Initial Observations:

- Heating is electric reheat and cooling is DX.

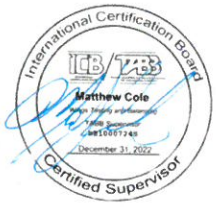
Testing Observations:

- EF-2 is over its design of 400 CFM. This fan is direct drive with no speed control.
- The RTU control static pressures are the following:
  - RTU-1 = 1.20''wg
  - RTU-2 = 0.75''wg
  - RTU-3 = 1.0''wg
  - RTU-4 = 1.20''wg

The following pages are your record of the tested conditions. If you have any questions or if we can be of further assistance, 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
CT SM-2 License 6386
MA SM-2 13595

SUPPLY FAN REPORT

PROJECT: Hampshire Probate Court **DATE:** 2/28/22

AREA SERVED: RTU-1, RTU-2, RTU-3 **TECH:** BS

FAN DATA

FAN NUMBER	RTU-1		RTU-2		RTU-3		RTU-4	
LOCATION	Roof		Roof		Roof		Roof	
AREA SERVED	Court #2		Conf. + Lunch Rm		Probate + Records		Court #1	
MANUFACTURER	Carrier		Carrier		Carrier		Carrier	
MODEL OR SIZE	48HCEG14B		48HCEG14B		48HCEG14B		48HCEG14B	
	DESIGN	ACTUAL	DESIGN	ACTUAL	DESIGN	ACTUAL	DESIGN	ACTUAL
TOTAL CFM	4900	5201	4300	4407	5200	5355	4800	4696
RETURN AIR	3800	4099	3300	3369	4100	4244	3700	3531
OUTSIDE AIR	1100	1102	1000	1038	1100	1111	1100	1165
DISCH. STATIC	---	+1.63"	---	+1.15"	---	+1.11"	---	+1.09
SUCTION STATIC	---	-0.89"	---	-0.75"	---	-0.72"	---	-0.67
TOTAL STATIC	---	2.52"	---	1.90"	---	1.83"	---	1.76
FAN RPM	ND	944	ND	816	ND	949	ND	870
PULLEY O.D.	11.5" x 1 3/16		11.5" x 1 3/16		11.5" x 1 3/16		11.5" x 1 3/16	
ESP	2.19		1.62		1.57		1.43	
VFD SPEED	No VFD		No VFD		No VFD		No VFD	
O.A.D.MIN POS	12%		20%		20%		20%	

MOTOR DATA

MANUFACTURER	Century		Century		Century		Century	
MODEL OR FR.	184T		184T		184T		184T	
HORSEPOWER	5	5	5	5	5	5	5	5
MOTOR RPM	1755	1755	1755	1755	1755	1755	1755	1755
VOLTAGE / PH.	208/3	208/3	208/3	208/3	208/3	208/3	208/3	208/3
AMPS LEG 1	12.6	11.8	12.6	11.2	12.6	12.0	12.6	11.5
AMPS LEG 2	---	11.9	---	11.1	---	12.1	---	11.4
AMPS LEG 3	---	11.8	---	11.0	---	12.1	---	11.5
SHEAVE O.D.	6.5" x 1 1/8		6.5" x 1 1/8		6.5" x 1 1/8		6.5" x 1 1/8	
BELTS - QTY / SIZE	1/BX67		1/BX67		1/BX67		1/BX67	
SHEAVE POSITION	Fully closed		3/4 Closed		1/2 Closed		1/2 Open	
C to C	20.5		21.0		21.0		21.0	

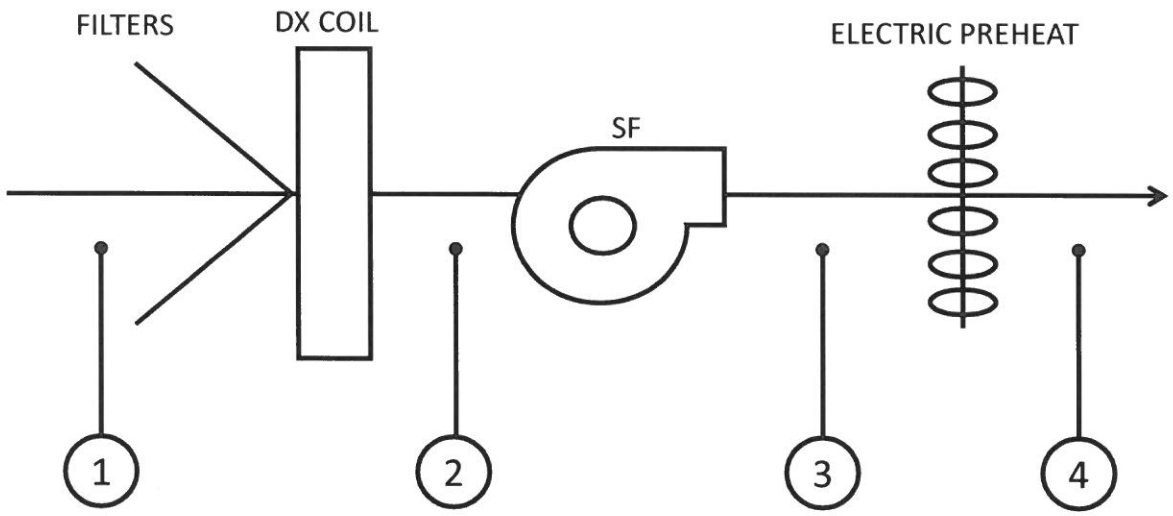
REMARKS

NA Not Available | **ND** No Design | **DD** Direct Drive | **N/R** No Requirement

SYSTEM STATIC PRESSURE PROFILE

PROJECT: Hampshire Probate Court **DATE:** 2/26/22

SYSTEM/AREA: RTUs **TECH:** BS



UNIT	1	2	3	4	5	6	7	8	NOTES
RTU-1	-0.59"	-0.89"	+1.63"	+1.60"					
RTU-2	-0.52"	-0.78"	+1.15"	+1.10"					
RTU-3	-0.49"	-0.72"	+1.11"	+1.08"					
RTU-4	-0.38"	-0.67"	+1.09"	+1.05"					

REMARKS

NA Not Available | **ND** No Design | **DD** Direct Drive | **N/R** No Requirement

VELOCITY PRESSURE READINGS

PROJECT: Hampshire Probate Court **DATE:** 2/26/22

AREA SERVED: RTUs **TECH:** BS

TRAVERSE LOCATIONS	DUCT SIZE "	AREA SQ.FT.	DESIGN		CENT. STAT. PRESS."	TEST		NOTES
			FPM	CFM		FPM	CFM	
RTU-1								
Total	50" x 26"	9.03	---	4900	w/ Velgrid	576	5201	
O.A.	50" x 26"	9.03	---	1100	w/ Velgrid	122	1102	
Return	---	---	---	3800	Calculated		4099	
RTU-2								
Total	50" x 26"	9.03	---	4300	w/ Velgrid	488	4407	
O.A.	50" x 26"	9.03	---	1000	w/ Velgrid	115	1038	
Return	---	---	---	3300	Calculated		3369	
RTU-3								
Total	50" x 26"	9.03	---	5200	w/ Velgrid	593	5355	
O.A.	50" x 26"	9.03	---	1100	w/ Velgrid	123	1111	
Return	---	---	---	4100	Calculated		4244	
RTU-4								
Total	50" x 26"	9.03	---	4800	w/ Velgrid	520	4696	
O.A.	50" x 26"	9.03	---	1100	w/ Velgrid	129	1165	
Return	---	---	---	3700	Calculated		3531	

REMARKS

NA Not Available | **ND** No Design | **DD** Direct Drive | **N/R** No Requirement

EXHAUST FAN REPORT

PROJECT:	Hampshire Probate Court			**DATE:** 2/27/22
AREA SERVED:	EF-2 and EF-3			**TECH:** BS
FAN DATA				
FAN NUMBER		EF-2	EF-3	
LOCATION		Roof	Roof	
AREA SERVED		Restrooms	Restrooms	
MANUFACTURER		Cook	Cook	
MODEL OR SIZE		140SH756	140SH756	
TOTAL CFM	**DESIGN**	400	700	
	ACTUAL	636 (1)	639	
FAN RPM	**DESIGN**	DD	DD	
	ACTUAL	DD	DD	
PULLEY	**O.D.**	DD	DD	
SERVICE		NA	NA	
MOTOR DATA				
MANUFACTURER		Cook	Cook	
MODEL NUMBER		NA	NA	
MOTOR HP	**DESIGN**	1/4	1/4	
	ACTUAL	1/4	1/4	
MOTOR RPM		1725	1725	
VOLTAGE/PHASE		115/1	115/1	
MOTOR AMPS	**DESIGN**	3.4	3.4	
	ACT. LEG 1	3.0	3.0	
	ACT. LEG 2	---	---	
	ACT. LEG 3	---	---	
SHEAVE		DD	DD	
BELTS - QUANTITY/SIZE		DD	DD	
SHEAVE POSITION		DD	DD	

REMARKS

(1) This fan is direct drive with no speed controller.

NA Not Available | **ND** No Design | **DD** Direct Drive | **N/R** No Requirement

AIR DEVICE REPORT

PROJECT: Hampshire Probate Court **DATE:** 2/28/22

SYSTEM / AREA: Exhaust Fans **TECH:** BS

LOCATION	NO.	SIZE	A K	DESIGN		TEST		FINAL		NOTES
				FPM	CFM	FPM	CFM	FPM	CFM	
EF-2										
Toilet 113	1	10" x 10"	FH	---	50	---	106			
Toilet 111	2	16" x 16"	FH	---	100	---	147			
Toilet 112	3	16" x 16"	FH	---	100	---	149			
Toilet 114	4	10" x 10"	FH	---	50	---	83			
Toilet 118	5	8" x 8"	0.83	60	50	128	106			
Toilet 121	6	10" x 10"	FH	---	50	---	45			
					400		636			
EF-3										
Toilet 154	1	10" x 10"	FH	---	50	---	48			
Toilet 155	2	10" x 10"	FH	---	50	---	48			
JC 153	3	10" x 10"	FH	---	50	---	51			
Toilet 148	4	16" x 16"	FH	---	100	---	118			
Toilet 147	5	16" x 16"	FH	---	100	---	116			
Drug Test 144	6	10" x 10"	FH	---	50	---	46			
Toilet 126	7	10" x 10"	FH	---	50	---	53			
Toilet 127	8	10" x 10"	FH	---	50	---	46			
Cell 144	9	8" x 8"	FH	---	75	---	38			
Cell 142	10	8" x 8"	FH	---	75	---	31			
Storage 132	11	10" x 10"	FH	---	50	---	44			
					700		639			

REMARKS

NA Not Available | **ND** No Design | **DD** Direct Drive | **N/R** No Requirement