Fall River Justice Center
Fall River, MA

HVAC SYSTEM EVALUATIONS COVID-19

Office of Court Management

September 18, 2024

Tighe&Bond

100% Recyclable

Section 1
Existing Conditions and Site Observations

Tighe & Bond visited the Fall River Justice Center on September 18, 2020. While on site, we inspected the air handling units 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:
  - Marco Cavahlo, Facilities
- Tighe & Bond:
  - Sean Pringle, PE, Project Mechanical Engineer
  - Caitlin DeWolfe, Staff Engineer

1.1 Existing Ventilation System Description

The Fall River Justice Center is a five-story building, constructed in 2010, with a floor area of approximately 154,000 gross square feet. The HVAC system includes seven variable air volume (VAV) air handling units (AHU), all located in the mechanical penthouse.

All AHU's have a heating hot water coil; a chilled water cooling coil; supply air fan; return air fan; energy recovery wheel; return air (RA), outside air (OA), heat recovery bypass, and exhaust air dampers; and an outside air flow station. 2" MERV 8 Filters are located in the outside air, exhaust air, and supply air positions. The supply air also utilizes 12" MERV 14 final filters. All filters have differential pressure sensors.

AHU-1 is a 100% outdoor air, constant volume single zone unit that serves the lockup area. This unit utilizes an integral face and bypass damper arrangement for the heating coil, and external face and bypass damper for the cooling coil. This unit does not have a return air damper. All return air to the AHU is exhausted to the outdoors.

The air handling units are generally in good condition. They are original and are approximately 10 years old. According to staff, motors, actuators, bearings, and other wear items have been replaced as they failed. Some dampers could not be inspected because they were within ductwork, and not integral to the AHU. At the time of the visit, the AHUs were in unoccupied mode, so no outside air was being drawn into the buildings, except when the units entered unoccupied economizer operation. All cooling is provided through the AHU's for occupied spaces. In areas with large perimeter loads, finned tube radiation is provided for additional heating.

TABLE 1
Existing Air Handlers

Unit #	*Design Airflow (CFM)*	*Design Min OA (CFM)*	*Filters*	*Condition*
AHU-1	4,900	4,900	2" MERV 8 OA / 12" MERV 14 SA final	Good
AHU-2	9,000	3,900	2" MERV 8 OA & SA / 12" MERV 14 SA final	Good
AHU-3	7,400	3,700	2" MERV 8 OA & SA / 12" MERV 14 SA final	Good
AHU-4	21,300	10,000	2" MERV 8 OA & SA / 12" MERV 14 SA final	Good
AHU-5	21,400	10,000	2" MERV 8 OA & SA / 12" MERV 14 SA final	Good
AHU-6	27,000	13,700	2" MERV 8 OA & SA / 12" MERV 14 SA final	Good
AHU-7	27,000	13,700	2" MERV 8 OA & SA / 12" MERV 14 SA final	Good

Photo 1 – Representative Air Handler

Every air handler was missing at least some supply air pre- and/or final filters. In some cases, 30% or even 100% of the filters were missing. While the outside air was still passing through MERV 8 filters, return air was passing unfiltered through the heating and cooling coils and back to the building. Where only the prefilters were missing, the final filters were almost completely clogged with dust. Many of the cooling coils were dirty because of the lack of filters. Facilities staff indicated they were aware of the issue, and the following week contacted Tighe & Bond to let us know all filters were installed and the dirty filters had been replaced.

During our visit we also identified several minor issues with various AHU's. In AHU-1, control wiring was loose and hanging in the prefilter section. In AHU's 2,3, and 7, the coils were dirty. Finally, in AHU-3, the outside air dampers were very rusty, which is not expected from a unit of this build quality and age. It appears they are galvanized steel, while the dampers in most of the units are aluminum or stainless steel. The seacoast environment is likely causing them to corrode prematurely.

Supply air is regulated to each zone by variable air volume (VAV) terminals, with hot water reheat coils at each unit. The terminal units are a mix of traditional VAV units and series fan powered terminal units. As the building is less than 10 years old, we assume the VAV boxes (and all equipment) are original and have not been replaced. The working condition of these boxes is unknown but based on the age it is assumed they should be in generally good condition. According to staff, the fan powered terminal units utilize 1" MERV 8 filters.

The first floor lockup area is provided with 100% outside air at a constant airflow from AHU-1, supplied into the corridors and the cells. Air is exhausted from the cells through the toilet exhaust risers. The first floor lockup corridors and the control rooms are also supplied with 100% outside air from the same system. Each secure area on the upper floors are supplied by a recirculating type air handling system where supply air is regulated via a VAV box. The air is supplied to the corridors only and is exhausted through the cells.

Chilled water is provided by one 204-ton and one 178-ton water cooled chiller. Hot water is provided from three 1.5 MMBH (input) condensing boilers. Neither the hot nor chilled water systems contain glycol.

During the walkthrough, two occupied areas were noted as being used for different purposes than the original design. The ventilation rate for the intended use is not adequate for the revised use.

- Room 02009, an equipment (storage) room, is being used as a break room. While this may a reasonable place for one person to sit or use as an office, people should not congregate in this room due to the limited ventilation.
- Room 04003, a janitor's closet, is being used as a private office. There is a reasonably good airflow due to a 100 CFM exhaust grille, but since there is no supply grille the occupant will receive no direct supply air, only air transferred from the public lobby.

1.2 Existing Control System

The courthouse has a Trane building management control system (BMS). It is tied to the existing boiler & chiller systems, AHU's, VAV's, auxiliary heating, and exhaust fans.

While onsite, Tighe & Bond was able to observe various control system screens and setpoints.

The air handlers utilize a Demand-Controlled Ventilation (DCV) sequence, to vary the amount of outdoor air based on CO2 levels in the spaces. In addition to the AHU-DCV sequence, the VAV terminals that serve high density spaces also utilize zone-level DCV controls. When the space CO2 rises above the setpoint, the VAV will increase the supply air flow to the zone, increasing the effective outdoor air flow to the zone.

Section 2
Recommendations

2.1 Filtration Efficiency Recommendations

With all filters are in place, the existing MERV 8 prefilter and MERV 14 final filter in the supply air stream provide meet the ASHRAE recommendations for filtration during the pandemic. We recommend maintaining the current level of filtration.

2.2 Testing & Balancing Recommendations

We recommend the following measures:

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.

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	4,900	4,900	N/A (100% OA)	4,900
AHU-2	9,000	3,900	3,600	3,900
AHU-3	7,400	3,700	2,900	3,700
AHU-4	21,300	10,000	8,400	10,000
AHU-5	21,400	10,000	8,600	10,000
AHU-6	27,000	13,700	13,000	13,700
AHU-7	27,000	13,700	10,700	13,700

We recommend maintaining the outdoor airflows at the original designed values, as these exceed the code minimums calculated by Tighe & Bond and will likely result in improved indoor air quality (IAQ).

We recommend that the outdoor airflows for all units be verified to confirm that they match the recommended minimum OA amounts shown in the table above. Because this system uses airflow stations, it is possible that these changes can be made with control setpoint adjustments instead of hiring a TAB Contractor, however these units may not be reporting accurate values and should be checked periodically.

The airflow rate per person is shown below in Table 3. These values are based on the original design supply airflow rates and the recommended outdoor airflow rates shown in Table 2 above. The airflow rate per person also 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 maximum code required occupancy

TABLE 3
Average Airflow Rate per Person

	All spaces	***Courtrooms***	***Non-Courtroom Spaces***
Total Occupancy (People)	1,669	921	748
Total Supply Air (CFM/Person)	111	41	170
Outdoor Air (CFM/Person)	36	20	73

The airflow rate per person for each Courtroom and Jury Pool Room is shown below in Table 4. These values are based on full occupancy, the original design supply airflow rate, and the recommended outdoor airflow rate, without taking diversity into account. 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 – Courtrooms (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 03086	105	1,175	11	550	5
Courtroom 1	122	3,600	30	1,700	14
Courtroom 2	97	2,400	25	1,200	12
Courtroom 3	94	2,400	26	1,200	13
Courtroom 4	97	2,700	28	1,400	14
Courtroom 5	125	3,800	31	1,900	15
Courtroom 6	99	2,700	27	1,400	14
Courtroom 7	98	2,900	29	1,400	15
Courtroom 8	98	2,700	28	1,400	14
Courtroom 9	111	3,400	31	1,700	15

Note: Courtroom occupancy is based on seating layouts shown on HVAC drawings provided to Tighe & Bond

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 – Courtrooms (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 03086	23	1,175	51	550	24
Courtroom 1	20	3,600	180	1,700	85
Courtroom 2	15	2,400	160	1,200	80
Courtroom 3	15	2,400	160	1,200	80
Courtroom 4	15	2,700	180	1,400	93
Courtroom 5	19	3,800	200	1,900	100
Courtroom 6	16	2,700	169	1,400	88
Courtroom 7	16	2,900	181	1,400	88
Courtroom 8	15	2,700	180	1,400	93
Courtroom 9	22	3,400	155	1,700	77

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

We recommend this strategy for AHUs 2 – 7. These units operate at approximately 50% outside air (OA). The heating coils, cooling coils, and energy recovery wheels generally appear to be in good condition. If this measure is implemented the AHU supply air temperatures should be monitored.

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

Lockup areas
The lockup ventilation strategy is based on maintaining a slight airflow deficit in the cells relative to the corridors in the lockup area. To minimize the risk of one prisoner infecting others, it is important that the air balance is correct. If any vents have been accidently closed or if the supply air flow is too high in these areas, the likelihood of cross contamination is increased. Both prisoners and guards are at increased risk in the lockup areas due to the risk profile of prisoners and extended time within these spaces.

Whole building
If the Courthouse experiences regular cooling and heating comfort complaints, we recommend exploring rebalancing all air inlets and outlets throughout the building. Prior to rebalancing the building, we recommend verifying the chiller and boiler plants are maintaining the correct supply water temperatures.

RTB-6: *Test and balance all air handler chilled and hot water coils.*

Testing and balancing the air handler hot and chilled water coils will help ensure the coils are receiving the proper water flow rates. Considering the coils are only 10 years old, we don't expect there to be a significant issue with the flow rates.

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.

RE-2: *Clean air handler coils.*

Several cooling coils were noted as being dirty as a result of the missing filters. These should be cleaned. The heating coils should also be inspected and cleaned as necessary.

RE-4: *Inspect VAV Boxes and controllers.*

VAV boxes regulate the supply air delivered to each space. At a minimum, we recommend cycling the damper positions and testing the airflow to verify the maximum and minimum airflow rates are being delivered as designed. Consider cleaning airflow stations and reheat coils. Change dirty filters in the fan powered VAV boxes. Any boxes not delivering the expected airflow rates should be rebalanced.

2.4 Control System

The Fall River District Courthouse has a BMS. We recommend the following control system strategies be implemented into the existing control system:

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

RC-3: *Install controls required to introduce outside air beyond the minimum requirement in a stepped approach.*

RC-5: *Disable Demand-Controlled Ventilation Sequences (at the AHU level)*

For the duration of the COVID-19 pandemic, we recommend disabling the AHU-level DCV sequence to provide a higher level of outside air into the building. Note that the VAV-level DCV sequences for densely occupied spaces should be left operational as this maintains adequate airflow in these spaces.

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 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.

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.

The lockup area may be an area to consider adding temporary, portable humidifiers. While the energy recovery wheel will help to improve (increase) the cold weather humidity, the lockup area may tend to have a lower humidity than other areas served by recirculating type air handlers.

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Section 3
Testing & Balancing Results

On November 6, 2020 Wing's Testing Balancing CO., Inc visited the Fall River Justice Court 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 air and water flow rates versus the design rates are shown below in Tables 5, 6, and 7. The full testing and balancing report is attached. The balancing report also contains the water flow rate testing results of the air handler hot and chilled water coils.

On December 29, 2021, Wings returned to the site to correct the supply airflow on AHU-6 and the outdoor airflow on AHU's 3,4,6, and 7.

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	4,900	4,900	0	5,467	5,467	0
AHU-2	9,000	3,900	5,100	8,392	3,900	5,213
AHU-3	7,400	3,700	3,700	7,007	3,606	3,401
AHU-4	21,300	10,000	11,300	22,806	10,020	12,786
AHU-5	21,400	10,000	11,400	21,147	11,205	9,942
AHU-6	27,000	13,700	13,300	26,128	13,395	12,752
AHU-7	27,000	13,700	13,300	26,135	13,111	13,024

TABLE 6
Air Handler Waterflow Testing & Balancing Results

	Design		Actual	
Unit	Chilled Water Flow Rate (GPM)	Hot Water Flow Rate (GPM)	Chilled Water Flow Rate (GPM)	Hot Water Flow Rate (GPM)
AHU-1	33	19	34	20
AHU-2	48	33	47	34
AHU-3	40	27	40	26
AHU-4	113	77	113	77
AHU-5	114	77	114	77
AHU-6	140	98	140	98
AHU-7	146	98	146	98

TABLE 7
Exhaust Fan Testing & Balancing Results

Unit	Serving	Design Exhaust Fan Airflow	Actual Exhaust Fan Airflow
TEF-1	Toilet Exhaust	5,615	5,599
TEF-2	Toilet Exhaust	5,105	5,658

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

1. All AHU's are performing within the acceptable supply range of design for both supply and exhaust fans.
2. Exhaust fan's TEF-1 and TEF 2 serving the restrooms are performing within the acceptable range.

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.

Tighe&Bond

Wings Testing & Balancing Co., Inc. TAB Report

November 14, 2020

WING'S TESTING & BALANCING CO., INC.

Fall River Justice Court
HVAC/Ventilation Survey

* * * *

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

November 14, 2020

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.

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

November 14, 2020

Re: Fall River Justice Court/HVAC Ventilation Study

Dear Jason,

The survey of the AHU's at the above-mentioned courthouse has been completed. While onsite, we worked with Pat Sweeney, the Controls Contractor. During our testing we found that the transducer for the return fan on AHU-7 is not good and needs replacing. Also, the outside air dampers on AHU-3 are not fully functional and need either maintenance or to be replaced. About half of all the calibration factors were off and were calibrated during our testing.

- To note we measured the spill (exhaust) both while at minimum OA and at 100% fresh air. The readings on the fan sheets for the exhaust sides represent the flow of the exhaust side while at 100% OA, and the supply side flows (SA, RA, OA) are listed while at minimum OA conditions.
- On AHU-7, there was not a suitable location to measure the minimum outdoor air directly. We took a total flow reading on the return riser and subtracted the minimum spill to derive the return flow. The OA was calculated as the total supply minus the derived return. We did not list the return total reading as to not cause confusion.

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.

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

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

Unit Static Setpoints

Unit	Computer	Actual
AHU-1	1.00"	0.78"
AHU-2	1.00"	0.96"
AHU-3	1.10"	0.98"
AHU-4	1.00"	0.92"
AHU-5	1.00"	0.96"
AHU-6	1.00"	0.86"
AHU-7	1.00"	0.98"

Filters List

AHU-1	(5) 12"x24"x2" (5) 20"x25"x2" (4) 16"x25"x2" (2) 16"x20"x2"	(2) ASHRAE Cell 24"x24"x12" (2) Viskon Airebag 12"x24"x2"
AHU-2	(6) 20"x25"x2" (8) 16"x20"x2" (8) 20"x20"x2"	(6) Viskon Airebag 20"x25"x12"
AHU-3	(5) 12"x24"x2" (5) 20"x25"x2" (4) 16"x25"x2" (2) 16"x20"x2"	(2) ASHRAE Cell 24"x24"x12" (2) Viskon Airebag 12"x24"x2"
AHU-4	(36) 20"x25"2" (9) 16"x20"x12"	(12) Viskon Airebag 20"x25"x12" (3) Viskon Airebag 16"x20"12"
AHU-5	(36) 20"x25"2" (9) 16"x20"x12"	(12) Viskon Airebag 20"x25"x12" (3) Viskon Airebag 16"x20"12"
AHU-6	(10) 12"x24"x2" (10) 24"x24"x2" (6) 16"x25"x2" (7) 16"x20"x2" (18) 20"x25"x2" (4) 20"x24"x12"	(10) Viskon Airebag 12"x24"x12" (10) Viskon Airebag 24"x24"x12"
AHU-7	(15) 16"x20"x2" (28) 20"x25"x2" (12) 16"x25"x2"	(8) Viskon Airebag 20"x25"x12" (6) Viskon Airebag 16"x25"x12" " (6) Viskon Airebag 16"x20"x12"

SUPPLY FAN REPORT

PROJECT: Fall River Justice Center	**DATE:** 11/6/20
AREA SERVED: AHU-1	**TECH:** BS

FAN DATA						
FAN NUMBER	AHU-1		AHU-1 Exhaust			
LOCATION	Penthouse		Penthouse			
AREA SERVED	Holding cells		Holding Cells			
MANUFACTURER	Trane		Trane			
MODEL OR SIZE	MCCB012		MCCB012			
	DESIGN	**ACTUAL**	**DESIGN**	**ACTUAL**	**DESIGN**	**ACTUAL**
TOTAL CFM	4900	5467	5200	6689		
RETURN AIR	0	0	---	---		
OUTSIDE AIR	100%	100%	---	---		
DISCH. STATIC	---	+0.78"	---	+.18"	---	
SUCTION STATIC	---	-3.99"	---	-2.62"	---	
TOTAL STATIC	5.73"	4.77"	N/L	2.80"		
FAN RPM	2980	2482	1872	1670		
PULLEY O.D.	6.0"		6.0"			

MOTOR DATA						
MANUFACTURER	Baldor		Baldor			
MODEL OR FR.	213T		184T			
HORSEPOWER	7.5	7.5	5	5		
MOTOR RPM	1770	1770	1750	1750		
VOLTAGE / PH.	460/3	460/3	460/3	460/3		
AMPS LEG 1	9.6	9.3	6.6	6.1		
AMPS LEG 2	---	9.5	---	6.1	---	
AMPS LEG 3	---	9.0	---	6.0	---	
SHEAVE O.D.	8.0"		5.5"			
BELTS - QTY / SIZE	1/Bx37		1/Bx37			
SHEAVE POSITION	Fixed		Fixed			
BHP	7.24		4.6			

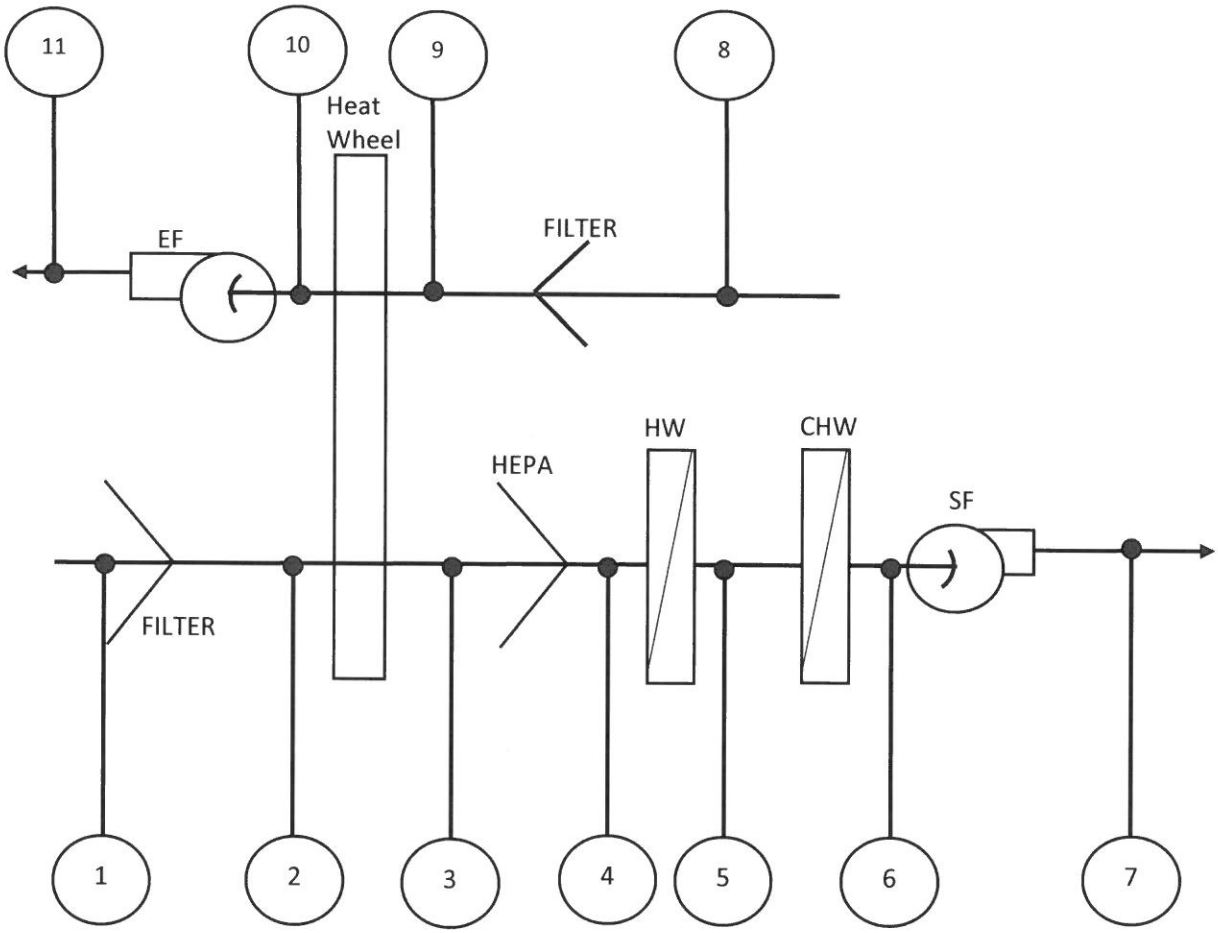
REMARKS

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

SYSTEM STATIC PRESSURE PROFILE

PROJECT: Fall River Justice Center | **DATE:** 11/6/20

SYSTEM/AREA SERV: AHU-1 | **TECH:** BS



STATIC PRESSURE READINGS "wc

POS. (+) / NEG.(-)	1	2	3	4	5	6	7	
Supply	-0.60"	-0.78"	-1.48"	-2.91"	-3.64"	-3.99"	+0.78"	
	8	**9**	**10**	**11**				
EF	-1.55"	-1.75"	-2.62"	+0.18"				

REMARKS

SUPPLY FAN REPORT

PROJECT: Fall River Justice Center	**DATE:** 11/6/20
AREA SERVED: AHU-2	**TECH:** BS

FAN DATA						
FAN NUMBER	AHU-2		AHU-2EF			
LOCATION	Penthouse		Penthouse			
AREA SERVED	Lobby/Jury		Lobby/Jury			
MANUFACTURER	Trane		Trane			
MODEL OR SIZE	MCCB021		MCCB021			
	DESIGN	**ACTUAL**	**DESIGN**	**ACTUAL**	**DESIGN**	**ACTUAL**
TOTAL CFM	9000	8392	7200	7001		
RETURN AIR	5100	5213	Exh @min	4349		
OUTSIDE AIR	3900	3179	---	---		
DISCH. STATIC	---	-2.17"	---	+.19"	---	
SUCTION STATIC	---	-1.29"	---	-2.27"	---	
TOTAL STATIC	5.73"	3.46"	N/L	2.46"		
FAN RPM	2369	1643	1649	1117		
PULLEY O.D.	6.5"		9.0"			
ESP	2.25"					
VFD SPEED	53 Hz					
O.A.D. MIN POS	BMS Driven					
MOTOR DATA						
MANUFACTURER	Baldor		Baldor			
MODEL OR FR.	254T		184T			
HORSEPOWER	15	15	5	5		
MOTOR RPM	1765	1765	1750	1750		
VOLTAGE / PH.	460/3	460/3	460/3	460/3		
AMPS LEG 1	18.5	10.9	6.6	5.6		
AMPS LEG 2	---	11.0	---	5.7	---	
AMPS LEG 3	---	10.9	---	5.8	---	
SHEAVE O.D.	7.0"		6.0"			
BELTS - QTY / SIZE	1/5Vx470		1/A57			
SHEAVE POSITION	Fixed		Fixed			
BHP	8.86		12.9			

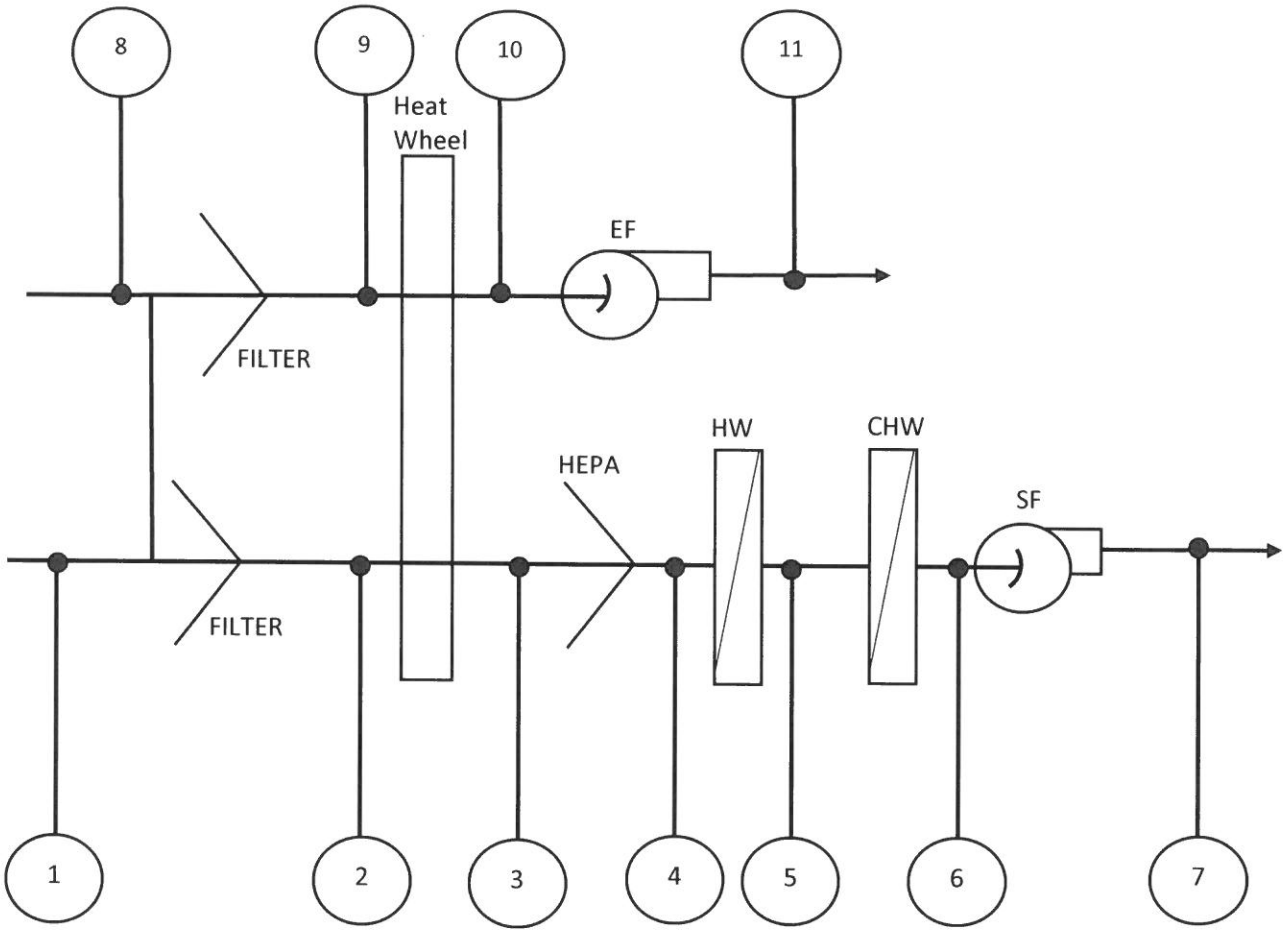
REMARKS

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

SYSTEM STATIC PRESSURE PROFILE

PROJECT: Fall River Justice Center | **DATE:** 11/6/20

SYSTEM/AREA SERV: AHU-2 | **TECH:** BS



STATIC PRESSURE READINGS "wc

POS. (+) / NEG.(-)	1	2	3	4	5	6	7	NOTES
Min O.A.	-0.55"	-0.72"	-0.62"	-1.80"	-1.94"	-2.17"	+1.29"	
100% O.A.	-0.27"	-0.67"	-0.79"	-1.95"	-2.00"	-2.33"	+1.27"	
	8	**9**	**10**	**11**				
Min O.A.	-0.43"	-0.46"	-0.53"	+0.06"				
100% O.A.	-1.20"	-1.38"	-2.27"	+0.19"				

REMARKS

SUPPLY FAN REPORT

PROJECT: Fall River Justice Center	**DATE:** 11/6/20
AREA SERVED: AHU-3	**TECH:** BS

FAN DATA						
FAN NUMBER	AHU-3		AHU-3EF			
LOCATION	Penthouse		Penthouse			
AREA SERVED	Law Library		Law Library			
MANUFACTURER	Trane		Trane			
MODEL OR SIZE	MCCB017		MCCB017			
	DESIGN	**ACTUAL**	**DESIGN**	**ACTUAL**	**DESIGN**	**ACTUAL**
TOTAL CFM	7400	7007	5920	6210		
RETURN AIR	3700	5057	Exh @min	(1)		
OUTSIDE AIR	3700	1950	---	---		
DISCH. STATIC	---	+1.45"	---	+0.42"	---	
SUCTION STATIC	---	-3.24"	---	-1.67"	---	
TOTAL STATIC	5.73"	4.69"	N/L	2.09"		
FAN RPM	2857	1722	1402	1299		
PULLEY O.D.	6.0"		7.0"			
ESP	2.75"					
VFD SPEED	60 Hz					
O.A.D. MIN POS	(1)					

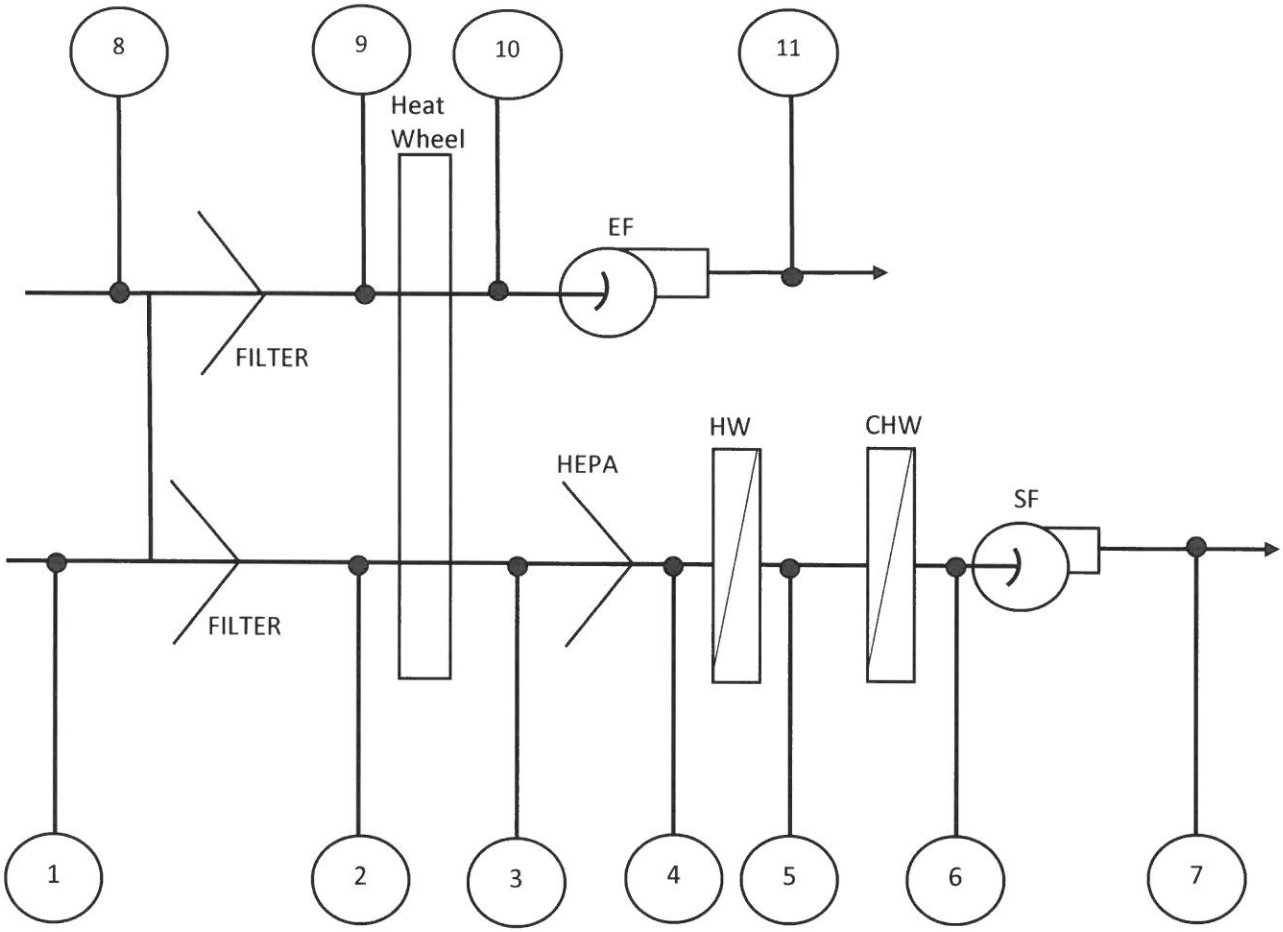
MOTOR DATA						
MANUFACTURER	Baldor		Baldor			
MODEL OR FR.	254T		184T			
HORSEPOWER	10	10	5	5		
MOTOR RPM	1765	1765	1750	1750		
VOLTAGE / PH.	460/3	460/3	460/3	460/3		
AMPS LEG 1	14.0	10.6	6.6	5.0		
AMPS LEG 2	---	10.9	---	4.9	---	
AMPS LEG 3	---	10.8	---	5.0	---	
SHEAVE O.D.	6.0"		5.0"			
BELTS - QTY / SIZE	1/5Vx450		1/Ax43			
SHEAVE POSITION	Fixed		Fixed			
BHP	7.7		3.8			

REMARKS

(1) The outside air and return dampers are not functional and need replacing.
NA-Not Available
ND-No Design DD-Direct Drive

SYSTEM STATIC PRESSURE PROFILE

PROJECT: Fall River Justice Center	**DATE:** 11/6/20
SYSTEM/AREA SERV: AHU-3	**TECH:** BS



STATIC PRESSURE READINGS "wc

POS. (+) / NEG.(-)	1	2	3	4	5	6	7	NOTES
Supply	-1.30"	-1.39"	-1.36"	-2.80"	-2.91"	-3.24"	+1.45"	
	8	**9**	**10**	**11**				
RF	-1.36"	-1.52"	-1.67"	+0.42"				

REMARKS

SUPPLY FAN REPORT

PROJECT: Fall River Justice Center	**DATE:** 11/6/20
AREA SERVED: AHU-4	**TECH:** BS

FAN DATA						
FAN NUMBER	AHU-4		AHU-4EF			
LOCATION	Penthouse		Penthouse			
AREA SERVED	2nd & 3rd Floors		2nd & 3rd Floors			
MANUFACTURER	Trane		Trane			
MODEL OR SIZE	MCCB050		MCCB050			
	DESIGN	**ACTUAL**	**DESIGN**	**ACTUAL**	**DESIGN**	**ACTUAL**
TOTAL CFM	21,300	22,806	17,040	16,775		
RETURN AIR	11,300	14,136	Exh @min	7410		
OUTSIDE AIR	10,000	8670	---	---		
DISCH. STATIC	---	+0.92"	---	+0.03"	---	
SUCTION STATIC	---	-2.78"	---	-2.22"	---	
TOTAL STATIC	5.4"	3.00	N/L	2.25"		
FAN RPM	1636	1047	966	835		
PULLEY O.D.	14.0"		10.0"			
ESP	2.25"					
VFD SPEED	56 Hz					
O.A.D. MIN POS	BMS Driven					
MOTOR DATA						
MANUFACTURER	Baldor		Century			
MODEL OR FR.	286T		S215T			
HORSEPOWER	30	30	10	10		
MOTOR RPM	1770	1770	1755	1755		
VOLTAGE / PH.	460/3	460/3	460/3	460/3		
AMPS LEG 1	35.0	24.2	12.6	11.4		
AMPS LEG 2	---	24.6	---	11.5	---	
AMPS LEG 3	---	24.1	---	11.6	---	
SHEAVE O.D.	9.0"		5.0"			
BELTS - QTY / SIZE	2/Bx90		2/Bx78			
SHEAVE POSITION	Fixed		Fixed			
BHP	20.8		9.1			

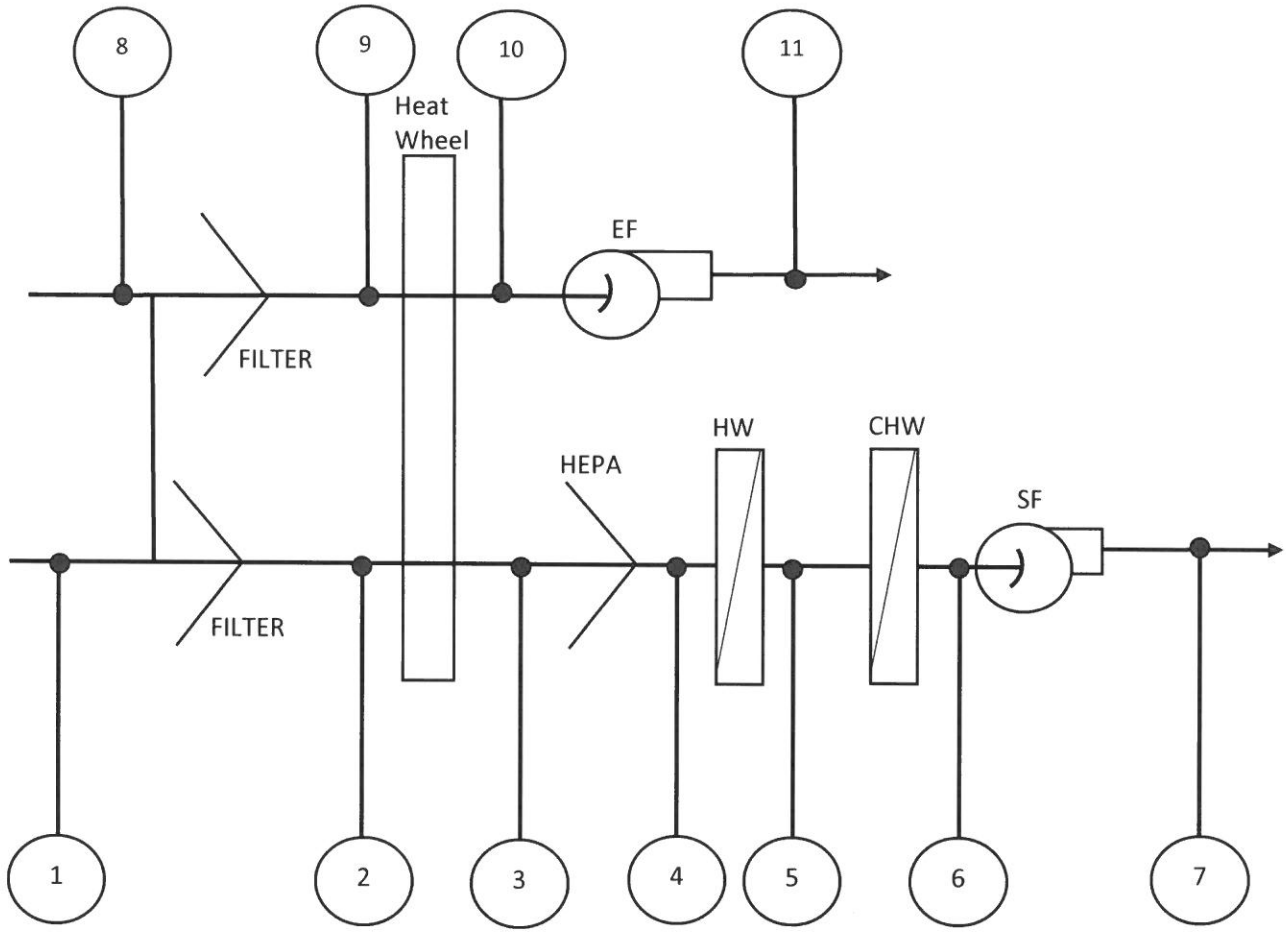
REMARKS

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

SYSTEM STATIC PRESSURE PROFILE

PROJECT: Fall River Justice Center | **DATE:** 11/6/20

SYSTEM/AREA SERV: AHU-4 | **TECH:** BS



STATIC PRESSURE READINGS "wc

POS. (+) / NEG.(-)	1	2	3	4	5	6	7	NOTES
Min O.A.	-1.36"	-1.49"	-1.44"	-2.39"	-2.46"	-2.78"	+0.92"	
100% O.A.	-0.37"	-0.49"	-0.85"	-1.83"	-1.89"	-2.09"	+1.00"	
	8	**9**	**10**	**11**				
Min O.A.	-1.33"	-1.46"	-1.51"	+0.03"				
100% O.A.	-1.04"	-1.16"	-2.22"	+0.03"				

REMARKS

SUPPLY FAN REPORT

PROJECT: Fall River Justice Center	**DATE:** 11/6/20
AREA SERVED: AHU-5	**TECH:** BS

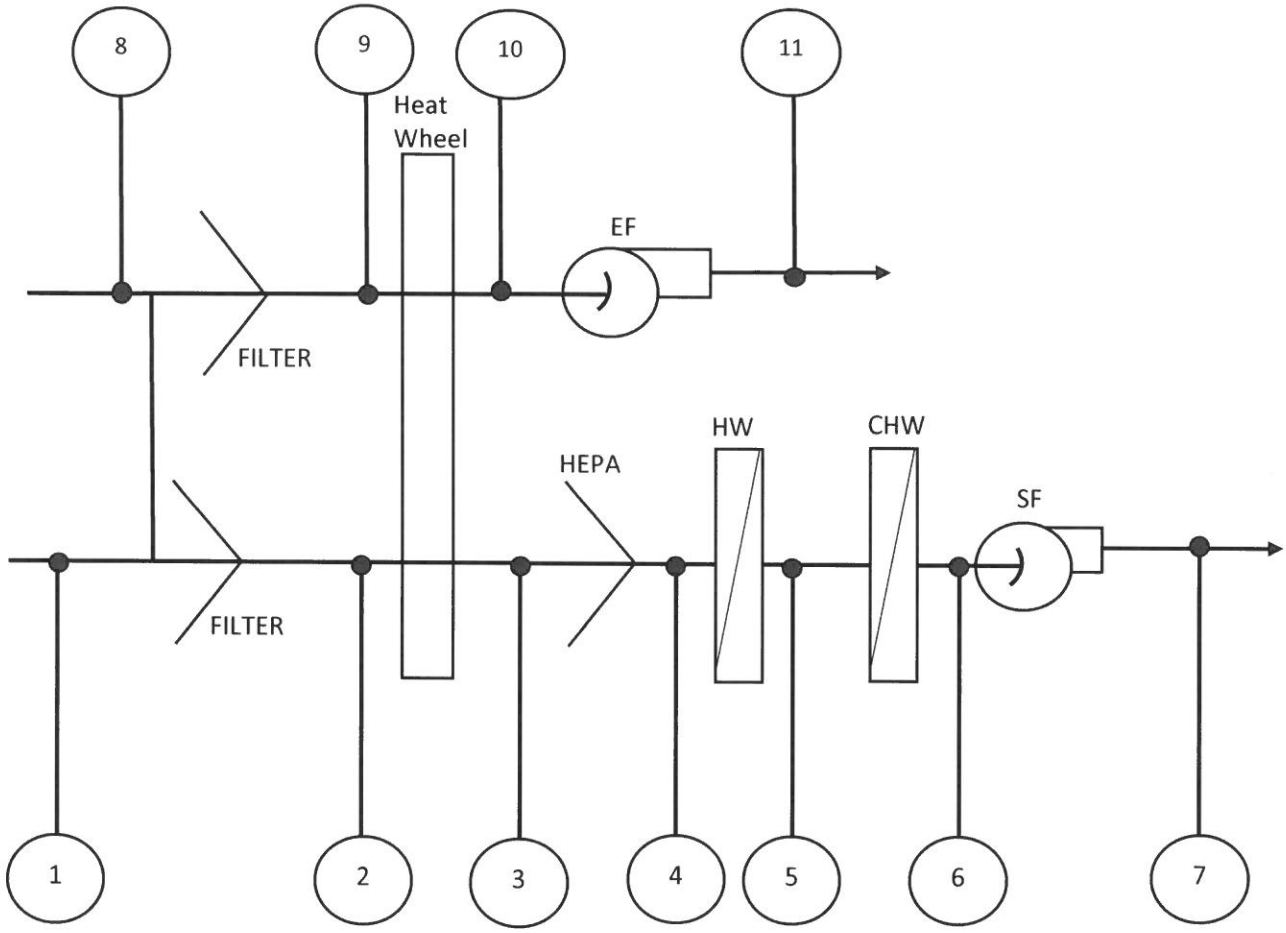
FAN DATA						
FAN NUMBER	AHU-5		AHU-5EF			
LOCATION	Penthouse		Penthouse			
AREA SERVED	2nd & 3rd Floors		2nd & 3rd Floors			
MANUFACTURER	Trane		Trane			
MODEL OR SIZE	MCCB050		MCCB050			
	DESIGN	**ACTUAL**	**DESIGN**	**ACTUAL**	**DESIGN**	**ACTUAL**
TOTAL CFM	21,400	21,147	17,120	17,321		
RETURN AIR	11,400	9942	Exh @min	8735		
OUTSIDE AIR	10,000	11,205	---	---		
DISCH. STATIC	---	+1.48"	---	+.19"	---	
SUCTION STATIC	---	-2.61"	---	-1.78"	---	
TOTAL STATIC	5.4"	4.09"	N/L	1.97"		
FAN RPM	1636	1067	966	838		
PULLEY O.D.	14.0"		10.0"			
ESP	2.25"					
VFD SPEED	59 Hz					
O.A.D. MIN POS	BMS Driven					
MOTOR DATA						
MANUFACTURER	Baldor		Century			
MODEL OR FR.	286T		S215T			
HORSEPOWER	30	30	10	10		
MOTOR RPM	1770	1770	1755	1755		
VOLTAGE / PH.	460/3	460/3	460/3	460/3		
AMPS LEG 1	35.0	26.1	12.6	12.0		
AMPS LEG 2	---	26.2	---	12.0	---	
AMPS LEG 3	---	26.0	---	11.9	---	
SHEAVE O.D.	9.0"		5.0"			
BELTS - QTY / SIZE	2/Bx90		2/Bx78			
SHEAVE POSITION	Fixed		Fixed			
BHP	22.4		9.5			

REMARKS

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

SYSTEM STATIC PRESSURE PROFILE

PROJECT: Fall River Justice Center	**DATE:** 11/6/20
SYSTEM/AREA SERV: AHU-5	**TECH:** BS



STATIC PRESSURE READINGS "wc

POS. (+) / NEG.(-)	1	2	3	4	5	6	7	NOTES
Min O.A.	-0.95"	-1.11"	-0.99"	-2.20"	-2.66"	-2.61"	+1.48"	
100% O.A.	-0.61"	-0.73"	-1.18"	-2.30"	-2.33"	-2.66"	+1.46"	
	8	**9**	**10**	**11**				
Min O.A.	-0.79"	-0.97"	-1.05"	+0.09"				
100% O.A.	-1.17"	-1.36"	-1.78"	+0.19"				

REMARKS

SUPPLY FAN REPORT

PROJECT: Fall River Justice Center	**DATE:** 11/6/20
AREA SERVED: AHU-6	**TECH:** BS

FAN DATA						
FAN NUMBER	AHU-6		AHU-6RF			
LOCATION	Penthouse		Penthouse			
AREA SERVED	4th & 5th Floors		4th & 5th Floors			
MANUFACTURER	Trane		Trane			
MODEL OR SIZE	MCCB057		MCCB057			
	DESIGN	**ACTUAL**	**DESIGN**	**ACTUAL**	**DESIGN**	**ACTUAL**
TOTAL CFM	27,000	23,762	13,700	14,805		
RETURN AIR	13,300	9402	Exh @min	9338		
OUTSIDE AIR	13,700	11,010	---	---		
DISCH. STATIC	---	+0.88"	---	+0.17"	---	
SUCTION STATIC	---	-4.33"	---	-1.16"	---	
TOTAL STATIC	5.95"	5.21	N/L	1.33"		
FAN RPM	1527	1228	876	649		
PULLEY O.D.	12.0"		13.0"			
ESP	3.19"					
VFD SPEED	60 Hz					
O.A.D. MIN POS	BMS Driven					

MOTOR DATA						
MANUFACTURER	Baldor		Baldor			
MODEL OR FR.	324T		254T			
HORSEPOWER	40	40	15	15		
MOTOR RPM	1775	1775	1760	1760		
VOLTAGE / PH.	460/3	460/3	460/3	460/3		
AMPS LEG 1	46.0	35.6	19.0	18.3		
AMPS LEG 2	---	36.6	---	18.3	---	
AMPS LEG 3	---	37.0	---	18.4	---	
SHEAVE O.D.	9.0"		6.0"			
BELTS - QTY / SIZE	2/5Vx900		1/5Vx860			
SHEAVE POSITION	Fixed		Fixed			
BHP	31.7		14.5			

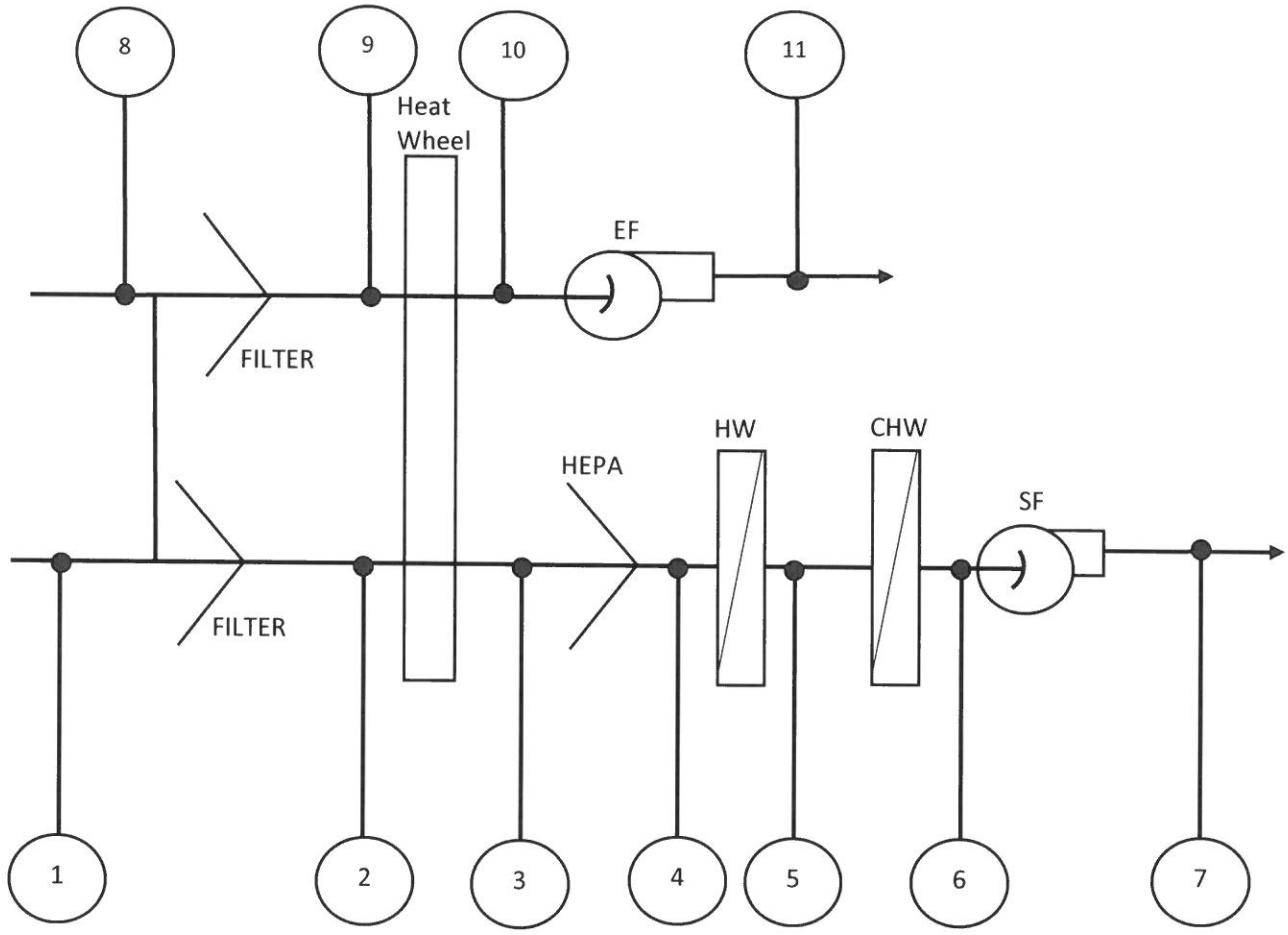
REMARKS

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

SYSTEM STATIC PRESSURE PROFILE

PROJECT: Fall River Justice Center | **DATE:** 11/6/20

SYSTEM/AREA SERV: AHU-6 | **TECH:** BS



STATIC PRESSURE READINGS "wc

POS. (+) / NEG.(-)	1	2	3	4	5	6	7	NOTES
Min O.A.	-2.31"	-2.61"	-2.39"	-3.87"	-3.97"	-4.33"	+0.88"	
100% O.A.	-1.35"	-1.39"	-1.70"	-2.99"	-3.11"	-3.48"	+0.86"	
	8	**9**	**10**	**11**				
Min O.A.	-1.39"	-1.44"	-1.81"	+0.14"				
100% O.A.	-0.76"	-0.82"	-1.16"	+0.17"				

REMARKS

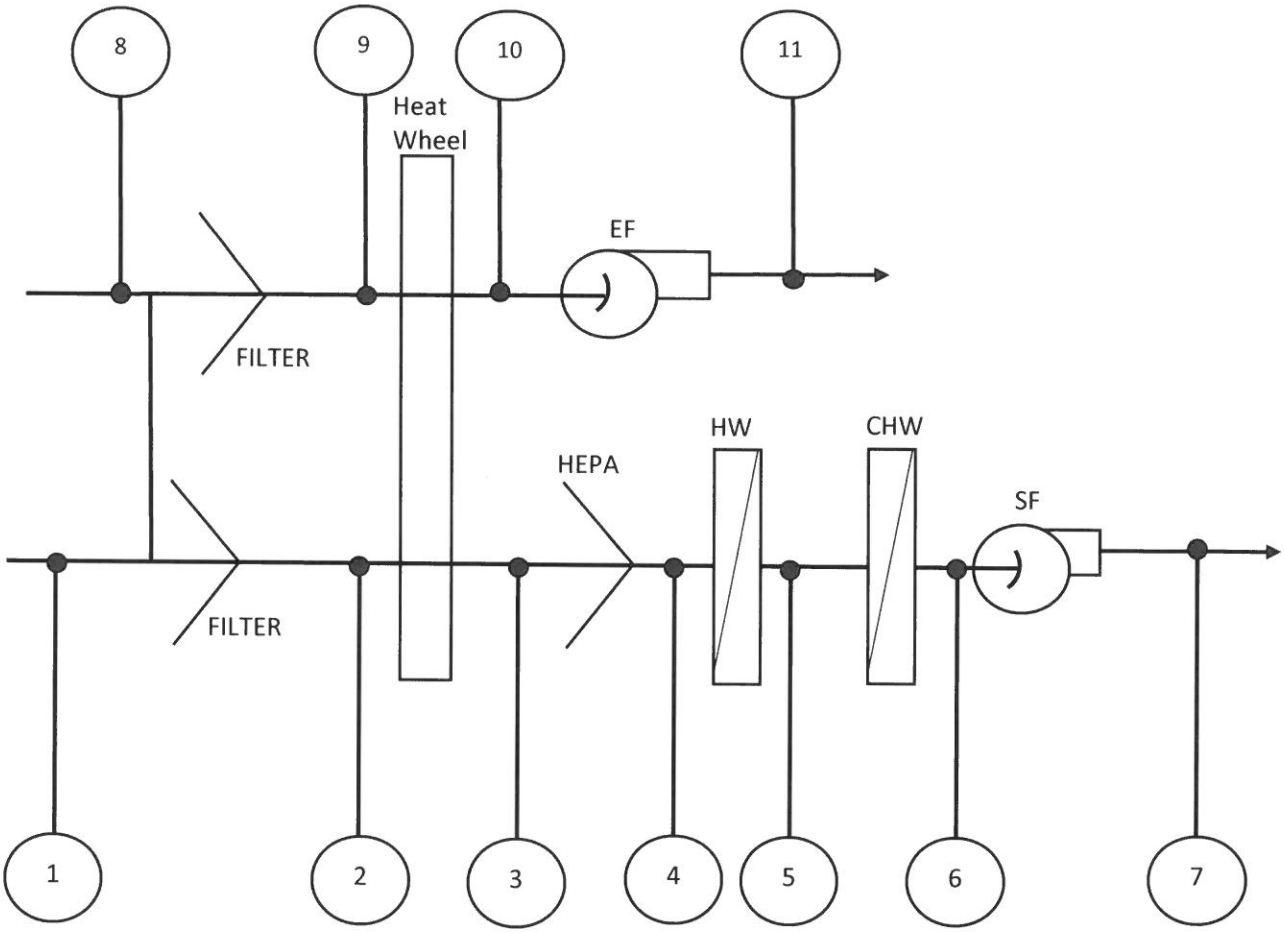
SUPPLY FAN REPORT

PROJECT: Fall River Justice Center				**DATE:** 11/6/20		
AREA SERVED: AHU-7				**TECH:** BS		
FAN DATA						
FAN NUMBER	AHU-7		AHU-7EF			
LOCATION	Penthouse		Penthouse			
AREA SERVED	4th & 5th Floors		4th & 5th Floors			
MANUFACTURER	Trane		Trane			
MODEL OR SIZE	MCCB057		MCCB057			
	DESIGN	**ACTUAL**	**DESIGN**	**ACTUAL**	**DESIGN**	**ACTUAL**
TOTAL CFM	27,000	26,135	21,600	21,538		
RETURN AIR	13,300	14,533	Exh @min	13,553		
OUTSIDE AIR	13,700	11,582	---	---		
DISCH. STATIC	---	+2.08"	---	+0.19"	---	
SUCTION STATIC	---	-3.25"	---	-1.48"	---	
TOTAL STATIC	5.95"	5.33	N/L	1.67"		
FAN RPM	1527	1149	876	858		
PULLEY O.D.	12.0"		13.0"			
ESP	2.74"					
VFD SPEED	60 Hz					
O.A.D. MIN POS	BMS Driven					
MOTOR DATA						
MANUFACTURER	Baldor		Baldor			
MODEL OR FR.	324T		254T			
HORSEPOWER	40	40	15	15		
MOTOR RPM	1775	1775	1760	1760		
VOLTAGE / PH.	460/3	460/3	460/3	460/3		
AMPS LEG 1	46.0	39.4	19.0	12.7		
AMPS LEG 2	---	39.2	---	12.6	---	
AMPS LEG 3	---	38.8	---	12.6	---	
SHEAVE O.D.	9.0"		6.0"			
BELTS - QTY / SIZE	2/5Vx900		1/5Vx860			
SHEAVE POSITION	Fixed		Fixed			
BHP	34.0		10.0			
REMARKS						
NA-Not Available ND-No Design DD-Direct Drive						

SYSTEM STATIC PRESSURE PROFILE

PROJECT: Fall River Justice Center | **DATE:** 11/6/20

SYSTEM/AREA SERV: AHU-7 | **TECH:** BS



STATIC PRESSURE READINGS "wc

POS. (+) / NEG.(-)	1	2	3	4	5	6	7	NOTES
Min O.A.	-0.66"	-1.21"	-0.82"	-2.74"	-2.78"	-3.25"	+2.08"	
100% O.A.	0.69"	-0.97"	-1.39"	-2.87"	-2.96"	-3.39"	+2.04"	
	8	**9**	**10**	**11**				
Min O.A.	-0.36"	-0.47"	-0.61"	+0.08"				
100% O.A.	-0.97"	-1.19"	-1.48"	+0.19"				

REMARKS

EXHAUST FAN REPORT

PROJECT: Fall River Justice Center | **DATE:** 11/6/20

AREA SERVED: | **TECH:** BS

FAN DATA						
FAN NUMBER		TEF-1	TEF-2			
LOCATION		Penthouse	Penthouse			
AREA SERVED		Restrooms	Restrooms			
MANUFACTURER		Greenheck	Greenheck			
MODEL OR SIZE		TCB-1-22-30	TCB-1-22-30			
TOTAL CFM	DESIGN	5615	5105			
	ACTUAL	5599	5658			
FAN RPM	DESIGN	1355	1223			
	ACTUAL	NA	NA			
PULLEY	O.D.	NA	NA			
SERVICE		1.15	1.15			
MOTOR DATA						
MANUFACTURER		Baldor	Baldor			
MODEL NUMBER		184T	184T			
MOTOR HP	DESIGN	3	3			
	ACTUAL	5	3			
MOTOR RPM		1750	1755			
VOLTAGE/PHASE		460/3	460/3			
MOTOR AMPS	DESIGN	6.6	4.0			
	ACT. LEG 1	6.0	3.2			
	ACT. LEG 2	6.6	3.2			
	ACT. LEG 3	6.2	3.5			
SHEAVE		4.5"	3.5"			
BELTS-QTY/SIZE		2/A67	2/A64			
SHEAVE POSITION		100% closed	50% open			
BHP		2.8	2.5			

REMARKS

VELOCITY PRESSURE READINGS

PROJECT: Fall River Justice Center | **DATE:** 11/6/2020

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

TRAVERSE LOCATIONS	DUCT SIZE "	AREA SQ.FT.	DESIGN		CENTERLINE STATIC PRES."	TEST		NOTES
			FPM	CFM		FPM	CFM	
AHU-1 (ERV)								
Supply Side	30" x 20"	4.17	1175	4900	-.43"	1312	5467	
Exhaust Side	45" x 14"	4.375	1189	5200	-1.49"	1529	6689	
AHU-2/ REF-2								
Supply	40" x 26"	7.22	1247	9000	1.29"	1162	8392	
Min O.A.	36" x 26"	6.5	600	3900	-.04"	489	3179	
Return to AHU-2	Calculated	---	---	5100	---	---	5213	
Exh @ Min OA	26" x 40"	6.5	---	N/D	+.06"	669	4349	
Exh @ 100% OA	26" x 40"	6.5	1108	7200	+.19"	1077	7001	
AHU-3/ REF-3								
Supply	22" x 32"	4.89	1513	7400	1.60"	1433	7007	
Min O.A.	24" x 36"	6.0	617	3700	+.03"	325	1950	(1)
Return to AHU-3	Calculated	---	---	3700	---	---	5057	
Exh @ Min OA	36" x 24"	6.0	---	N/D	+.42"	1035	6210	(1)
Exh @ 100% OA	36" x 24"	6.0	987	5920	+.42"	1035	6210	(1)
AHU-4/ REF-4								
Supply	48" x 42"	14.0	---	21,300	.87"	1629	22,806	
Min O.A.	54" x 40"	15.0	---	10,000	-.06	578	8670	
Return to AHU-4	Calculated	---	---	11,300	---	---	14,136	
Exh @ Min OA	54" x 40"	15.0	---	N/D	+.03"	494	7410	
Exh @ 100% OA	54" x 40"	15.0	---	17,040	+.03"	1117	16,755	

REMARKS

(1) The outside air and spill dampers are not fully functioning properly

Note: Design exhaust at minimum OA is a dynamic system calculation

VELOCITY PRESSURE READINGS

PROJECT: Fall River Justice Center | **DATE:** 11/6/2020

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

TRAVERSE LOCATIONS	DUCT SIZE "	AREA SQ.FT.	DESIGN FPM	DESIGN CFM	CENTERLINE STATIC PRES."	TEST FPM	TEST CFM	NOTES
AHU-5/ REF-5								
Supply	46" x 50"	15.97	1340	21,400	1.45"	1324	21,147	
Min O.A.	54" x 40"	15.0	667	10,000	-.12"	747	11,205	
Return to AHU-5	Calculated	---	---	11,400	---	---	9942	
Exh @ Min OA	54" x 36"	13.5	---	N/D	+.09"	647	8735	
Exh @ 100% OA	54" x 36"	13.5	1268	17,120	+.19"	1283	17,321	
AHU-6/ REF-6								
Supply	42" x 64"	18.67	1446	27,000	.88"	1273	23,762	
Min O.A.	40" x 54"	15.0	913	13,700	-.06"	734	11,010	
Return to AHU-6	Calculated	---	---	13,300	---	---	12,752	
Exh @ Min OA	56" x 46"	17.88	---	N/D	+.14"	522	9338	
Exh @ 100% OA	56" x 46"	17.88	743	13,700	+.17"	828	14,805	
AHU-7/ REF-7								
Supply	54" x 38"	14.25	1895	27,000	2.08"	1834	26,135	
Min O.A.	---	calc	---	13,700	calc	---	11,582	(1)
Return to AHU-7	Calculated	---	---	13,300	---	---	14,533	(1)
Exh @ Min OA	60" x 40"	16.67	---	N/D	+.08"	813	13,553	
Exh @ 100% OA	60" x 40"	16.67	1296	21,600	+.19"	1292	21,538	
TEF-1	34" x 20"	4.77	---	5615	.19	1186	5599	
TEF-2	30" x 20"	4.17	---	5105	-.82	1358	5658	

REMARKS

(1) Total at the return riser was taken. That flow minus minimum spill equals return to unit total. Unit supply minus unit return equals OA. There was not a good location to measure the OA directly.

Note: Design exhaust at minimum OA is a dynamic system calculation

HYDRONIC FLOW ELEMENTS

PROJECT: Fall River Justice Center | **DATE:** 11/6/20

AREA SERVED: AHU's | **TECH:** BS

LOCATION	NO.	ELEMENT	MFG.	SIZE	DESIGN GPM	TEST I			FINAL			NOTES
						POS.	PR.DIF	GPM	POS.	PR.DIF	GPM	
CHILLED												
AHU-1		C/S	Nexus	5A	33.0	75%	11.6	34.0				
AHU-2		C/S	Nexus	6A	48.0	90%	23.3	47.0				
AHU-3		C/S	Nexus	6A	40.0	75%	17.1	40.0				
AHU-4		C/S	Nexus	NXFB-300	113.0	Open	7.3	113.0				
AHU-5		C/S	Nexus	NXFB-300	114.0	Open	7.8	114.0				
AHU-6		C/S	Nexus	NXFB-300	140.4	Open	5.4	140.4				
AHU-7		C/S	Nexus	NXFB-300	146.5	Open	5.1	146.5				
HOT												
AHU-1		C/S	Nexus	4A	19.0	80%	44.0	20.0				
AHU-2		C/S	Nexus	5A	33.0	95%	36.6	34.0				
AHU-3		C/S	Nexus	5A	27.0	90%	22.5	26.0				
AHU-4		C/S	Nexus	N2FY-250	77.0	Open	7.1	77.0				
AHU-5		C/S	Nexus	N2FY-250	77.0	Open	6.9	77.0				
AHU-6		C/S	Nexus	N2FY-250	98.0	Open	6.1	98.0				
AHU-7		C/S	Nexus	N2FY-250	98.0	Open	6.0	98.0				

REMARKS

AHU-4-7 AUTO FLOW

Tighe&Bond

Wings Testing & Balancing Co., Inc. TAB Report

December 29, 2021

WING'S TESTING & BALANCING CO., INC.

Fall River Justice Court
HVAC/Ventilation Survey
REVISIT December 2021

* * * *

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

December 29th, 2021

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.

December 29th, 2021

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

Re: Fall River Justice Court/HVAC Ventilation Study – Revisit December 2021

Dear Jason,

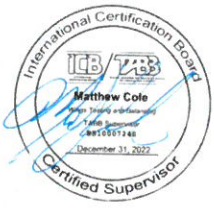
Wing's has completed the return visit for the above referenced location. The results are as follows:

- Outside air minimums for AHU-3, AHU-4 and AHU-7 have been reset to design numbers.
- AHU-6 was sped up to design and the outside air minimum position was reset to meet design.

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: Fall River Justice Center				**DATE:**	12/30/21	
AREA SERVED: AHU-3				**TECH:**	BS	
FAN DATA						
FAN NUMBER	AHU-3		AHU-3EF			
LOCATION	Penthouse		Penthouse			
AREA SERVED	Law Library		Law Library			
MANUFACTURER	Trane		Trane			
MODEL OR SIZE	MCCB017		MCCB017			
	DESIGN	**ACTUAL**	**DESIGN**	**ACTUAL**	**DESIGN**	**ACTUAL**
TOTAL CFM	7400	7007	5920	6210		
RETURN AIR	3700	3401	Exh @min	4065		
OUTSIDE AIR	3700	3606	---	---		
DISCH. STATIC	---	+1.45"	---	+0.42"	---	
SUCTION STATIC	---	-3.24"	---	-1.67"	---	
TOTAL STATIC	5.73"	4.69"	NA	2.09"		
FAN RPM	2857	1722	1402	1299		
PULLEY O.D.	6.0"		7.0"			
ESP	2.75"		---			
VFD SPEED	60 Hz		---			
O.A.D. MIN POS	40%		---			
MOTOR DATA						
MANUFACTURER	Baldor		Baldor			
MODEL OR FR.	254T		184T			
HORSEPOWER	10	10	5	5		
MOTOR RPM	1765	1765	1750	1750		
VOLTAGE / PH.	460/3	460/3	460/3	460/3		
AMPS LEG 1	14.0	10.6	6.6	5.0		
AMPS LEG 2	---	10.9	---	4.9	---	
AMPS LEG 3	---	10.8	---	5.0	---	
SHEAVE O.D.	6.0"		5.0"			
BELTS - QTY / SIZE	1/5Vx450		1/Ax43			
SHEAVE POSITION	Fixed		Fixed			
BHP	7.7		3.8			

REMARKS

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

SUPPLY FAN REPORT

PROJECT: Fall River Justice Center				**DATE:** 12/30/21		
AREA SERVED: AHU-4				**TECH:** BS		
FAN DATA						
FAN NUMBER	AHU-4		AHU-4EF			
LOCATION	Penthouse		Penthouse			
AREA SERVED	2nd & 3rd Floors		2nd & 3rd Floors			
MANUFACTURER	Trane		Trane			
MODEL OR SIZE	MCCB050		MCCB050			
	DESIGN	**ACTUAL**	**DESIGN**	**ACTUAL**	**DESIGN**	**ACTUAL**
TOTAL CFM	21,300	22,806	17,040	16,775		
RETURN AIR	11,300	12,786	Exh @min	7410		
OUTSIDE AIR	10,000	10,020	---	---		
DISCH. STATIC	---	+0.92"	---	+0.03"	---	
SUCTION STATIC	---	-2.78"	---	-2.22"	---	
TOTAL STATIC	5.4"	3.00	N/L	2.25"		
FAN RPM	1636	1047	966	835		
PULLEY O.D.	14.0"		10.0"			
ESP	2.25"		---			
VFD SPEED	56 Hz		---			
O.A.D. MIN POS	25%		---			
MOTOR DATA						
MANUFACTURER	Baldor		Century			
MODEL OR FR.	286T		S215T			
HORSEPOWER	30	30	10	10		
MOTOR RPM	1770	1770	1755	1755		
VOLTAGE / PH.	460/3	460/3	460/3	460/3		
AMPS LEG 1	35.0	24.2	12.6	11.4		
AMPS LEG 2	---	24.6	---	11.5	---	
AMPS LEG 3	---	24.1	---	11.6	---	
SHEAVE O.D.	9.0"		5.0"			
BELTS - QTY / SIZE	2/Bx90		2/Bx78			
SHEAVE POSITION	Fixed		Fixed			
BHP	20.8		9.1			

REMARKS

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

SUPPLY FAN REPORT

PROJECT: Fall River Justice Center				**DATE:**	12/30/21	
AREA SERVED: AHU-6				**TECH:**	BS	
FAN DATA						
FAN NUMBER	AHU-6		AHU-6RF			
LOCATION	Penthouse		Penthouse			
AREA SERVED	4th & 5th Floors		4th & 5th Floors			
MANUFACTURER	Trane		Trane			
MODEL OR SIZE	MCCB057		MCCB057			
	DESIGN	**ACTUAL**	**DESIGN**	**ACTUAL**	**DESIGN**	**ACTUAL**
TOTAL CFM	27,000	26,128	13,700	14,805		
RETURN AIR	13,300	12,752	Exh @min	9338		
OUTSIDE AIR	13,700	13,345	---	---		
DISCH. STATIC	---	+1.09"	---	+0.17"	---	
SUCTION STATIC	---	-4.58"	---	-1.16"	---	
TOTAL STATIC	5.95"	5.67"	N/L	1.33"		
FAN RPM	1527	1356	876	649		
PULLEY O.D.	12.0"		13.0"			
ESP	3.61"		---			
VFD SPEED	66 Hz		---			
O.A.D. MIN POS	50%		---			
MOTOR DATA						
MANUFACTURER	Baldor		Baldor			
MODEL OR FR.	324T		254T			
HORSEPOWER	40	40	15	15		
MOTOR RPM	1775	1775	1760	1760		
VOLTAGE / PH.	460/3	460/3	460/3	460/3		
AMPS LEG 1	46.0	46.1	19.0	18.3		
AMPS LEG 2	---	46.1	---	18.3	---	
AMPS LEG 3	---	47.0	---	18.4	---	
SHEAVE O.D.	9.0"x 2 1/8"		6.0"			
BELTS - QTY / SIZE	2/5Vx900		1/5Vx860			
SHEAVE POSITION	Fixed		Fixed			
BHP	40		14.5			

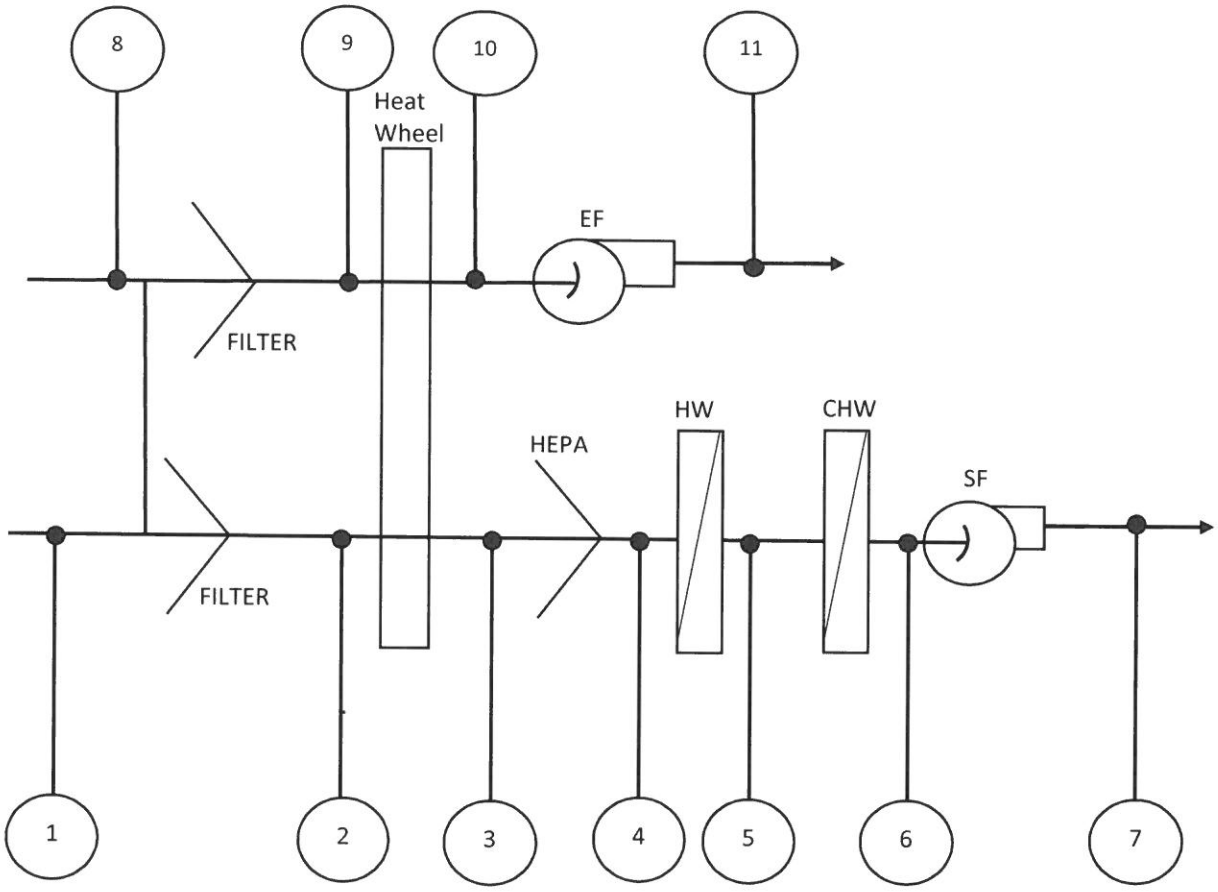
REMARKS

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

SYSTEM STATIC PRESSURE PROFILE

PROJECT: Fall River Justice Center | **DATE:** 12/30/21

SYSTEM/AREA SERV: AHU-6 | **TECH:** BS



STATIC PRESSURE READINGS "wc

POS. (+) / NEG.(-)	1	2	3	4	5	6	7	NOTES
Min O.A.	-2.52"	-2.60"	-2.91"	-4.26"	-4.40"	-4.58"	+1.09"	
100% O.A.	-1.35"	-1.39"	-1.70"	-2.99"	-3.11"	-3.48"	+0.86"	
	8	9	10	11				
Min O.A.	-1.39"	-1.44"	-1.81"	+0.14"				
100% O.A.	-0.76"	-0.82"	-1.16"	+0.17"				

REMARKS

SUPPLY FAN REPORT

PROJECT: Fall River Justice Center				**DATE:** 12/30/21		
AREA SERVED: AHU-7				**TECH:** BS		
FAN DATA						
FAN NUMBER	AHU-7		AHU-7EF			
LOCATION	Penthouse		Penthouse			
AREA SERVED	4th & 5th Floors		4th & 5th Floors			
MANUFACTURER	Trane		Trane			
MODEL OR SIZE	MCCB057		MCCB057			
	DESIGN	**ACTUAL**	**DESIGN**	**ACTUAL**	**DESIGN**	**ACTUAL**
TOTAL CFM	27,000	26,135	21,600	21,538		
RETURN AIR	13,300	13,024	Exh @min	13,553		
OUTSIDE AIR	13,700	13,111	---	---		
DISCH. STATIC	---	+2.08"	---	+0.19"	---	
SUCTION STATIC	---	-3.25"	---	-1.48"	---	
TOTAL STATIC	5.95"	5.33"	N/L	1.67"		
FAN RPM	1527	1149	876	858		
PULLEY O.D.	12.0"		13.0"			
ESP	2.74"		---			
VFD SPEED	60 Hz		---			
O.A.D. MIN POS	35%		---			
MOTOR DATA						
MANUFACTURER	Baldor		Baldor			
MODEL OR FR.	324T		254T			
HORSEPOWER	40	40	15	15		
MOTOR RPM	1775	1775	1760	1760		
VOLTAGE / PH.	460/3	460/3	460/3	460/3		
AMPS LEG 1	46.0	39.4	19.0	12.7		
AMPS LEG 2	---	39.2	---	12.6	---	
AMPS LEG 3	---	38.8	---	12.6	---	
SHEAVE O.D.	9.0"		6.0"			
BELTS - QTY / SIZE	2/5Vx900		1/5Vx860			
SHEAVE POSITION	Fixed		Fixed			
BHP	34.0		10.0			
REMARKS						
NA-Not Available ND-No Design DD-Direct Drive						

VELOCITY PRESSURE READINGS

PROJECT: Fall River Justice Center | **DATE:** 12/30/21

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

TRAVERSE LOCATIONS	DUCT SIZE "	AREA SQ.FT.	DESIGN		CENTERLINE STATIC PRES."	TEST		NOTES
			FPM	CFM		FPM	CFM	
AHU-1 (ERV)								
Supply Side	30" x 20"	4.17	1175	4900	-0.43"	1312	5467	
Exhaust Side	45" x 14"	4.375	1189	5200	-1.49"	1529	6689	
AHU-2/ REF-2								
Supply	40" x 26"	7.22	1247	9000	1.29"	1162	8392	
Min O.A.	36" x 26"	6.5	600	3900	-0.04"	489	3179	
Return to AHU-2	Calculated	---	---	5100	---	---	5213	
Exh @ Min OA	26" x 40"	6.5	---	N/D	+0.06"	669	4349	
Exh @ 100% OA	26" x 40"	6.5	1108	7200	+0.19"	1077	7001	
AHU-3/ REF-3								
Supply	22" x 32"	4.89	1513	7400	1.60"	1433	7007	
Min O.A.	24" x 36"	6.0	617	3700	+0.03"	601	3606	
Return to AHU-3	Calculated	---	---	3700	---	---	3401	
Exh @ Min OA	36" x 24"	6.0	---	N/D	+0.18"	1035	4065	
Exh @ 100% OA	36" x 24"	6.0	987	5920	+0.42"	1035	6210	
AHU-4/ REF-4								
Supply	48" x 42"	14.0	---	21,300	0.87"	1629	22,806	
Min O.A.	54" x 40"	15.0	---	10,000	-0.10"	668	10,020	
Return to AHU-4	Calculated	---	---	11,300	---	---	12,786	
Exh @ Min OA	54" x 40"	15.0	---	N/D	+0.03"	494	7410	
Exh @ 100% OA	54" x 40"	15.0	---	17,040	+0.03"	1117	16,755	

REMARKS

Note: Design exhaust at minimum OA is a dynamic system calculation

VELOCITY PRESSURE READINGS

PROJECT: Fall River Justice Center | **DATE:** 12/30/21

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

TRAVERSE LOCATIONS	DUCT SIZE "	AREA SQ.FT.	DESIGN		CENTERLINE STATIC PRES."	TEST		NOTES
			FPM	CFM		FPM	CFM	
AHU-5/ REF-5								
Supply	46" x 50"	15.97	1340	21,400	1.45"	1324	21,147	
Min O.A.	54" x 40"	15.0	667	10,000	-0.12"	747	11,205	
Return to AHU-5	Calculated	---	---	11,400	---	---	9942	
Exh @ Min OA	54" x 36"	13.5	---	N/D	+0.09"	647	8735	
Exh @ 100% OA	54" x 36"	13.5	1268	17,120	+0.19"	1283	17,321	
AHU-6/ REF-6								
Supply	42" x 64"	18.67	1446	27,000	0.88"	1400	26,138	
Min O.A.	40" x 54"	15.0	913	13,700	-0.07"	897	13,395	
Return to AHU-6	Calculated	---	---	13,300	---	---	12,752	
Exh @ Min OA	56" x 46"	17.88	---	N/D	+0.14"	522	9338	
Exh @ 100% OA	56" x 46"	17.88	743	13,700	+0.17"	828	14,805	
AHU-7/ REF-7								
Supply	54" x 38"	14.25	1895	27,000	+2.08"	1834	26,135	
Min O.A.	---	calc	---	13,700	calc	---	13,111	(1)
Return to AHU-7	Calculated	---	---	13,300	---	---	13,024	(1)
Exh @ Min OA	60" x 40"	16.67	---	N/D	+0.08"	813	13,553	
Exh @ 100% OA	60" x 40"	16.67	1296	21,600	+0.19"	1292	21,538	
TEF-1	34" x 20"	4.77	---	5615	+0.19"	1186	5599	
TEF-2	30" x 20"	4.17	---	5105	-0.82"	1358	5658	

REMARKS

(1) Total at the return riser was taken. That flow minus minimum spill equals return to unit total. Unit supply minus unit return equals OA. There was not a good location to measure the OA directly.

Note: Design exhaust at minimum OA is a dynamic system calculation