Dedham District Court
Dedham, MA

HVAC SYSTEM EVALUATIONS COVID-19

Office of Court Management

July 20, 2022

Tighe&Bond

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Section 1
Existing Conditions & Site Observations

Tighe & Bond visited the Dedham District Courthouse on May 5, 2021. 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.

Tighe & Bond received mechanical drawings for half of the courthouse from a renovation in 2001. There are three other rooftop units that we do not have any mechanical drawings for. It is unknown what type of system (VAV, Single Zone, Multi Zone, etc.) these rooftop units are, what areas they serve, or what the design values may be for supply air, outside air and return air. Therefore, it is not possible for Tighe & Bond to calculate the code required minimum outside air for these systems. Our analysis is based on the information from the mechanical drawings we received and our site visit.

Site Visit Attendees:

- *Office of Court Management:*
  - John McGowan, Courthouse Facilities Staff
- *Tighe & Bond*
  - Ryan Ablondi, PE, Senior Mechanical Engineer
  - Tim Bill, Staff Mechanical Engineer

1.1 Existing Ventilation System

The Dedham District Courthouse was constructed in 1938 and is approximately 26,000 square feet in size. It has had several renovations over the years including a large addition on the back of the building as well as an air quality improvements project in 2001 which included the installation of the mechanical equipment assessed in this report. A constant volume, single zone rooftop air handling unit (RTU) with heat pump serves the main courtroom. The unit contains a supply fan, 2" MERV 10 Filters and refrigerant (DX) cooling/heating coil and is in fair condition. It is unknown whether the supply fan continues to run to provide ventilation air when the space temperature is satisfied.

One variable air volume (VAV) air handling unit (AHU) in the attic serves two courtrooms and associated office space on the second floor. The unit contains a DX cooling coil, supply fan, and a 2" MERV 10 filter and is in fair condition. There is a dedicated return fan serving the unit. Supply air is distributed to each zone via VAV boxes. All VAV boxes are equipped with electric heating coils.

As mentioned above, there are three rooftop units that Tighe & Bond did not receive any mechanical drawings for. Two of the three RTUs are mounted on the high rear roof over the addition on the back of the building. The third is mounted toward the center of the roof. It is assumed that all three of these units are serving areas in the addition at the rear of the building.

The two units mounted on the high roof are Carrier model 50HC cooling only RTUs. Based on the nametag on the unit, these units do not have any factory provided heat and it is unknown whether there is any auxiliary heat such as a duct mounted electric heating coil

in either of these systems. If there is not any auxiliary heat, the system can not operate in winter and the areas served by these units would not have any ventilation at that time. The unit includes a supply fan, 2" MERV 10 filter and a DX cooling coil.

The third unit mounted toward the middle of the roof is a Bryant 558F cooling only RTU. Similar to the carrier units, there is no factory mounted heat option for this unit and it is unknow if there are any auxiliary heater in the system. If the system does not run in the winter, the areas served with not have any ventilation. The unit includes a supply fan, 2" MERV 10 filter and DX cooling coil.

There are three fan coil units (FCU) serving the building that are in fair condition, one in the basement and two on the first floor. The FCU in the basement serves various office areas, support areas and the corridor. The basement FCU has a supply fan, DX cooling coil, 2" MERV 10 filter and integral hot water coil. Outside air is ducted from the exterior, directly to the return air inlet of the FCU. The two FCUs on the first floor serve office spaces for the clerk and probation areas. Each of these units has a supply fan, 2" MERV 10 filter and DX cooling coil. It is unknown whether the supply fans continues to run to provide ventilation air when the space temperature is satisfied. A dedicated outside air fan in the attic provides outside air ducted to the return air inlet of each FCU.

The lockup area is served by an energy recovery ventilator (ERV) which consists of a 100% outside air fan, 2" MERV 10 filters, electric preheat coil, energy wheel and an exhaust air fan. There are duct mounted DX cooling and hot water heating coils in the supply duct.

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

TABLE 1
Existing Air Handling Units

Unit	Original Design Airflow (CFM)	Original Design Min. O.A. (CFM)	Filters	Condition
RTU-1	4,000	1,200	2" MERV 10	Fair
AHU-1	5,125	1,800	2" MERV 10	Fair
RTU-X	Unknown	Unknown	2" MERV 10	Fair
RTU-X	Unknown	Unknown	2" MERV 10	Fair
RTU-X	Unknown	Unknown	2" MERV 10	Fair
FCU-1	1,040	150	2" MERV 10	Fair
FCU-2	1,600	275	2" MERV 10	Fair
FCU-3	1,600	250	2" MERV 10	Fair
ERV-1	440	440	2" MERV 10	Fair

Photo 1 – Representative Air Handler

1.2 Existing Control System

The Dedham District Courthouse does not have a building management system (BMS). All of the mechanical equipment operates under local electric controls. We are not aware of any demand control ventilation sequences in use at this courthouse. RTU-1 which serves the main courtroom is noted on the drawings as having full economizer.

Section 2
Recommendations

Below is a list of recommendations for the Dedham District Courthouse. Please refer to the "Overview of Recommendations" report for further explanation and requirements of the stated recommendations.

Building areas without adequate ventilation and filtration significantly increase the risk of spreading viruses like Coronavirus (SARS-CoV-2), especially areas with high occupant density and where people occupy the same space for relatively long periods of time. Consider significantly reducing occupancy or relocating occupants to other areas with adequate ventilation.

2.1 Filtration Efficiency Recommendations

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

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

The TAB Contractor and/or Engineer shall verify that the air handlers can accommodate a MERV-13 filter per Appendix A in the overview of recommendations report. 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.*

2.2 Testing & Balancing Recommendations

Based on the mechanical drawings we received, the air handling units are approximately 20 years old. The age of the units we did not receive drawings for is unknown. It is unknown to Tighe & Bond when the last time the any of 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 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)
RTU-1	4,000	1,200	585	**1,200**
AHU-1	5,125	1,800	523	**1,800**
RTU-X	Unknown	Unknown	Unknown	Unknown
RTU-X	Unknown	Unknown	Unknown	Unknown
RTU-X	Unknown	Unknown	Unknown	Unknown
FCU-1	1,040	150	144	**150**
FCU-2	1,600	275	114	**275**
FCU-3	1,600	250	83	**250**
ERV-1	440	440	279	**440**

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.

We recommend maintaining the outdoor airflows at the original designed values where they exceed the code minimums calculated by Tighe & Bond. Supplying more outdoor than required by code will provide better indoor air quality.

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)	134	103	31
Total Supply Air (CFM/Person)	103	68	221
Outdoor Air (CFM/Person)	31	22	60

*Values in table only based on spaces with ventilation air.

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 rate per person assumes the full supply airflow is being delivered to the room. At times when the supply airflow for AHU-1 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	80	4,000	50	1,200	16
Courtroom 2	67	Unknown	Unknown	Unknown	Unknown
Courtroom 3	67	Unknown	Unknown	Unknown	Unknown
Courtroom 4	32	1,500	47	527	16
Courtroom 5	35	1,500	43	527	15

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	4,000	235	1,200	71
Courtroom 2	15	Unknown	Unknown	Unknown	Unknown
Courtroom 3	14	Unknown	Unknown	Unknown	Unknown
Courtroom 4	8	1,500	188	527	66
Courtroom 5	8	1,500	188	527	66

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

RTB-2: *Rebalance system return air flow rate.*

We recommend testing and balancing the return fan airflow rate for AHU-1 to ensure the correct quantity of return air is being delivered to the air handler.

RTB-4: *Test and balance VAV box flow rates.*

We recommend testing and balancing the VAV boxes serving AHU-1 to ensure each space is being supplied the proper quantity of air.

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

If the airflow to each space has not been recently tested, we recommending testing the airflow rates in the holding cells, control room, Courtrooms, Jury Pool room, and other densely occupied areas as a minimum. These systems are very old and the airflow rate delivered to and returned from these spaces may not match the original design intent.

If specific areas within the Courthouse experiences regular cooling and heating comfort complaints this may be an indication of a lack of airflow to the space. We recommend testing and balancing the air inlets and outlets serving those spaces to the designed values. Prior to rebalancing the building, we recommend verifying the boiler plant is maintaining the correct supply water temperature. Incorrect supply water temperature may be contributing to the temperature control complaints instead of a lack of airflow.

RTB-6: *Test and balance all air handler and fan coil unit dx and hot water coils.*

Testing and balancing the air handler and fan coil unit hot water coils will help ensure the coils are receiving the proper water flow rates. Due to the age of the coils, the coils may not perform as required to properly temper the supply air. Coils become fouled over time, which degrades the performance.

Confirm that the air handler and fan coil unit's refrigerant system is operating correctly to ensure the DX coil is receiving full refrigerant flow.

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*.

Replace dampers and actuators that are not functioning properly.

RE-2: *Clean air handler coils and drain pans.*

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 the airflow stations and reheat coils and changing dirty filters in the fan powered VAV boxes. Any boxes not delivering the expected airflow rates should be rebalanced or replaced.

RE-7: *Test the existing air handler and fan coil unit control valves and actuators for proper operation.*

2.4 Control System Recommendations

We recommend the following for the control system:

RC-1: *Implement a pre and post-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 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. Refer to the "Overview of Recommendations" document for further guidance on installing portable HEPA filters.

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

2.7.1 Document As-Built Conditions and Recalculate Outdoor Air Requirements

As discussed in Section 1, the drawings received by Tighe & Bond do not show all of the mechanical systems in the building. If documentation of these systems cannot be found, we recommend investigating the ductwork distribution systems throughout the building and developing as-built drawings. Once this is documented, revised outdoor airflow to each RTU should be calculated by an engineer.

2.7.2 Capital Planning for Replacement of Aging Mechanical Equipment

The existing mechanical equipment including RTU-1, AHU-1, the FCUs and ERV-1 are approx. 20 years old and are approaching the end of their useful life. These units are currently in good condition however ASHRAE data shows that the median life expectancy for RTUs and packaged split DX AHUs is 15 years and Fan coil units is 20 years. While

immediate replacement is not necessary at this time, we would recommend developing a capital plan to replace these units in ~5 years.

2.7.3 Install a Building Management System

We recommend installing a Building Management System (BMS) to control and monitor HVAC equipment. Installing a modern BMS to operate and monitor the mechanical systems in the building can save energy and lower maintenance and operating costs. This recommendation is an energy saving and maintenance measure and does not affect the indoor air quality of the building.

Section 3
Testing & Balancing Results

Milharmer Associates visited the Dedham District Courthouse on May 13, 2022 to test the airflow rates of the air handling units and the exhaust fans. A summary of the tested airflow rates versus the design airflow rates are shown below in Tables 5 and 6. The full testing and balancing report is attached.

TABLE 5
Air Handler Airflow 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	4,000	1,200	2,800	4,927	1,695	3,232
RTU-1	5,125	1,800	3,325	2,474	779	1,695
RTU-2	Unknown	Unknown	Unknown	1,480	322	1,158
RTU-3	Unknown	Unknown	Unknown	1,948	353	1,595
RTU-4	Unknown	Unknown	Unknown	1,265	886	379
FCU-1	1,040	150	890	710	NT	707
FCU-2	1,600	275	1,325	1,488	NT	572
FCU-3	1,600	250	1,350	1,329	NT	576
ERV-1	440	440	560	421	421	518

Note: The three "XXX" RTUs were arbitrarily given tag numbers RTU-2, RTU-3, and RTU-4.

TABLE 6
Return Fan Testing & Balancing Results

Unit	**Serving**	**Design Return/Exhaust Airflow (CFM)**	**Actual Return/Exhaust Airflow (CFM)**
ILF-1	AHU-1	5,125	4,724
ILF-2	AHU-1	400	378

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

1. AHU-1 is operating 23% above the design airflow, however the balance report notes that the associated VAV boxes are not properly balanced. We recommend balancing the VAV's to the original design airflow and retesting the system. AHU-1 return fans ILF-1 & 2 are operating within acceptable tolerances.

2. The TAB report notes that RTU-1 is operating at 60% of the design airflow and requires a sheave change to get the airflow back to design. We recommend moving ahead with the sheave change.
3. In an effort to identify what the three unknown RTUs served, the TAB Contractor tested the airflow rates in each room and matched the flow rates to the air handlers. Refer to the balance report to see which spaces each air handler is connected to.
4. ERV-1 is providing 96% of the design outdoor airflow which is within acceptable tolerance.
5. FCU-1 is operating at 70% of design supply airflow and has a return airflow that matches the supply indicating there is no outside air being delivered to the space. We recommend the unit be investigated to determine any potential case for the lack of supply airflow and rebalanced to supply the recommended amount of outdoor air noted in Table 5 above.
6. FCU-2 & 3 are operating below the acceptable airflow range. The outdoor airflow for these units was not tested however, based on the return airflows noted in the TAB report, it is apparent that there was a significant amount of outdoor air being delivered at the time of testing. These units may experience issues properly tempering the air if they are providing higher than design levels of outdoor air. The units should be investigated to determine the cause of the lack of supply airflow and the outdoor airflow for each unit should be balanced to the recommended outdoor airflows listed in the table above.

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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MILHARMER ASSOCIATES, INC.
534 New State Highway, Route 44, Suite 3
Raynham, MA 02767
Tel.: 508-823-8500; Facsimile: 508-823-8600

TEST AND BALANCE REPORT

Project: **Dedham District Court**
631 High St., Dedham, MA

Project No.: **22-184** **Project Date:** **5/13/2022**

MECHANICAL CONTRACTOR
Tighe & Bond

3384

A N.E.B.B. Certified Company

Project:	Dedham District Court		
Address:	631 High St., Dedham, MA		
Date:	5/13/2022	**Project No.**	22-184

CERTIFICATION

Submitted & Certified by:

Milharmer Associates, Inc.

Certification No.: ***3384*** Certification Expiration Date: **3-31-23**

The data presented in this Report is a record of system measurements and final adjustments that have been obtained in accordance with the current edition of the ***N.E.B.B. Procedural Standards for Testing, Adjusting and Balancing of Environmental Systems.*** Any variances from design quantities which exceed N.E.B.B. tolerances, are noted in the Test-Adjust-Balance Report Project Summary.

N.E.B.B. Qualified TAB Supervisor Name: **Scott F. Miller**

N.E.B.B. Qualified TAB Supervisor Signature:_____

Certification

SCOTT F. MILLER

HAS MET ALL REQUIREMENTS FOR NEBB CERTIFIED PROFESSIONAL STATUS IN THE FOLLOWING DISCIPLINE

Testing, Adjusting and Balancing of Environmental Systems

This Certificate, as well as individual affiliation with a NEBB Certified Firm and associated NEBB Certification Stamp are REQUIRED to provide a NEBB Certified Report. Participation in the NEBB Quality Assurance Program requires the Certificant be affiliated with a NEBB Certified Firm

CP-23541

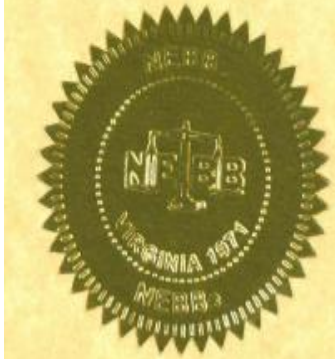
NEBB Certification Number

March 31, 2023

Expiration Date

NEBB President

NEBB President-Elect



Firm Certification

MILHARMER ASSOCIATES, INC.

HAS MET ALL REQUIREMENTS FOR NEBB CERTIFIED STATUS IN THE FOLLOWING DISCIPLINE

Testing, Adjusting and Balancing of Environmental Systems

3384

NEBB Certification Number

March 31, 2023

Expiration Date

NEBB President

NEBB President-Elect

Project:	Dedham District Court		
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Date:	5/13/2022	**Project No.**	22-184

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INSTRUMENT SHEET

The following is a list of Instruments owned and operated by Milharmer Associates, Inc. and used on this project.

Instrument ID Number	Instrument	Calibration Date	Calibration Due Date
1	ADM-870 Digital Multimeter	8-20-21	8-20-22
2	Shortridge Flow Hood	8-20-21	8-20-22
3	Ampmeter	8-20-21	8-20-22
4	Tachometer	8-20-21	8-20-22
5	Airflow Anemometer	8-20-21	8-20-22
6	Digital Thermometers	8-20-21	8-20-22
7	Shortridge Water Meter	8-20-21	8-20-22
8	Sound Meter	8-20-21	8-20-22
9	Vibration Meter	8-20-21	8-20-22

Please Note: Instruments are tested annually at the M.A.I. Lab. and sent back to the factory if deviation exceeds manufacturing tolerance.

Technician:

SYMBOL SHEET

AHU	Air Handling Unit	HEATER O.L.	Thermal Overload
AC or ACU	Air Conditioner Unit		Protection For Motors
ACCU	Air Cooled Condensing Unit		Located at Starter Motor
ADJ P.D.	Adjusted Pitch Diameter		
AMP	Amperage	HEPA	High Efficiency Particulate
AVG	Average		Arrestance
A.D.	Air Density	HOA	Hand/Off/Auto Switch
		H.P.	Horsepower
B.H.P.	Brake Horsepower	HPS	High Pressure Steam
		HRC	Heat (Recovery or Recliam) Coil
CFM	Cubic Feet Per Minute	HVAC	Heating, Ventilation and
CH	Chiller		Air Conditioning
CHWR	Chilled Water Return	HWR	Hot Water Return or
CHW or CHWS	Chilled Water Supply		Heating Water Return
CT	Cooling Tower	HWS	Hot Water Supply or
CWR	Condenser Water Return		Heating Water Supply
CW or CWS	Condenser Water Supply	HX	Heat Exchanger
DB	Dry Bulb	I.D.	Inside Diameter
D.D.	Direct Drive		
DIA	Diameter	LAT	Leaving Air Temperature
		L.D.	Linear Supply Diffuser
EAT	Entering Air Temperature	LPS	Low Pressure Steam
EDC	Electric Duct Coil	L.T.	Light Troffer
EDH	Electric Duct Heater	LWT	Leaving Water Temperature
EF	Exhaust Fan		
EMS	Energy Mgt System	MAU/MUA	Make Up Air Unit
EWT	Entering Water Temperature	MBH	1,000 BTU's per Hour
FCU	Fan Coil Unit	N.A.	Not Accessible
FH	Fume Hood	N/A	Not Applicable
F.L.A.	Full Load Amperage	N.I.	Not Installed
FPB	Fan Powered Box	N.L.	Not Listed
FPM	Feet Per Minute		
FT. HD.	Feet of Head		
GPM	Gallons Per Minute		

SYMBOL SHEET CONTINUED

O.D.	Outside Diameter	TAB	Testing, Adjusting, and Balancing
OA Min	Outside Air Minimum	TSP	Total Static Pressure
OAT	Outside Air Total	TP	Thermally Protected
PF	Power Factor	UH	Unit Heater
PHC	Preheat Coil		
PH	Phase(s)	V	Volts
PSI	Pounds Per Square Inch	VAV	Variable Air Volume
P.T.	Pitot Traverse	VD	Volume Damper
		VFD	Variable Frequency Drive
RA	Return Air	VP	Velocity Pressure
RF	Return Air Fan		
R.G.	Return Grille	W	Watts
RHC	Reheat Coil	WB	Wet Bulb
RPM	Revolutions per Minute	W.D.	Water Density
		W.G.	Water Guage
SA	Supply Air		
SAT	Supply Air Temperature	F	Degrees Fahrenheit
S.D.	Supply Diffuser		
SEF	Smoke Exhaust Fan	ΔP	Differential (Delta) Pressure or Pressure Drop
SF (AIR)	Supply Fan		
S.F.(Elect)	Service Factors		
SHC	Steam Heating Coil	ΔT	Differential (Delta) Temperature, Net Temperature Decrease or Increase
S.P. "W.C."	Static Pressure Measured in Inches of Water Column	#	PSI or Pounds Per Square Inch Decrease or Increase

Project:	Dedham District Court		
Address:	631 High St., Dedham, MA		
Date:	5/13/2022	**Project No.**	22-184

REPORT SUMMARY

The following is the report for the Dedham District Court with the following comments:

1. AHU-1 is running at design airflow but the attached VAV boxes are out of balance and should be re-balanced to design.

2. RTU-1 is running at approximately 50% of design airflow and would require a sheave change to increase airlow to design.

Project:	Dedham District Court		
Address:	631 High St., Dedham, MA		
Date:	5/13/2022	**Project No.**	22-184

REPORT SUMMARY

AIR HANDLING UNITS

UNIT	SUPPLY	RETURN	OUTSIDE AIR
AHU-1	4,927 CFM	3,232 CFM	1,695 CFM
RTU-1	2,474 CFM	1,695 CFM	779 CFM
RTU-XXX	1,480 CFM	1,158 CFM	322 CFM
RTU-XXX	1,948 CFM	1,595 CFM	353 CFM
RTU-XXX	1265 CFM	379 CFM	886 CFM

UNIT	RETURN
ILF-1	378 CFM
ILF-2	4,724 CFM

Project: Dedham District Court
Address: 631 High St., Dedham, MA
Date: 5/13/2022 **Project No.** 22-184

FAN DATA SHEET

	FAN NO. AHU-1		FAN NO.	
Serves / Location:	VAV's 1, 2, 3, 4, 5	Attic		
Manufacturer:	Carrier			
Model Number:	39MN12A00257222SXS			
Size:	NL			
Serial Number:	3502F76802			
MOTOR	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Manufacturer:	NL	BALDOR		
Frame Number:	NL	184T		
Horsepower:	NL	5		
Brake Horsepower:	4.4	NA		
Safety Factor:	NL	1.15		
Volts/Phase:	208/3	208		
Motor Amperage:	13.4	10.5/11.6/12.2		
Motor RPM:	1750	1515		
Speeds:	VFD	60Hz		
Heater Size:	NL	NA		
Heater Amps.:	NL	NA		
FAN	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Supply Air CFM:	5125	4927		
Return Air CFM:		3232		
Exhaust Air CFM:				
Outside Air CFM:	1800	1695		
Suction Pressure:	NL	-0.038		
Discharge Pressure:	NL	1.515		
Fan Static Pressure:	2.5"	-0.34		
External Pressure:	NL	1.553		
RPM	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Fan RPM:	1140	909		
Motor Drive:	NL	1VP65		
Motor Size/Bore:	NL	1"		
Fan Drive:	NL	4 7/8		
Fan Size/Bore:	NL	1 3/8		
Belt Size / Number:	NL	BX42		
Shafts C-C:	NL	14 1/2		
Turns Open:	NL	5		

Comments:

Project: Dedham District Court
Address: 631 High St., Dedham, MA
Date: 5/13/2022 **Project No.** 22-184

AIR DISTRIBUTION

SYSTEM: AHU-1
SUPPLY [X] RETURN [ ] EXHAUST [ ]

ROOM OR LOCATION	UNIT NUMBER	UNIT SIZE	AREAxK FACTOR	DESIGN FT/MIN	TEST FT/MIN	DESIGN CFM	TESTED CFM
	VAV-1						
Office 202	1	24X24	FH	NA	NA	450	576
Office 203	2	24X24	FH	NA	NA	325	275
					TOTAL:	775	851
	VAV-2						
Bookkeep Closet	1	8X8	0.44	NA	46	250	20
1st Asst. Clerl Closet	2	8X8	0.44	NA	52	250	23
					TOTAL:	500	43
	VAV-3						
Court 204	1	8X8	0.44	NA	857	125	377
Court 204	2	8X8	0.44	NA	884	125	389
Court 204	3	8X8	0.44	NA	1039	125	457
Court 204	4	8X8	0.44	NA	841	125	370
Court 204	5	8X8	0.44	NA	928	250	408
Court 204	6	8X8	0.44	NA	959	250	422
Court 204	7	8X8	0.44	NA	866	250	381
Court 204	8	8X8	0.44	NA	882	250	388
					TOTAL:	1500	3193
	VAV-4						
Office 205	1	24X24	FH	NA	NA	275	90
Office 206	2	24X24	FH	NA	NA	300	120
Office 207	3	24X24	FH	NA	NA	275	95
					TOTAL:	850	305

Comments:

Project: Dedham District Court
Address: 631 High St., Dedham, MA
Date: 5/13/2022 **Project No.** 22-184

AIR DISTRIBUTION

SYSTEM: AHU-1
SUPPLY [X] RETURN [ ] EXHAUST [ ]

ROOM OR LOCATION	UNIT NUMBER	UNIT SIZE	AREAxK FACTOR	DESIGN FT/MIN	TEST FT/MIN	DESIGN CFM	TESTED CFM
	VAV-5						
Court 208	1	8X8	0.44	NA	156	125	69
Court 208	2	8X8	0.44	NA	135	125	59
Court 208	3	8X8	0.44	NA	120	125	53
Court 208	4	8X8	0.44	NA	144	125	63
Court 208	5	8X8	0.44	NA	179	250	79
Court 208	6	8X8	0.44	NA	157	250	69
Court 208	7	8X8	0.44	NA	143	250	63
Court 208	8	8X8	0.44	NA	182	250	80
					TOTAL:	1500	535

Comments:

Project: Dedham District Court
Address: 631 High St., Dedham, MA
Date: 5/13/2022 **Project No.** 22-184

FAN DATA SHEET

	FAN NO. ILF-1		FAN NO. ILF-2	
Serves / Location:	AHU-1 Return	Attic	AHU-1 Return	Attic
Manufacturer:	Greenheck		NL	
Model Number:	BSQ-80-LMD		NL	
Size:	NL		NL	
Serial Number:	02C20300		NL	
MOTOR	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Manufacturer:	NL	*1	NL	AC SMITH
Frame Number:	NL	*1	NL	PA56H
Horsepower:	1/4	1/4	2	2
Brake Horsepower:	0.17	NA	1.84	NA
Safety Factor:	NL	1.35	NL	1.15
Volts/Phase:	115/1	115/1	460/200-230	208/3
Motor Amperage:	4.6	2.1	3.5/6.6-7.0	4.3
Motor RPM:	NL	NA	1725	1731
Speeds:	1	1	NL	NA
Heater Size:	NL	CB	NL	CB
Heater Amps.:	NL	CB	NL	CB
FAN	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Supply Air CFM:				
Return Air CFM:	400	378	5125	4724
Exhaust Air CFM:				
Outside Air CFM:				
Suction Pressure:		-0.39		-0.33
Discharge Pressure:		0.24		0.17
Fan Static Pressure:		NA		NA
External Pressure:	0.625	0.63	0.625	0.5
RPM	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Fan RPM:	NL	INLINE	NL	INLINE
Motor Drive:	NL	3 1/4	NL	4 1/2
Motor Size/Bore:	NL	0.5	NL	0.625
Fan Drive:	NL	INLINE	NL	INLINE
Fan Size/Bore:	NL	INLINE	NL	INLINE
Belt Size / Number:	NL	4L360	NL	A55
Shafts C-C:	NL	13"	NL	NA
Turns Open:	NL	3	NL	NA

Comments: ***1 No access to motor info.**

Project: Dedham District Court
Address: 631 High St., Dedham, MA
Date: 5/13/2022 **Project No.** 22-184

TRAVERSE DATA

SYSTEM: ILF-1 TRAVERSE NUMBER : T1
Return TRAVERSE LOCATION: Attic

DUCT SIZE (ROUND)	10	" DIAMETER	Sq Ft =	0.55
DUCT SIZE (RECT.)		" WIDTH x	" DEPTH Sq Ft =	0.00

AIR DENSITY DATA

STATIC PRESS @ CL:	0.03	InWg.	DESIGN CFM =	400
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	378
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**379**

AIR DENSITY RATIO CORRECTION = 1.00
SCFM CORRECTION FACTOR 1.00
ACTUAL DENSITY 0.075

TEST HOLE	1	2	3	4	5	6	7
A	794	799					
B	723	641					
C	844	489					
D	850	467					
E	776	556					
F							
G							
H							
I							

NO. OF READINGS = 10 AVERAGE FPM = 694

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Alanna Clark

Project: Dedham District Court
Address: 631 High St., Dedham, MA
Date: 5/13/2022 **Project No.** 22-184

TRAVERSE DATA

SYSTEM: ILF-2 TRAVERSE NUMBER : T2
Return TRAVERSE LOCATION: Attic

DUCT SIZE (ROUND)		" DIAMETER			Sq Ft =	0.00
DUCT SIZE (RECT.)	30	" WIDTH x	20	" DEPTH	Sq Ft =	4.17

AIR DENSITY DATA

STATIC PRESS @ CL:	0.03	InWg.	DESIGN CFM =	5125
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	4724
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**4727**

AIR DENSITY RATIO CORRECTION = 1.00
SCFM CORRECTION FACTOR 1.00
ACTUAL DENSITY 0.075

TEST HOLE	1	2	3	4	5	6	7
A	1123	1201	1094	1109			
B	1046	1100	1121	1212			
C	1179	1065	1167	1188			
D							
E							
F							
G							
H							
I							

NO. OF READINGS = 12 AVERAGE FPM = 1134

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Alanna Clark

Project: Dedham District Court
Address: 631 High St., Dedham, MA
Date: 5/13/2022 **Project No.** 22-184

FAN DATA SHEET

	FAN NO. RTU-1		FAN NO. RTU-XXX	
Serves / Location:	Main Court Room	Low Roof	Court Room #3	High Roof (Left Unit)
Manufacturer:	Carrier		Carrier	
Model Number:	50TC0D12A2A5A0A0G0		50HC-D11A25A0F2F0	
Size:	NL		NL	
Serial Number:	4019P42833		1714P85104	
MOTOR	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Manufacturer:	NL	MARATHON	NL	MARATHON
Frame Number:	NL	56HZ	NL	56HZ
Horsepower:	NL	NL	NL	NL
Brake Horsepower:	1.86	NA	NL	NA
Safety Factor:	NL	1.15	NL	1.15
Volts/Phase:	208/3	208	230/3	230
Motor Amperage:	9.2	2.2/2.3/2.5	10.6	5.5/5.9/6.2
Motor RPM:	1750	1158	1725	1129
Speeds:	NL	NA	NL	NA
Heater Size:	NL	NA	NL	NA
Heater Amps.:	NL	NA	NL	NA
FAN	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Supply Air CFM:	4000	2474	NL	1480
Return Air CFM:		1695	NL	1158
Exhaust Air CFM:				
Outside Air CFM:	1200	779	NL	322
Suction Pressure:	NL	-0.155	NL	-0.695
Discharge Pressure:	NL	NA	NL	0.707
Fan Static Pressure:	NL	-0.3986	NL	-1.011
External Pressure:	0.8	NA	NL	1.402
RPM	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Fan RPM:	819	542	NL	431
Motor Drive:	NL	4 3/4	NL	4 3/4
Motor Size/Bore:	NL	7/8	NL	7/8
Fan Drive:	NL	AFD74	NL	AFD 74
Fan Size/Bore:	NL	1"	NL	1"
Belt Size / Number:	NL	AX49	NL	AX49
Shafts C-C:	NL	17	NL	17
Turns Open:	NL	5	NL	4

Comments:

Project: Dedham District Court
Address: 631 High St., Dedham, MA
Date: 5/13/2022 **Project No.** 22-184

AIR DISTRIBUTION

SYSTEM: RTU-1
SUPPLY [X] RETURN [X] EXHAUST [ ]

ROOM OR LOCATION	UNIT NUMBER	UNIT SIZE	AREAxK FACTOR	DESIGN FT/MIN	TEST FT/MIN	DESIGN CFM	TESTED CFM
	SUPPLY						
Main Court 103	1	8X8	0.44	NA	250	350	220
Main Court 103	2	8x8	0.44	NA	308	350	236
Main Court 103	3	8X8	0.44	NA	241	350	206
Main Court 103	4	8X8	0.44	NA	224	350	199
Main Court 103	5	8X8	0.44	NA	166	350	173
Main Court 103	6	8X8	0.44	NA	246	350	208
Main Court 103	7	8X8	0.44	NA	128	350	156
Main Court 103	8	8X8	0.44	NA	394	350	273
Main Court 103	9	8X8	0.44	NA	222	300	198
Main Court 103	10	8X8	0.44	NA	298	300	231
Main Court 103	11	8X8	0.44	NA	206	300	191
Main Court 103	12	8X8	0.44	NA	188	300	183
					TOTAL:	4000	2474

Comments:

Project: Dedham District Court
Address: 631 High St., Dedham, MA
Date: 5/13/2022 **Project No.** 22-184

AIR DISTRIBUTION

SYSTEM: RTU-XXX
SUPPLY [X] RETURN [X] EXHAUST [ ]

ROOM OR LOCATION	UNIT NUMBER	UNIT SIZE	AREAxK FACTOR	DESIGN FT/MIN	TEST FT/MIN	DESIGN CFM	TESTED CFM
	SUPPLY						
Court 3	1	9X9	FH	NA	NA	NL	63
Court 3	2	9X	FH	NA	NA	NL	34
Court 3	3	72X6	3	NA	218	NL	654
Jury 3	4	12X12	1	NA	146	NL	146
Probation Off. 3	5	14X10	FH	NA	NA	NL	76
Probation Off. 3	6	20X10	1.39	NA	231	NL	321
Judges Lobby 3	7	14X8	0.78	NA	238	NL	186
					TOTAL:	NL	1480
	RETURN						
Court 3	1	30X15	3.13	NA	138	NL	432
Jury 3	2	14X10	0.97	NA	209	NL	203
Probation Off. 3	3	14X10	FH	NA	NA	NL	402
Judges Lobby 3	4	14X8	0.78	NA	155	NL	121
					TOTAL:	NL	1158

Comments:

Project: Dedham District Court
Address: 631 High St., Dedham, MA
Date: 5/13/2022 **Project No.** 22-184

FAN DATA SHEET

	FAN NO. RTU-XXX		FAN NO. RTU-XXX	
Serves / Location:	Court 2, Judge lobby, DA / High Roof (Right Unit)		Basement Back Office	Middle Roof
Manufacturer:	Carrier		Byant	
Model Number:	50HC-D11A2A5A0F2F0		558FPX891660HA	
Size:	NL		NL	
Serial Number:	1714P85105		3205030698	
MOTOR	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Manufacturer:	NL	MARATHON	NL	GE Comm. Motors
Frame Number:	NL	56HZ	NL	56Y
Horsepower:	NL	NL	NL	NL
Brake Horsepower:	NL	NA	NL	NA
Safety Factor:	NL	1.15	NL	1.15
Volts/Phase:	230/3	230	208/3	208
Motor Amperage:	10.6	5.4/5.9/6.0	5.2	3.1/3.3/3.4
Motor RPM:	1725	1060	1725	1094
Speeds:	NL	NA	NL	NA
Heater Size:	NL	NA	NL	NA
Heater Amps.:	NL	NA	NL	NA
FAN	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Supply Air CFM:	NL	1948	NL	1265
Return Air CFM:	NL	1595	NL	379
Exhaust Air CFM:				
Outside Air CFM:	NL	353	NL	886
Suction Pressure:	NL	-0.4387	NL	-0.304
Discharge Pressure:	NL	0.992	NL	0.717
Fan Static Pressure:	NL	-0.606	NL	-0.52
External Pressure:	NL	1.479	NL	1.021
RPM	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Fan RPM:	NL	636	NL	656
Motor Drive:	NL	4 3/4	NL	3 3/4
Motor Size/Bore:	NL	7/8	NL	5/8
Fan Drive:	NL	AFD74	NL	AM47X1
Fan Size/Bore:	NL	1"	NL	1"
Belt Size / Number:	NL	AX49	NL	4L500
Shafts C-C:	NL	17	NL	17
Turns Open:	NL	4	NL	2

Comments:

Project: Dedham District Court
Address: 631 High St., Dedham, MA
Date: 5/13/2022 **Project No.** 22-184

AIR DISTRIBUTION

SYSTEM: RTU-XXX
SUPPLY [X] RETURN [X] EXHAUST [ ]

ROOM OR LOCATION	UNIT NUMBER	UNIT SIZE	AREAxK FACTOR	DESIGN FT/MIN	TEST FT/MIN	DESIGN CFM	TESTED CFM
	SUPPLY						
Court Room 2	1	72X6	3	NA	232	NL	696
Court Room 2	2	9X9	FH	NA	NA	NL	53
Court Room 2	3	9X9	FH	NA	NA	NL	75
Judges Library 2	4	12X8	0.67	NA	152	NL	102
Secritaries Office	5	16X6	0.67	NA	293	NL	196
Judges Lobby 2A	6	18X6	0.75	NA	268	NL	201
Judges Lobby 2B	7	18X6	0.75	NA	518	NL	389
Jury Room 2	8	14X10	0.97	NA	244	NL	237
					TOTAL:	NL	1948
	RETURN						
Court Room 2	1	30X15	3.12	NA	363	NL	1133
Judges Library 2	2	12X8	0.67	NA	42	NL	28
Secritaries Office	3	12X8	0.67	NA	0	NL	0
Judges Lobby 2A	4	14X8	0.78	NA	107	NL	83
Judges Lobby 2B	5	14X8	0.78	NA	146	NL	114
Jury Room 2	6	14X10	0.97	NA	244	NL	237
					TOTAL:	NL	1595

Comments:

Project: Dedham District Court
Address: 631 High St., Dedham, MA
Date: 5/13/2022 **Project No.** 22-184

AIR DISTRIBUTION

SYSTEM: RTU-XXX
SUPPLY [X] RETURN [X] EXHAUST [ ]

ROOM OR LOCATION	UNIT NUMBER	UNIT SIZE	AREAxK FACTOR	DESIGN FT/MIN	TEST FT/MIN	DESIGN CFM	TESTED CFM
	SUPPLY						
Civil Clerk	1	30X8	1.67	NA	169	NL	282
Assistant Clerks	2	14X10	0.97	NA	181	NL	176
DA Office	3	14X10	0.97	NA	336	NL	326
DA Office	4	12X8	0.67	NA	408	NL	273
Hallway	5	24X24	FH	NA	NA	NL	103
Hallway	6	24X24	FH	NA	NA	NL	105
					TOTAL:	NL	1265
	RETURN						
Civil Clerk	1	30X8	1.67	NA	0	NL	0
Assistant Clerks	2	14X10	0.97	NA	290	NL	281
DA Office	3	10X8	0.56	NA	175	NL	98
					TOTAL:	NL	379

Comments:

Project: Dedham District Court
Address: 631 High St., Dedham, MA
Date: 5/13/2022 **Project No.** 22-184

FAN DATA SHEET

	FAN NO.	ERU-1	FAN NO. Exhaust	
Serves / Location:	BSMT Cell Blocks	BSMT Mech.		
Manufacturer:	Greenheck			
Model Number:	ERV-251S-A-ES			
Size:	NL			
Serial Number:	02E10333			
MOTOR	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Manufacturer:	NL	NL	NL	NL
Frame Number:	NL	NL	NL	NL
Horsepower:	1/4	1/4	1/4	1/4
Brake Horsepower:	NL	NA	NL	NA
Safety Factor:	NL	1.15	NL	1.15
Volts/Phase:	208/1	208	208/1	208
Motor Amperage:	3.9	2.9	3.9	2.6
Motor RPM:	1350	Direct Drive	1350	Direct Drive
Speeds:	1	1	1	1
Heater Size:	NL	CB	NL	CB
Heater Amps.:	NL	CB	NL	CB
FAN	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Supply Air CFM:	440	421		
Return Air CFM:				
Exhaust Air CFM:			560	518
Outside Air CFM:				
Suction Pressure:		-0.3		-0.43
Discharge Pressure:		0.33		0.21
Fan Static Pressure:		NA		NA
External Pressure:	0.65	0.66	0.8	0.64
RPM	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Fan RPM:	950	Direct Drive	1150	Direct Drive
Motor Drive:	NL	Direct Drive	NL	Direct Drive
Motor Size/Bore:	NL	Direct Drive	NL	Direct Drive
Fan Drive:	NL	Direct Drive	NL	Direct Drive
Fan Size/Bore:	NL	Direct Drive	NL	Direct Drive
Belt Size / Number:	NL	Direct Drive	NL	Direct Drive
Shafts C-C:	NL	Direct Drive	NL	Direct Drive
Turns Open:	NL	Direct Drive	NL	Direct Drive

Comments:

Project: Dedham District Court
Address: 631 High St., Dedham, MA
Date: 5/13/2022 **Project No.** 22-184

AIR DISTRIBUTION

SYSTEM: ERU-1
SUPPLY [X] RETURN [X] EXHAUST [ ]

ROOM OR LOCATION	UNIT NUMBER	UNIT SIZE	AREAxK FACTOR	DESIGN FT/MIN	TEST FT/MIN	DESIGN CFM	TESTED CFM
	SUPPLY						
Group Cell 2	2	6X6	0.25	NA	148	110	101
Corridor	3	6X6	0.25	NA	167	75	68
Corridor	4	6X6	0.25	NA	460	75	78
Room NL 1	5	6X6	0.25	NA	367	90	92
Room NL 2	6	6X6	0.25	NA	130	90	82
					TOTAL:	440	421
	RETURN						
Cell 3	1	8X6	0.33	NA	269	80	82
Cell 4	2	8X6	0.33	NA	127	80	77
Room NL 2	3	6X6	0.25	NA	84	150	131
Room NL 3	4	6X6	0.25	NA	88	150	137
Room NL 3	5	6X6	0.25	NA	88	50	46
Room NL 3	6	6X6	0.25	NA	88	50	45
					TOTAL:	560	518

Comments:

Project: Dedham District Court
Address: 631 High St., Dedham, MA
Date: 5/13/2022 **Project No.** 22-184

TRAVERSE DATA

SYSTEM: ERU-1 TRAVERSE NUMBER : T1
Supply TRAVERSE LOCATION: Mech. Rm.

DUCT SIZE (ROUND)	10	" DIAMETER		Sq Ft =	0.55
DUCT SIZE (RECT.)		" WIDTH x	" DEPTH	Sq Ft =	0.00

AIR DENSITY DATA

STATIC PRESS @ CL:	0.66	InWg.	DESIGN CFM =	NL
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	567
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**568**

AIR DENSITY RATIO CORRECTION = 1.00
SCFM CORRECTION FACTOR 1.00
ACTUAL DENSITY 0.075

TEST HOLE	1	2	3	4	5	6	7
A	1625	1624					
B	1123	1509					
C	484	428					
D	645	507					
E	1287	1157					
F	1095	988					
G							
H							
I							

NO. OF READINGS = 12 AVERAGE FPM = 1039

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Alanna Clark

Project: Dedham District Court
Address: 631 High St., Dedham, MA
Date: 5/13/2022 **Project No.** 22-184

FAN DATA SHEET

	FAN NO. FCU-1		FAN NO. FCU-2	
Serves / Location:	BSMT Office & Hall	BSMT Mech.	Clerk Office	Clerk Magistrate
Manufacturer:	Magic Aire		Carrier	
Model Number:	036-0UX-5-3-3HW		FB4ANFO48	
Size:	NL		NL	
Serial Number:	W01114632		0902A69228	
MOTOR	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Manufacturer:	NL	NA	NL	NA
Frame Number:	NL	NA	NL	NA
Horsepower:	NL	NA	NL	3/4
Brake Horsepower:	NL	NA	NL	NA
Safety Factor:	NL	NA	NL	NA
Volts/Phase:	115	115	208/1	208
Motor Amperage:	5.4	4.1	4.3	3.26
Motor RPM:	1175	DIRECT DRIVE	NL	DIRECT DRIVE
Speeds:	NL	NA	NL	NA
Heater Size:	NL	NA	NL	NA
Heater Amps.:	NL	NA	NL	NA
FAN	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Supply Air CFM:	NL	710	NL	1488
Return Air CFM:	NL	707	NL	572
Exhaust Air CFM:				
Outside Air CFM:				
Suction Pressure:				
Discharge Pressure:				
Fan Static Pressure:				
External Pressure:				
RPM	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Fan RPM:	NL	DIRECT DRIVE	NL	DIRECT DRIVE
Motor Drive:	NL	DIRECT DRIVE	NL	DIRECT DRIVE
Motor Size/Bore:	NL	DIRECT DRIVE	NL	DIRECT DRIVE
Fan Drive:	NL	DIRECT DRIVE	NL	DIRECT DRIVE
Fan Size/Bore:	NL	DIRECT DRIVE	NL	DIRECT DRIVE
Belt Size / Number:	NL	DIRECT DRIVE	NL	DIRECT DRIVE
Shafts C-C:	NL	DIRECT DRIVE	NL	DIRECT DRIVE
Turns Open:	NL	DIRECT DRIVE	NL	DIRECT DRIVE

Comments:

Project: Dedham District Court
Address: 631 High St., Dedham, MA
Date: 5/13/2022 **Project No.** 22-184

AIR DISTRIBUTION

SYSTEM: FCU-1
SUPPLY [X] RETURN [X] EXHAUST [ ]

ROOM OR LOCATION	UNIT NUMBER	UNIT SIZE	AREAxK FACTOR	DESIGN FT/MIN	TEST FT/MIN	DESIGN CFM	TESTED CFM
	SUPPLY						
Staff Break	1	8X6	0.33	NA	297	200	98 *1
Corridor	2	6X6	0.25	NA	227	80	57 *1
Corridor *2	3	6X6	0.25	NA	55	80	14 *1
Corridor	4	12X12	FH	NA	NA	100	58 *1
Switchboard	5	6X6	0.25	NA	76	100	19 *1
Admin.	6	6X6	0.25	NA	422	100	106 *1
Admin.	7	6X6	0.25	NA	182	100	46 *1
Corridor	8	6X6	0.25	NA	456	80	114 *1
Court Officers	9	6X6	0.25	NA	189	120	47 *1
1st CM Assist.	10	8X6	0.33	NA	132	160	44 *1
					TOTAL:	1120	601
	RETURN						
Corridor	1	15X15	1.56	NA	368	800	574
Court Officers	2	6X6	0.25	NA	245	100	61 *3
1st CM Assist.	3	12X12	1	NA	72	180	72 *3
					TOTAL:	1080	707

Comments: *1 Total unit reading in hallway by traverse.
*2 Flex connection from diffuser to switchboard room.
*3 Branch unit reading in hallway by traverse.

Project: Dedham District Court
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TRAVERSE DATA

SYSTEM: FCU-1 TRAVERSE NUMBER : T2
Supply TRAVERSE LOCATION: BSMT Hallway

DUCT SIZE (ROUND)	12	" DIAMETER	Sq Ft =	0.79
DUCT SIZE (RECT.)		" WIDTH x	" DEPTH Sq Ft =	0.00

AIR DENSITY DATA

STATIC PRESS @ CL:	0.02	InWg.	DESIGN CFM =	NL
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	322
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**322**

AIR DENSITY RATIO CORRECTION = 1.00
SCFM CORRECTION FACTOR 1.00
ACTUAL DENSITY 0.075

TEST HOLE	1	2	3	4	5	6	7
A	568	839					
B	426	559					
C	245	419					
D	364	286					
E	277	382					
F	272	279					
G							
H							
I							

NO. OF READINGS = 12 AVERAGE FPM = 410

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Alanna Clark

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TRAVERSE DATA

SYSTEM: FCU-1 TRAVERSE NUMBER : T1
Return TRAVERSE LOCATION: BSMT Hallway

DUCT SIZE (ROUND)	10	" DIAMETER	Sq Ft =	0.55
DUCT SIZE (RECT.)		" WIDTH x	" DEPTH Sq Ft =	0.00

AIR DENSITY DATA

STATIC PRESS @ CL:	0.02	InWg.	DESIGN CFM =	NL
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	132
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**132**

AIR DENSITY RATIO CORRECTION = 1.00
SCFM CORRECTION FACTOR 1.00
ACTUAL DENSITY 0.075

TEST HOLE	1	2	3	4	5	6	7
A	228	220					
B	272	256					
C	235	236					
D	248	237					
E	253	231					
F	274	224					
G							
H							
I							

NO. OF READINGS = 12 AVERAGE FPM = 243

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Alanna Clark

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TRAVERSE DATA

SYSTEM: FCU-1 TRAVERSE NUMBER : T2
Return TRAVERSE LOCATION: BSMT Hallway

DUCT SIZE (ROUND)		" DIAMETER			Sq Ft =	0.00
DUCT SIZE (RECT.)	15	" WIDTH x	15	" DEPTH	Sq Ft =	1.56

AIR DENSITY DATA

STATIC PRESS @ CL:	NA	InWg.	DESIGN CFM =	NL
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	368
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**369**

AIR DENSITY RATIO CORRECTION = 1.00
SCFM CORRECTION FACTOR 1.00
ACTUAL DENSITY 0.075

TEST HOLE	1	2	3	4	5	6	7
A	233	246					
B	242	222					
C							
D							
E							
F							
G							
H							
I							

NO. OF READINGS = 4 AVERAGE FPM = 236

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Alanna Clark

Project: Dedham District Court
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TRAVERSE DATA

SYSTEM: FCU-1 TRAVERSE NUMBER : T1
O.A. TRAVERSE LOCATION: Mechanical

DUCT SIZE (ROUND)	10	" DIAMETER	Sq Ft =	0.55
DUCT SIZE (RECT.)		" WIDTH x " DEPTH	Sq Ft =	0.00

AIR DENSITY DATA

STATIC PRESS @ CL:	0.02	InWg.	DESIGN CFM =	NL
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	555
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**555**

AIR DENSITY RATIO CORRECTION = 1.00
SCFM CORRECTION FACTOR 1.00
ACTUAL DENSITY 0.075

TEST HOLE	1	2	3	4	5	6	7
A	1061	978					
B	1043	1046					
C	955	1049					
D	979	1010					
E	1044	1040					
F	1057	958					
G							
H							
I							

NO. OF READINGS = 12 AVERAGE FPM = 1018

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Alanna Clark

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AIR DISTRIBUTION

SYSTEM: FCU-2
SUPPLY [X] RETURN [X] EXHAUST [ ]

ROOM OR LOCATION	UNIT NUMBER	UNIT SIZE	AREAxK FACTOR	DESIGN FT/MIN	TEST FT/MIN	DESIGN CFM	TESTED CFM
	SUPPLY						
Clerk Magistrate	1	24X24	FH	NA	NA	275	279
Lobby 102	2	24X24	FH	NA	NA	275	228
Clerks 104	3	24X24	FH	NA	NA	300	329
Clerks 104	4	24X24	FH	NA	NA	350	379
Clerks 104	5	24X24	FH	NA	NA	400	273
					TOTAL:	100	1488
	RETURN						
Clerks 104	1	21X21	FH	NA	NL	1050	444
Clerk Magistrate	2	12X12	FH	NA	NL	275	128
					TOTAL:	1325	572

Comments:

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FAN DATA SHEET

	FAN NO.	FCU-3	FAN NO.	
Serves / Location:	Probation Office	Probation		
Manufacturer:	Carrier			
Model Number:	FB4ANF048			
Size:	NL			
Serial Number:	0902A69227			
MOTOR	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Manufacturer:	NL	NA		
Frame Number:	NL	NA		
Horsepower:	NL	3/4		
Brake Horsepower:	NL	NA		
Safety Factor:	NL	NA		
Volts/Phase:	208/1	208		
Motor Amperage:	4.3	3.44		
Motor RPM:	1175	DIRECT DRIVE		
Speeds:	NL	NA		
Heater Size:	NL	NA		
Heater Amps.:	NL	NA		
FAN	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Supply Air CFM:	NL	1329		
Return Air CFM:	NL	576		
Exhaust Air CFM:				
Outside Air CFM:				
Suction Pressure:				
Discharge Pressure:				
Fan Static Pressure:				
External Pressure:				
RPM	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Fan RPM:	NL	DIRECT DRIVE		
Motor Drive:	NL	DIRECT DRIVE		
Motor Size/Bore:	NL	DIRECT DRIVE		
Fan Drive:	NL	DIRECT DRIVE		
Fan Size/Bore:	NL	DIRECT DRIVE		
Belt Size / Number:	NL	DIRECT DRIVE		
Shafts C-C:	NL	DIRECT DRIVE		
Turns Open:	NL	DIRECT DRIVE		

Comments:

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AIR DISTRIBUTION

SYSTEM: FCU-3
SUPPLY [X] RETURN [X] EXHAUST [ ]

ROOM OR LOCATION	UNIT NUMBER	UNIT SIZE	AREAxK FACTOR	DESIGN FT/MIN	TEST FT/MIN	DESIGN CFM	TESTED CFM
	SUPPLY						
Probation Trans.	1	24X24	FH	NA	NA	150	169
Probation Trans.	2	24X24	FH	NA	NA	200	217
Probation Trans.	3	24X24	FH	NA	NA	350	273
Corridor	3	12X12	FH	NA	NA	500	332
Probation 107	4	12X12	FH	NA	NA	400	338
					TOTAL:	1600	1329
	RETURN						
Probation Trans.	1	24X12	2	NA	288	1350	576

Comments: