Cambridge/Malden District Courts
Medford, MA

HVAC SYSTEM EVALUATIONS COVID-19

Office of Court Management

November 29, 2021

Tighe&Bond

100% Recyclable

Section 1
Existing Conditions & Site Observations

Tighe & Bond visited the Cambridge/Malden District Courts on February 23, 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.

Site Visit Attendees:

- *Office of Court Management:*
  - Bruce Toby, Courthouse Facilities Staff
- *Tighe & Bond*
  - Jason Urso, PE, Senior Mechanical Engineer
  - Ryan Ablondi, Senior Mechanical Engineer
  - Matt Mancini, Staff Mechanical Engineer

1.1 Existing Ventilation System

The Cambridge/Malden District Courts went through a major renovation in 2008 in which the mechanical systems were replaced. The building is approximately 65,000 square feet in size. Ventilation air is provided to the building by two larger variable air volume (VAV) air handling units (RTU-5 & 6) which serve the majority of the building while four smaller VAV Air Handling Units (RTU-1,2,3 & 4) provide ventilation air to each of the three courtrooms and the large corridor outside the courtrooms. Finally, an energy recovery unit (ERU-1) provides ventilation air to Holding Area. Each unit contains a supply fan, refrigerant (DX) cooling coils, gas-fired furnace and a 2" MERV 13 pre filter.

The two larger units and the ERU were installed as part of a renovation to the building in 2008 and are in good condition, however, the fans in RTU-6 makes a loud noise and the PVC cooling coil condensate drain piping has broken off. The four smaller units serving the Courtrooms and corridor were existing and relocated during the 2008 renovation. Tighe & Bond is unsure of their exact age, but we estimate that they were manufactured ~2005 based on information found on unit nameplates. ASHRAE data indicates that the median useful life expectancy for Rooftop Units like these are 15 Years, however, these unit appear to be in good condition and with proper maintenance, likely have several years of useful life remaining.

Each air handler, with the exception of the ERU, is a variable air volume (VAV) unit, where VAV boxes regulate the airflow into zones throughout the building. According to the plans, there are seven toilet exhaust fans, which are in good condition. All toilet exhaust fans were running during the time of our site visit.

According to the drawings provided to Tighe & Bond, there are eight exhaust fans serving the building. Seven fans serve toilet rooms and one fan serves the sally port area. The toilet exhaust fans and sally port exhaust fan were all running at the time of our site visit.

The lockup area is served by an Energy Recovery Unit which provides 50% outside air to all spaces in the holding area and exhaust 50% of the air from the space. Each holding area is negatively pressurized.

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
ERU-1	3,250	1,650	MERV-13	Good
RTU-1	4,110 100 (Est, based on diffuser totals)	Unknown	MERV-13	Good
RTU-2	3,050 (Est, based on diffuser totals)	Unknown	MERV-13	Good
RTU-3	4,000 (Est, based on diffuser totals)	Unknown	MERV-13	Good
RTU-4	5,000 (Est, based on diffuser totals)	Unknown	MERV-13	Good
RTU-5	18,800	5,000	MERV-13	Good
RTU-6	18,000	5,000	MERV-13	Good

Photo 1 – Representative Air Handler

1.2 Existing Control System

The Cambridge/Malden District Courts does not have a Building Management System (BMS) for controlling the mechanical systems. All the mechanical equipment is controlled using local controls. All the Rooftop AHU's have integral airside economizer controls. All existing controls are electronic, there are no pneumatics in the building.

Section 2
Recommendations

Below is a list of recommendations for the Cambridge/Malden District Courts. Please refer to the "Master Recommendation List" for further explanation and requirements of the stated recommendations.

2.1 Filtration Efficiency Recommendations

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

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

RF-1: *MERV-13 filters.*

We recommend the continued use of MERV-13 filters which meet the ASHRAE minimum recommendation, pending the testing and balancing results. Existing filters should be checked to ensure they are within their service lives and installed properly. The filter racks should be inspected 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.*

Currently the units do not appear to have DP sensors across the filter banks. We recommend installing them to monitor the filters.

2.2 Testing & Balancing Recommendations

The air handling units are approximately 13-15 years old and it is unknown to Tighe & Bond when the last time the units were tested and balanced. Also, the code requirements to determine the outdoor air flow rates that were used to design the original system may be different than the 2015 International Mechanical Code (IMC) and current ASHRAE Standard 62.1 requirements.

We recommend the following testing and balancing measures be implemented:

RTB-1: *Test and balance air handling unit supply air and minimum outdoor air flow rates.*

We recommend testing and balancing the outdoor air flow rates for all air handling units to the recommended minimum 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)
ERU-1	3,250	1,650	1,750	**1,750**
RTU-1	4,100 (Est, based on Diffuser Totals)	Unknown	916	**950**
RTU-2	3,050 (Est, based on Diffuser Totals)	Unknown	1,058	**1,100**
RTU-3	4,000 (Est, based on Diffuser Totals)	Unknown	1,039	**1,050**
RTU-4	5,000 (Est, based on Diffuser Totals)	Unknown	1,545	**1,550**
RTU-5	18,800	5,000	5,382	**5,400**
RTU-6	18,000	5,000	7,759	**7,800**

Notes:

1. 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.
2. Current Code Min. O.A. Requirements were calculated using assumed VAV minimum flow values as design minimums were not available on the renovation drawings.

During the pandemic, 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.

Where we recommend increasing the outdoor air beyond the original design, it appears the cooling and heating coils should be able to provide suitable leaving air conditions under peak outdoor air conditions, assuming the coils are clean and their performance has not degraded significantly over time. Supply air temperatures during the heating and cooling season should be monitored to ensure they are not dropping below design values. If the supply air temperature does drop below design values, the outdoor airflow rate should be reduced, but not below the originally designed outdoor air flow rates.

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)	686	314	372
Total Supply Air (CFM/Person)	82	38	119
Outdoor Air (CFM/Person)	29	14	41

The airflow rate per person for each Courtroom and the Jury Pool Room 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 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)*
Jury Assembly Room 1107	18	1,800	100	780	43
Courtroom 1 1212	191	4,990	26	1,550	8
Courtroom 2 1208	129	3,000	23	1,082	8
Courtroom 3 1200	129	3,960	31	1,037	8

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

The airflow rate per person for each Courtroom and the Jury Pool Room, based on a reduced occupancy schedule determined by the Office of Court Management, is shown below in Table 4a. The airflow rate per person assumes the full supply airflow is being delivered to the room. At times when the supply airflow is reduced due to the space temperature being satisfied, the airflow rate per person will also be reduced.

TABLE 4a
Airflow Rate per Person (Reduced Occupancy)

		Total Air		Outdoor Air	
Courtroom	*Total People*	*Supply Airflow (CFM)*	*Airflow Rate (CFM/Person)*	*Outdoor Airflow (CFM)*	*Airflow Rate (CFM/Person)*
Jury Assembly Room 1107	16	1,800	113	780	49
Courtroom 1 1212	31	4,990	161	1,550	50
Courtroom 2 1208	26	3,000	115	1,082	42
Courtroom 3 1200	26	3,960	152	1,037	40

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

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

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

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

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.*

Replace control components, such as outdoor and return air temperature and/or humidity sensors, as required.

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.

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 Inspect / Repair RTU-6 Supply Fan

As mentioned above, the supply fan for RTU-6 makes a loud noise. We recommend inspecting the fan belts, sheaves and bearings to determine the source of the noise and repair / replace parts as necessary. This recommendation is a maintenance item and does not increase the indoor air quality of the building.

2.7.2 Repair RTU-6 Condensate Trap

As mentioned above, the PCV condensate trap piping has broken off the unit and air is being sucked into the unit downstream of the filters, through the condensate drainpipe. We recommend replacing it to prevent further unfiltered air from entering the unit.

2.7.3 Install a Building Management System (BMS)

We recommend installing a Building Management System to control all the Mechanical systems for the building. This recommendation is primarily an energy saving and maintenance measure and does not affect the indoor air quality of the building, although it will allow ventilation control and scheduling measures to be more easily implemented.

Disclaimer

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

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Section 3
Testing & Balancing Results

Milharmer Associates visited the Cambridge/Malden District Courthouse on August 6th 2021 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 Testing & Balancing Results

	Design			Actual		
Unit	**Total Supply Fan Airflow (CFM)**	**Recommended Outdoor Airflow (CFM)**	**Return Airflow (CFM)**	**Supply Fan Airflow (CFM)**	**Outdoor Airflow (CFM)**	**Return Airflow (CFM)**
RTU-1	4,110 (Est. based on Diffuser Totals)	950	3,160 (Estimated)	3,959	506	3,453
RTU-2	3,050 (Est. based on Diffuser Totals)	1,100	1,950 (Estimated)	2,907	404	2,503
RTU-3	4,000 (Est. based on Diffuser Totals)	1,050	2,950 (Estimated)	3,878	1,733	2,145
RTU-4	5,000 (Est. based on Diffuser Totals)	1,550	3,450 (Estimated)	4,890	1,782	3,108
RTU-5	18,800	5,400	13,400	20,060	7,255	12,805
RTU-6	18,000	7,800	10,200	18,113	4,687	13,426
ERU-1	3,250	1,750	1,500	3,548	1,502	N/A*

* The TAB report notes that the balancing contractor did not have access to the exhaust air grilles for ERU-1.

TABLE 6
Exhaust Fan Testing & Balancing Results

Unit	Serving	Design Return/Exhaust Airflow (CFM)	Actual Return/Exhaust Airflow (CFM)
EF-3	1034 & 1035 Toilets	400	391
EF-4	Toilet Rooms	300	N/A*
EF-5	1220-1217 Toilets	1,200	1,146
EF-9	Toilet Rooms	425	416
EF-10	1112 Electrical	560	600
EF-11	1096 & 1098 Shower	400	367

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

1. RTU-1, RTU-2, and RTU-6 are performing within the acceptable supply airflow range, however the outdoor air airflow is below the 10% tolerance for our recommended outdoor airflow rate. We recommend rebalancing the outside air damper to the outdoor airflow recommendation given in Table 5.
2. The outdoor airflow rate for ERU-1 is within the 10% tolerance but still falls below our recommended airflow rate. We recommend rebalancing the outside air damper to the outdoor airflow rate recommendation given in Table 5.
3. The balancing report notes that EF-4 has a bad motor and was not operational at the time of testing. We recommend replacing the motor for EF-4.

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: **3rd District Middlesex Court**
Medford, MA

Project No.: **21-207** **Project Date:** **8/6/2021**

MECHANICAL CONTRACTOR
Tighe & Bond

3384

A N.E.B.B. Certified Company

Project:	3rd District Middlesex Court		
Address:	Medford, MA		
Date:	8/6/2021	**Project No.**	21-207

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

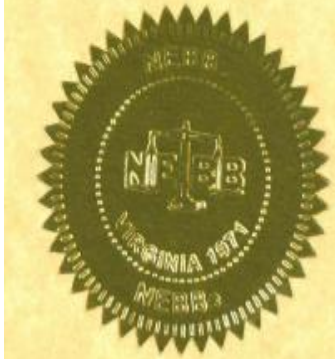
NEBB Certification Number

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:	3rd District Middlesex Court		
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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	8-20-20	8-20-21
2	Shortridge Flow Hood	8-20-20	8-20-21
3	Ampmeter	8-20-20	8-20-21
4	Tachometer	8-20-20	8-20-21
5	Airflow Anemometer	8-20-20	8-20-21
6	Digital Thermometers	8-20-20	8-20-21
7	Shortridge Water Meter	8-20-20	8-20-21
8	Sound Meter	8-20-20	8-20-21
9	Vibration Meter	8-20-20	8-20-21

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

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REPORT SUMMARY

The following is the report for the 3rd District Middlesex Court. A survey was performed on RTU-1 through RTU-6, ERU-1 and EF-3, 4, 5, 9, 10 and 11.

EF-4 has a bad motor that needs to be replaced.

Project:	3rd District Middlesex Court		
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REPORT SUMMARY

AIR HANDLING UNITS

UNIT	SUPPLY	RETURN	OUTSIDE AIR
RTU-1	3,959 CFM	3,453 CFM	506 CFM
RTU-2	2,907 CFM	2,503 CFM	404 CFM
RTU-3	3,878 CFM	2,145 CFM	1,733 CFM
RTU-4	4,890 CFM	3,108 CFM	1,782 CFM
RTU-5	20,060 CFM	12,805 CFM	7,255 CFM
RTU-6	18,113 CFM	13,426 CFM	4,687 CFM
ERU-1	3,548 CFM	NA	1,502 CFM

EXHAUST FANS

UNIT	EXHAUST
EF-3	391 CFM
EF-4	NA
EF-5	1,146 CFM
EF-9	416 CFM
EF-10	600 CFM
EF-11	367 CFM

Project: 3rd District Middlesex Court
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FAN DATA SHEET

	FAN NO. RTU-1		FAN NO. RTU-2	
Serves / Location:	Corridor 1210-1196		Courtroom 1208	
Manufacturer:	Lennox		Lennox	
Model Number:	LGA120H2BH3G		LGA120H2BH3G	
Size:	NL		NL	
Serial Number:	5605F06786		5605F06787	
MOTOR	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Manufacturer:	NL	Century	NL	Century
Frame Number:	NL	RA56HZ	NL	RA56HZ
Horsepower:	NL	3	NL	3
Brake Horsepower:	NL	NA	NL	NA
Safety Factor:	NL	1.15	NL	1.15
Volts/Phase:	460	460/3	460/3	460/3
Motor Amperage:	4.4	3.5/3.5/3.5	4.4	2.7/2.8/2.6
Motor RPM:	1725	NA	1725	NA
Speeds:	1	60Hz	1	60Hz
Heater Size:	NL	NA	NL	NA
Heater Amps.:	NL	NA	NL	NA
FAN	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Supply Air CFM:	3900	3959	3050	2907
Return Air CFM:	NL	3453	NL	2503
Exhaust Air CFM:				
Outside Air CFM:	NL	506	NL	404
Suction Pressure:	NL	-1.2	NL	-0.37
Discharge Pressure:	NL	0.59	NL	0.18
Fan Static Pressure:	NL	1.79	NL	0.55
External Pressure:	NL	NA	NL	NA
RPM	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Fan RPM:	NL	NA	NL	NA
Motor Drive:	NL	1VL44	NL	1VL34
Motor Size/Bore:	NL	7/8"	NL	7/8"
Fan Drive:	NL	AK64	NL	AK64
Fan Size/Bore:	NL	1"	NL	1"
Belt Size / Number:	NL	AX46/1	NL	A-46/1
Shafts C-C:	NL	16 1/4"	NL	16 1/2"
Turns Open:	NL	3 1/2	NL	4 1/2

Comments:

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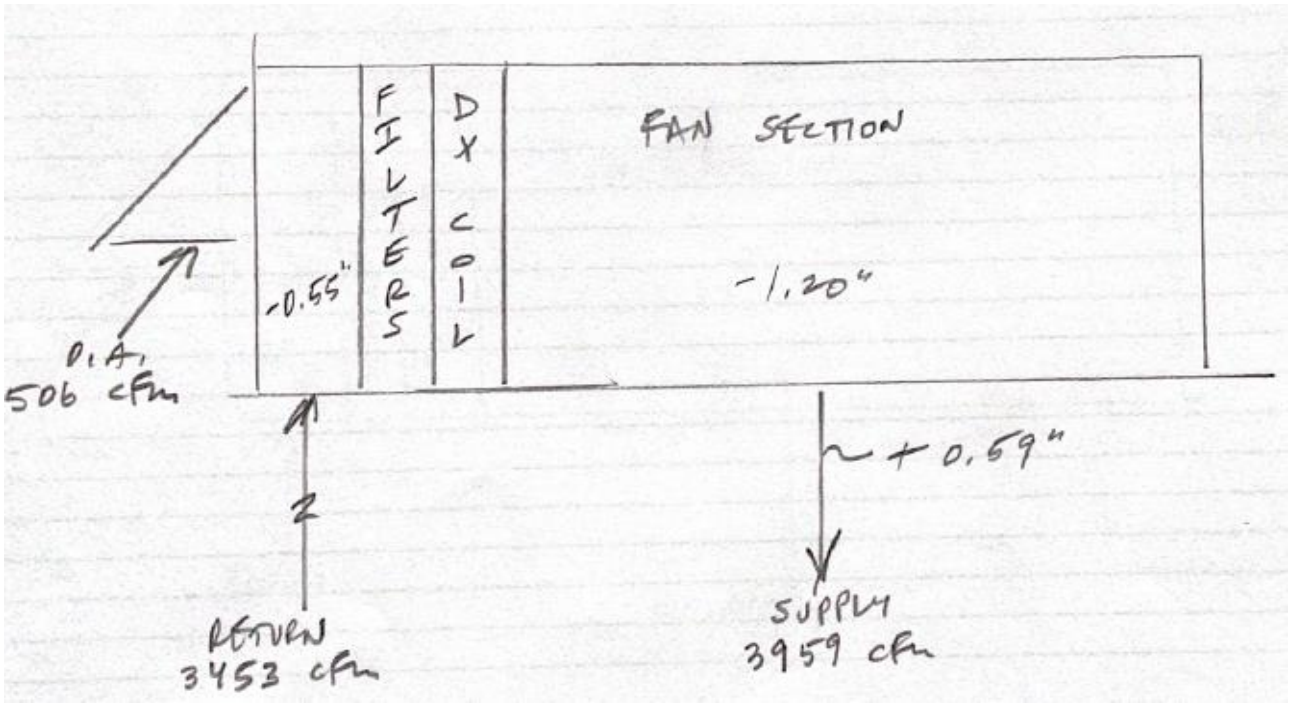
RTU-1 COURTROOM



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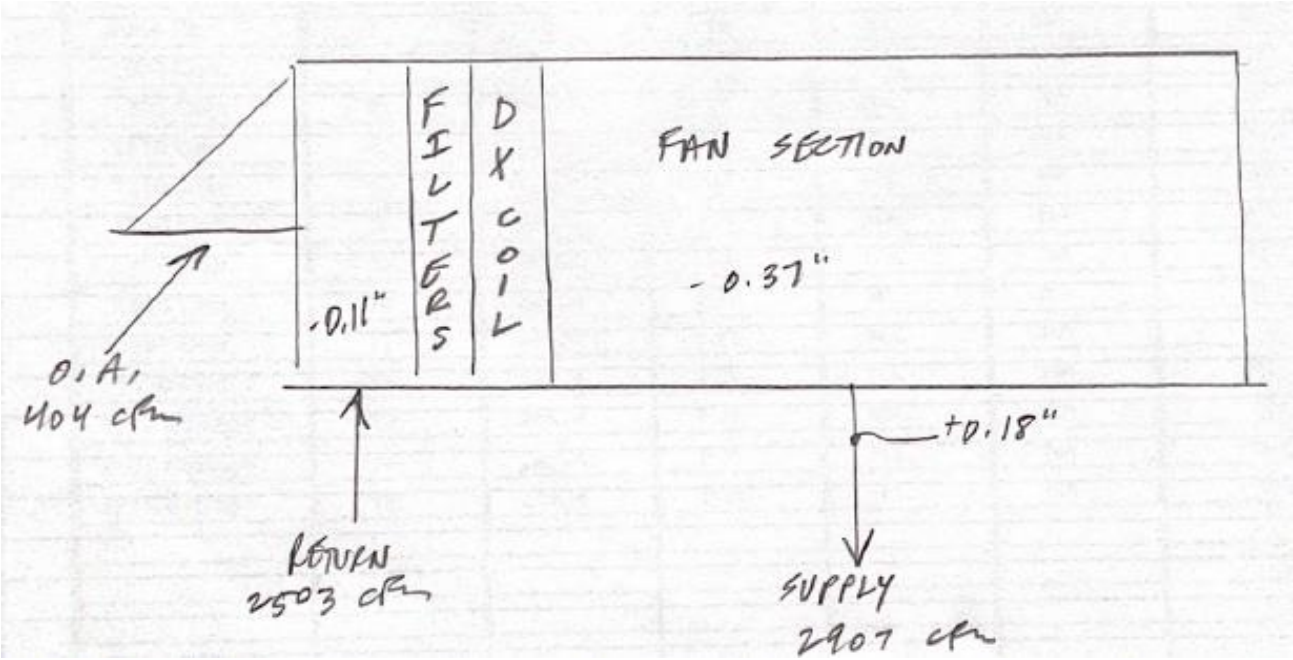
RTU-2 COURTROOM 1208



Project: 3rd District Middlesex Court
Address: Medford, MA
Date: 8/6/2021 **Project No.** 21-207

AIR DISTRIBUTION

SYSTEM: RTU-1

SUPPLY [X] RETURN [ ] EXHAUST [ ]

ROOM OR LOCATION	UNIT NUMBER	UNIT SIZE	AREAxK FACTOR	DESIGN FT/MIN	TEST FT/MIN	DESIGN CFM	TESTED CFM
1002 Lobby	1	24x24	FH	NL	NA	300	296
1002 Lobby	2	24x24	FH	NL	NA	300	310
1004 Corr.	3	24x24	FH	NL	NA	300	307
1004 Corr.	4	24x24	FH	NL	NA	300	292
1210 Corr.	5	24x24	FH	NL	NA	300	307
1210 Corr.	6	24x24	FH	NL	NA	300	312
1210 Corr.	7	24x24	FH	NL	NA	300	300
1210 Corr.	8	24x24	FH	NL	NA	300	291
1196 Corr.	9	24x24	FH	NL	NA	300	313
1196 Corr.	10	24x24	FH	NL	NA	300	312
1196 Corr.	11	24x24	FH	NL	NA	300	304
1196 Corr.	12	24x24	FH	NL	NA	300	311
1117 Storage	13	24x24	FH	NL	NA	100	104
1108 Storage	14	24x24	FH	NL	NA	100	108
1215 Storage	15	24x24	FH	NL	NA	100	92
Comments:					TOTALS:	3900	3959

Project: 3rd District Middlesex Court
Address: Medford, MA
Date: 8/6/2021 **Project No.** 21-207

AIR DISTRIBUTION

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

ROOM OR LOCATION	UNIT NUMBER	UNIT SIZE	AREAxK FACTOR	DESIGN FT/MIN	TEST FT/MIN	DESIGN CFM	TESTED CFM
1208 Court	1	18x6	0.69	362	NA	250	231
1208 Court	2	18x6	0.69	362	NA	250	229
1208 Court	3	18x6	0.69	362	NA	250	241
1208 Court	4	18x6	0.69	362	NA	250	239
1208 Court	5	18x6	0.69	362	NA	250	244
1208 Court	6	18x6	0.69	362	NA	250	251
1208 Court	7	18x6	0.69	362	NA	250	240
1208 Court	8	18x6	0.69	362	NA	250	237
1208 Court	9	18x6	0.69	362	NA	250	226
1208 Court	10	18x6	0.69	362	NA	250	244
1208 Court	11	18x6	0.69	362	NA	250	234
1208 Court	12	18x6	0.69	362	NA	250	241
1078 Corr.	13	24x24	FH	NL	NA	50	50
Comments:					TOTALS:	3050	2907

Project: 3rd District Middlesex Court
Address: Medford, MA
Date: 8/6/2021 **Project No.** 21-207

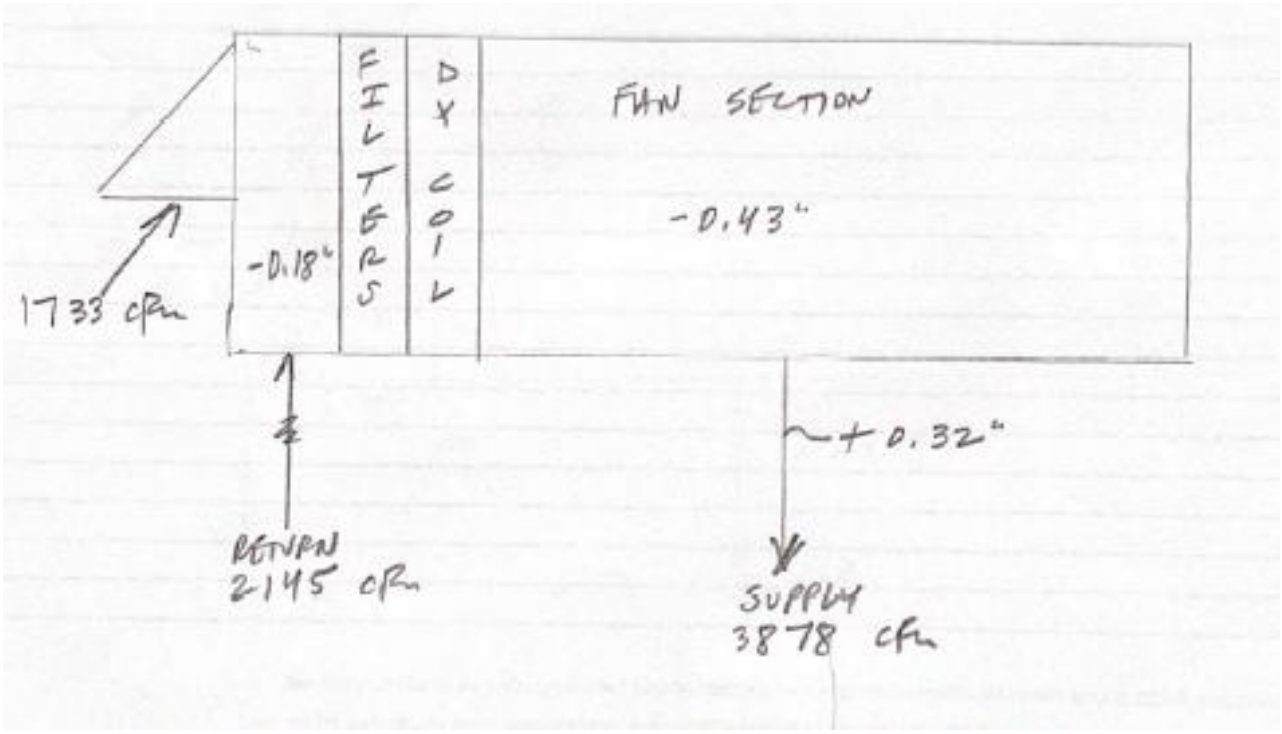
FAN DATA SHEET

	FAN NO. RTU-3		FAN NO. RTU-4	
Serves / Location:	Courtroom 1200		Courtroom 1212	
Manufacturer:	Lennox		Lennox	
Model Number:	TGA090H2BM1G		LGC156H2B52G	
Size:	NL		NL	
Serial Number:	5605E00395		5605G13637	
MOTOR	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Manufacturer:	NL	Emerson	NL	Century
Frame Number:	NL	56HZ	NL	PA56HZ
Horsepower:	NL	2	NL	2
Brake Horsepower:	NL	NA	NL	NA
Safety Factor:	NL	T.P.	NL	1.2
Volts/Phase:	460/3	460/3	200-230/460	480/3
Motor Amperage:	3.9	2.7/2.8/2.8	6.6-7.0 /3.5	3.0/2.9/2.9
Motor RPM:	1725	NA	1725	1770
Speeds:	1	60Hz	1	60Hz
Heater Size:	NL	NA	NL	NA
Heater Amps.:	NL	NA	NL	NA
FAN	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Supply Air CFM:	4010	3878	4990	4890
Return Air CFM:	NL	2145	NL	3108
Exhaust Air CFM:				
Outside Air CFM:	NL	1733	NL	1782
Suction Pressure:	NL	-0.43	NL	-0.37
Discharge Pressure:	NL	0.32	NL	0.39
Fan Static Pressure:	NL	0.75	NL	0.76
External Pressure:	NL	NA	NL	NA
RPM	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Fan RPM:	NL	NA	NL	611
Motor Drive:	NL	1VL44	NL	1VL40
Motor Size/Bore:	NL	7/8"	NL	7/8"
Fan Drive:	NL	AK69	NL	BK95
Fan Size/Bore:	NL	1"	NL	1 7/16"
Belt Size / Number:	NL	A46/1	NL	BX59/1
Shafts C-C:	NL	16 1/4"	NL	20 3/4"
Turns Open:	NL	5	NL	5

Comments:

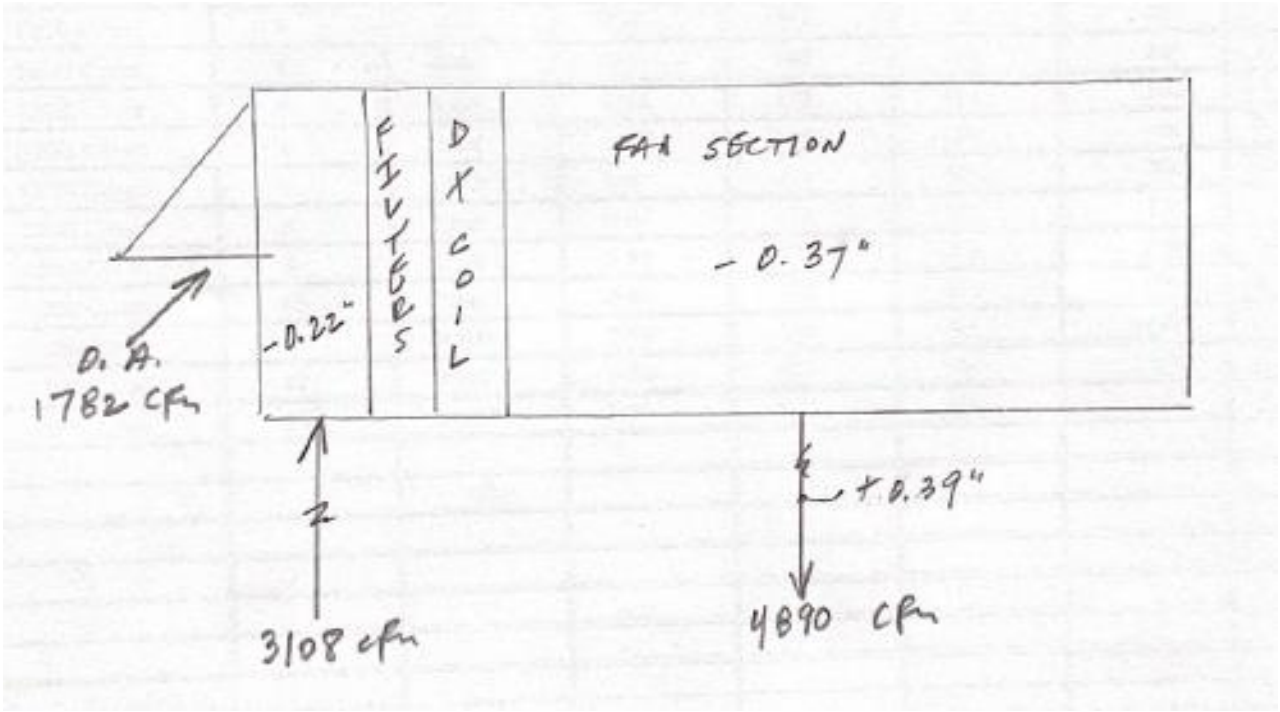
Project:	3rd District Middlesex Court		
Address:	Medford, MA		
Date:	8/6/2021	**Project No.**	21-207

RTU-3 COURTROOM 1200



Project:	3rd District Middlesex Court		
Address:	Medford, MA		
Date:	8/6/2021	**Project No.**	21-207

RTU-4 COURTROOM 1212



Project: 3rd District Middlesex Court
Address: Medford, MA
Date: 8/6/2021 **Project No.** 21-207

AIR DISTRIBUTION

SYSTEM: RTU-3

SUPPLY [X] RETURN [ ] EXHAUST [ ]

ROOM OR LOCATION	UNIT NUMBER	UNIT SIZE	AREAxK FACTOR	DESIGN FT/MIN	TEST FT/MIN	DESIGN CFM	TESTED CFM
1200 Court	1	18x6	0.69	478	NA	330	339
1200 Court	2	18x6	0.69	478	NA	330	329
1200 Court	3	18x6	0.69	478	NA	330	331
1200 Court	4	18x6	0.69	478	NA	330	308
1200 Court	5	18x6	0.69	478	NA	330	318
1200 Court	6	18x6	0.69	478	NA	330	308
1200 Court	7	18x6	0.69	478	NA	330	321
1200 Court	8	18x6	0.69	478	NA	330	303
1200 Court	9	18x6	0.69	478	NA	330	311
1200 Court	10	18x6	0.69	478	NA	330	318
1200 Court	11	18x6	0.69	478	NA	330	319
1200 Court	12	18x6	0.69	478	NA	330	327
1078 Corr.	13	24x24	FH	NL	NA	50	46
Comments:					TOTALS:	4010	3878

Project: 3rd District Middlesex Court
Address: Medford, MA
Date: 8/6/2021 **Project No.** 21-207

AIR DISTRIBUTION

SYSTEM: RTU-4

SUPPLY [X] RETURN [ ] EXHAUST [ ]

ROOM OR LOCATION	UNIT NUMBER	UNIT SIZE	AREAxK FACTOR	DESIGN FT/MIN	TEST FT/MIN	DESIGN CFM	TESTED CFM
1212 Court	1	18x8	0.92	413	NA	380	371
1212 Court	2	18x8	0.92	413	NA	380	381
1212 Court	3	18x8	0.92	413	NA	380	368
1212 Court	4	18x8	0.92	413	NA	380	370
1212 Court	5	18x8	0.92	413	NA	380	382
1212 Court	6	18x8	0.92	413	NA	380	360
1212 Court	7	18x8	0.92	413	NA	380	371
1212 Court	8	18x8	0.92	413	NA	380	383
1212 Court	9	18x8	0.92	413	NA	380	370
1212 Court	10	18x8	0.92	413	NA	380	365
1212 Court	11	18x8	0.92	413	NA	380	381
1212 Court	12	18x8	0.92	413	NA	380	373
1212 Court	13	18x8	0.92	413	NA	380	368
1061 Corr.	14	24x24	FH	NL	NA	50	47
Comments:					TOTALS:	4990	4890

Project: 3rd District Middlesex Court
Address: Medford, MA
Date: 8/6/2021 **Project No.** 21-207

FAN DATA SHEET

	FAN NO. RTU-5		FAN NO. RTU-6	
Serves / Location:	VAV'S & FPT'S		VAV'S&FPT'S	
Manufacturer:	Carrier		Carrier	
Model Number:	48A3T050KGG611HH		48A3T050KGG611HH	
Size:	NL		NL	
Serial Number:	3908U29135		3908U29136	
MOTOR	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Manufacturer:	NL	Century	NL	Century
Frame Number:	NL	S286T	NL	S286T
Horsepower:	30	30	NL	30
Brake Horsepower:	25	NA	NL	NA
Safety Factor:	NL	1.15	NL	1.15
Volts/Phase:	460/3	460/3	460/3	460/3
Motor Amperage:	37.5	33.1/32.9/33.0	37.5	31.9/32.7/32.4
Motor RPM:	1760	1781	1760	1774
Speeds:	1	60Hz	1	60Hz
Heater Size:	NL	NA	NL	NA
Heater Amps.:	NL	NA	NL	NA
FAN	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Supply Air CFM:	18800	20060	18000	18113
Return Air CFM:	13800	12805	13000	13426
Exhaust Air CFM:				
Outside Air CFM:	5000	7255 *1	5000	4687 *2
Suction Pressure:	NL	1.96	NL	2.18
Discharge Pressure:	NL	2.01	NL	1.7
Fan Static Pressure:	NL	3.97	NL	3.98
External Pressure:	1.5	NA	1.5	NA
RPM	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Fan RPM:	NL	1174	NL	1161
Motor Drive:	NL	7"	NL	7"
Motor Size/Bore:	NL	1 7/8"	NL	1 7/8"
Fan Drive:	NL	2B5V94	NL	9 1/2"
Fan Size/Bore:	NL	1 15/16"	NL	1 15/16"
Belt Size / Number:	NL	5VX570/2	NL	5VX570/2
Shafts C-C:	NL	15 1/2"	NL	16"
Turns Open:	NL	Fixed	NL	Fixed

Comments: ***1 20% O.A.D.**
***2 25% O.A.D.**

Project: 3rd District Middlesex Court
Address: Medford, MA
Date: 8/6/2021 **Project No.** 21-207

TRAVERSE DATA

SYSTEM: RTU-5 TRAVERSE NUMBER : T1
TRAVERSE LOCATION: 1041

DUCT SIZE (ROUND)		" DIAMETER			Sq Ft =	0.00
DUCT SIZE (RECT.)	70	" WIDTH x	20	" DEPTH	Sq Ft =	9.72

AIR DENSITY DATA

STATIC PRESS @ CL:	1.33	InWg.	DESIGN CFM =	18800
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	20060
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**20137**

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	1785	2109	1891	1674	2179	2402	2802
B	1809	1739	1758	1710	2556	2399	2510
C	1718	1661	1719	1870	2170	2267	2541
D	1592	1893	1861	1698	2176	2456	2828
E							
F							
G							
H							
I							

NO. OF READINGS = 28 AVERAGE FPM = 2063

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Brian Murphy

Project: 3rd District Middlesex Court
Address: Medford, MA
Date: 8/6/2021 **Project No.** 21-207

AIR DISTRIBUTION

SYSTEM: RTU-5

SUPPLY [ ] RETURN [X'] EXHAUST [ ]

ROOM OR LOCATION	UNIT NUMBER	UNIT SIZE	AREAxK FACTOR	DESIGN FT/MIN	TEST FT/MIN	DESIGN CFM	TESTED CFM
1041	1	46X18	5.75	NA	764	NL	4393
1041	2	46X18	5.75	NA	356	NL	2047
1041	3	46X18	5.75	NA	778	NL	4473
1041	4	46X18	5.75	NA	329	NL	1892
					TOTALS:	NL	12805

Comments:

Project: 3rd District Middlesex Court
Address: Medford, MA
Date: 8/6/2021 **Project No.** 21-207

TRAVERSE DATA

SYSTEM: RTU-6 TRAVERSE NUMBER : T1
TRAVERSE LOCATION: 1128

DUCT SIZE (ROUND)		" DIAMETER		Sq Ft =	0.00
DUCT SIZE (RECT.)	70	" WIDTH x	20	" DEPTH	Sq Ft = 9.72

AIR DENSITY DATA

STATIC PRESS @ CL:	1.1	InWg.	DESIGN CFM =	18000
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	18113
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**18172**

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	1660	1261	1601	1734	1803	2314	2476
B	1701	1532	1803	1703	1956	2373	2546
C	1773	1247	1712	1431	2016	2306	2342
D	1567	1309	1836	1726	1929	2211	2297
E							
F							
G							
H							
I							

NO. OF READINGS = 28 AVERAGE FPM = 1863

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Brian Murphy

Project: 3rd District Middlesex Court
Address: Medford, MA
Date: 8/6/2021 **Project No.** 21-207

AIR DISTRIBUTION

SYSTEM: RTU-6

SUPPLY ☐ RETURN ☒ EXHAUST ☐

ROOM OR LOCATION	UNIT NUMBER	UNIT SIZE	AREAxK FACTOR	DESIGN FT/MIN	TEST FT/MIN	DESIGN CFM	TESTED CFM
1161	1	64X20	8.9	NA	NA	NL	8418
1147	2	92X18	11.5	NA	NA	NL	5008
					TOTALS:	NL	13426

Comments:

Project: 3rd District Middlesex Court
Address: Medford, MA
Date: 8/6/2021 **Project No.** 21-207

FAN DATA SHEET

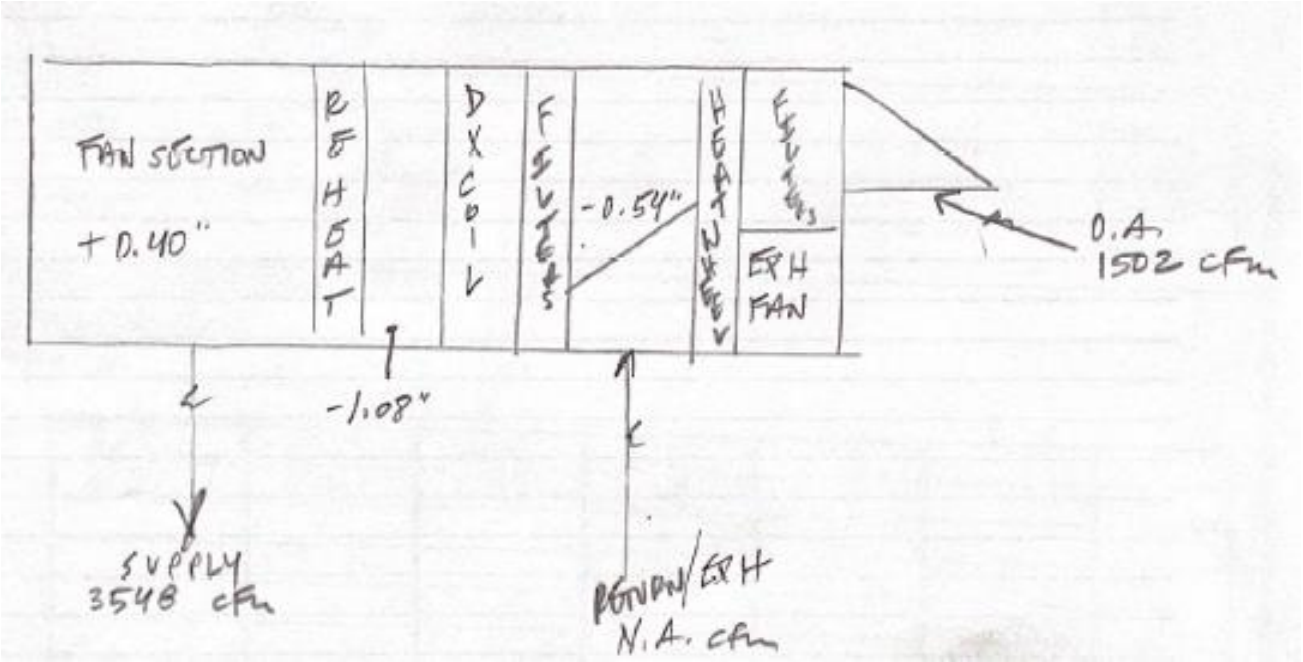
	FAN NO. ERU-1		FAN NO. ERU-1 EXHAUST	
Serves / Location:	Cells		Cells	
Manufacturer:	Valent		Valent	
Model Number:	VPRE-210-13A-201-C-1AA		VPRE-210-13A-201-C-1AA	
Size:	NL		NL	
Serial Number:	11523266		11523266	
MOTOR	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Manufacturer:	NL	Marathon	NL	Marathon
Frame Number:	NL	145T	NL	56
Horsepower:	5	2	NL	3/4
Brake Horsepower:	NL	NA	NL	NA
Safety Factor:	NL	1.15	NL	1.25
Volts/Phase:	460/3	460/3	460/3	460/3
Motor Amperage:	2.9	1.6/1.6/1.5	1.4	1.4/1.4/1.4
Motor RPM:	1735	Direct Drive	1725	Direct Drive
Speeds:	1	53.3 Hz	1	52 Hz
Heater Size:	NL	NA	NL	NA
Heater Amps.:	NL	NA	NL	NA
FAN	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Supply Air CFM:	3370	3548		
Return Air CFM:				
Exhaust Air CFM:			3370	*1
Outside Air CFM:	1650	1502 *2		
Suction Pressure:	NL	-1.08	NL	-1.74
Discharge Pressure:	NL	0.4	NL	NA
Fan Static Pressure:	NL	1.48	NL	NA
External Pressure:	2.25"	NA	NL	NA
RPM	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Fan RPM:	2063	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: ***1 No access to inlets to measure total.**

***2 With OAD @ 40%.**

Project:	3rd District Middlesex Court		
Address:	Medford, MA		
Date:	8/6/2021	**Project No.**	21-207

ERU-1 HOLDING CELL AREA



Project: 3rd District Middlesex Court
Address: Medford, MA
Date: 8/6/2021 **Project No.** 21-207

TRAVERSE DATA

SYSTEM: ERU-1 TRAVERSE NUMBER : T1
Supply TRAVERSE LOCATION: Roof

DUCT SIZE (ROUND)		" DIAMETER			Sq Ft =	0.00
DUCT SIZE (RECT.)	46	" WIDTH x	25	" DEPTH	Sq Ft =	7.99

AIR DENSITY DATA

STATIC PRESS @ CL:	NA	InWg.	DESIGN CFM =	NL
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	3548
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**3550**

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	429	427	420	515			
B	413	421	504	419			
C							
D							
E							
F							
G							
H							
I							

NO. OF READINGS = 8 AVERAGE FPM = 444

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Brian Murphy

Project: 3rd District Middlesex Court
Address: Medford, MA
Date: 8/6/2021 **Project No.** 21-207

AIR DISTRIBUTION

SYSTEM: ERU-1

SUPPLY [ ] RETURN [ ] EXHAUST [X]

ROOM OR LOCATION	UNIT NUMBER	UNIT SIZE	AREAxK FACTOR	DESIGN FT/MIN	TEST FT/MIN	DESIGN CFM	TESTED CFM
Unit R/A	1		FH	NA	NA	560	*1
Unit R/A	2		FH	NA	NA	560	*1
1095 Lockup	3	20x20	FH	NA	NA	300	274
1097 Lockup	4	20x20	FH	NA	NA	300	300
					TOTALS:	1720	*2

Comments: ***1 Design cfm not specified. No access to outlets.**

***2 Unable to access for total cfm.**

Project: 3rd District Middlesex Court
Address: Medford, MA
Date: 8/6/2021 **Project No.** 21-207

FAN DATA SHEET

	FAN NO. EF-3		FAN NO. EF-4	
Serves / Location:	1034 & 1035 Toilets			
Manufacturer:	Greenheck		Greenheck	
Model Number:	GB081-6		GB101HP-4	
Size:	NL		NL	
Serial Number:	115 15175 0809		115 15178 0809	
MOTOR	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Manufacturer:	NL	Marathon	NL	Marathon
Frame Number:	NL	48Y	NL	48Y
Horsepower:	1/4	1/6	1/4	1/4
Brake Horsepower:	0.16	NA	0.16	NA
Safety Factor:	NL	1.15	NL	1.35
Volts/Phase:	115/1	115/1	115/1	115/1
Motor Amperage:	3.6	2	5	3.4
Motor RPM:	1725	1741	1725	1741
Speeds:	1	60 Hz	1	60 Hz
Heater Size:	NL	NA	NL	CB
Heater Amps.:	NL	NA	NL	CB
FAN	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Supply Air CFM:				
Return Air CFM:				
Exhaust Air CFM:	400	391	300	*1
Outside Air CFM:				
Suction Pressure:				
Discharge Pressure:				
Fan Static Pressure:	1		1	
External Pressure:				
RPM	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Fan RPM:	NL	1237	NL	1013
Motor Drive:	NL	1VP25	NL	1VP25
Motor Size/Bore:	NL	1/2"	NL	1/2"
Fan Drive:	NL	3"	NL	AK51
Fan Size/Bore:	NL	3/4"	NL	3/4"
Belt Size / Number:	NL	3L180/1	NL	3L210/1
Shafts C-C:	NL	5 1/2"	NL	4 3/4"
Turns Open:	NL	4	NL	3

Comments: ***1 Not running, bad motor.**

Project: 3rd District Middlesex Court
Address: Medford, MA
Date: 8/6/2021 **Project No.** 21-207

AIR DISTRIBUTION

SYSTEM: EF-3

SUPPLY ☐ RETURN ☐ EXHAUST ☒ X

ROOM OR LOCATION	UNIT NUMBER	UNIT SIZE	AREAxK FACTOR	DESIGN FT/MIN	TEST FT/MIN	DESIGN CFM	TESTED CFM
1034 Men	1	20X20	FH	NA	NA	200	200
1035 Women	2	20X20	FH	NA	NA	200	191
Comments:					TOTALS:	400	391

Project: 3rd District Middlesex Court
Address: Medford, MA
Date: 8/6/2021 **Project No.** 21-207

AIR DISTRIBUTION

SYSTEM: EF-4

SUPPLY [ ] RETURN [ ] EXHAUST [X]

ROOM OR LOCATION	UNIT NUMBER	UNIT SIZE	AREAxK FACTOR	DESIGN FT/MIN	TEST FT/MIN	DESIGN CFM	TESTED CFM
1110 Toilet	1		FH	NA	NA	75	
1108 Toilet	2		FH	NA	NA	75	
1105 Toilet	3		FH	NA	NA	75	
1103 Toilet	4		FH	NA	NA	75	
					TOTALS:	300	*1

Comments: ***1 Not running, bad motor.**

Project: 3rd District Middlesex Court
Address: Medford, MA
Date: 8/6/2021 **Project No.** 21-207

FAN DATA SHEET

	FAN NO. EF-5		FAN NO.	
Serves / Location:	1220-1217 Toilets			
Manufacturer:	Greenheck			
Model Number:	GB-121-5			
Size:	NL			
Serial Number:	115 15179 0809			
MOTOR	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Manufacturer:	NL	Marathon		
Frame Number:	NL	56		
Horsepower:	1/2	1/2		
Brake Horsepower:	0.39	NA		
Safety Factor:	NL	1.15		
Volts/Phase:	208-230/460	NA		
Motor Amperage:	2.2 2.1/1.1	NA		
Motor RPM:	1725	1753		
Speeds:	1	60 Hz		
Heater Size:	NL	NA		
Heater Amps.:	NL	NA		
FAN	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Supply Air CFM:				
Return Air CFM:				
Exhaust Air CFM:	1200	1146		
Outside Air CFM:				
Suction Pressure:				
Discharge Pressure:				
Fan Static Pressure:	1			
External Pressure:				
RPM	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Fan RPM:	NL	1280		
Motor Drive:	NL	1VP25		
Motor Size/Bore:	NL	5/8"		
Fan Drive:	NL	AK39		
Fan Size/Bore:	NL	3/4"		
Belt Size / Number:	NL	4L220/1		
Shafts C-C:	NL	6"		
Turns Open:	NL	4		

Comments: ***1 Not running, bad motor.**

Project: 3rd District Middlesex Court
Address: Medford, MA
Date: 8/6/2021 **Project No.** 21-207

AIR DISTRIBUTION

SYSTEM: EF-5

SUPPLY [ ] RETURN [ ] EXHAUST [X]

ROOM OR LOCATION	UNIT NUMBER	UNIT SIZE	AREAxK FACTOR	DESIGN FT/MIN	TEST FT/MIN	DESIGN CFM	TESTED CFM
1220 Men	1	20X20	FH	NA	NA	300	301
1220 Men	2	20X20	FH	NA	NA	300	297
1217 Women	3	20X20	FH	NA	NA	300	279
1217 Women	4	20X20	FH	NA	NA	300	269
					TOTALS:	1200	1146

Comments:

Project: 3rd District Middlesex Court
Address: Medford, MA
Date: 8/6/2021 **Project No.** 21-207

FAN DATA SHEET

	FAN NO. EF-9		FAN NO. EF-10	
Serves / Location:	1023,1057,1170,1174,1180, Toilets		1112 Electrical	
Manufacturer:	Greenheck		Greenheck	
Model Number:	GB 081-6		GB 141 HP 4	
Size:	NL		NL	
Serial Number:	11515 180 0809		11515 181 0809	
MOTOR	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Manufacturer:	NL	Marathon	NL	Marathon
Frame Number:	NL	48Y	NL	48Y
Horsepower:	1/4	1/6	1/4	1/4
Brake Horsepower:	0.16	NA	0.09	NA
Safety Factor:	NL	1.15	NL	1.35
Volts/Phase:	115/1	115/1	115/1	115/1
Motor Amperage:	3.6	1.8	5.0	2.1
Motor RPM:	1725	1763	1725	1747
Speeds:	1	60HZ	1	60HZ
Heater Size:	NL	C.B.	NL	C.B.
Heater Amps.:	NL	C.B.	NL	C.B.
FAN	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Supply Air CFM:				
Return Air CFM:				
Exhaust Air CFM:	425	416	560	600
Outside Air CFM:				
Suction Pressure:	NL	-0.34	NL	-0.41
Discharge Pressure:	NL	0.1	NL	0.16
Fan Static Pressure:	1.0"	0.44	0.5"	0.57
External Pressure:	NL	NA	NL	NA
RPM	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Fan RPM:	NL	874	NL	NA
Motor Drive:	NL	1VP30	NL	1VP30
Motor Size/Bore:	NL	1/2"	NL	1/2"
Fan Drive:	NL	AK56	NL	OK4034
Fan Size/Bore:	NL	3/4	NL	3/4"
Belt Size / Number:	NL	3L210G-1	NL	3L210
Shafts C-C:	NL	4 7/8	NL	5"
Turns Open:	NL	0	NL	3

Comments:

Project: 3rd District Middlesex Court
Address: Medford, MA
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AIR DISTRIBUTION

SYSTEM: EF-9
SUPPLY [ ] RETURN [ ] EXHAUST [X]

ROOM OR LOCATION	UNIT NUMBER	UNIT SIZE	AREAxK FACTOR	DESIGN FT/MIN	TEST FT/MIN	DESIGN CFM	TESTED CFM
1170 Toilet	1	20X20	FH	NA	NA	100	97
1057 Toilet	2	20X20	FH	NA	NA	75	74
1023 Toilet	3	20X20	FH	NA	NA	75	73
1174 Toilet	4	20X20	FH	NA	NA	100	102
1180 Toilet	5	20X20	FH	NA	NA	75	70
					TOTALS:	425	416

Comments:

Project: 3rd District Middlesex Court
Address: Medford, MA
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AIR DISTRIBUTION

SYSTEM: EF-10

SUPPLY [ ] RETURN [ ] EXHAUST [X]

ROOM OR LOCATION	UNIT NUMBER	UNIT SIZE	AREAxK FACTOR	DESIGN FT/MIN	TEST FT/MIN	DESIGN CFM	TESTED CFM
1112 Electrical	1	8X6	0.33	394	NA	130	129
1113 Electrical	2	8X6	0.33	394	NA	130	139
1114 Electrical	3	8X6	0.33	394	NA	130	150
1115 Electrical	4	8X6	0.33	515	NA	170	182
					TOTALS:	560	600

Comments: ***1 Not running, bad motor.**

Project: 3rd District Middlesex Court
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FAN DATA SHEET

	FAN NO. EF-11		FAN NO.	
Serves / Location:	1096 & 1098 Shower			
Manufacturer:	Greenheck			
Model Number:	GB-101-HP-4			
Size:	NL			
Serial Number:	11512 182 0809			
MOTOR	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Manufacturer:	NL	Marathon		
Frame Number:	NL	48Y		
Horsepower:	1/4	1/4		
Brake Horsepower:	0.16	NA		
Safety Factor:	NL	1.35		
Volts/Phase:	115/1	115/1		
Motor Amperage:	5	2.9		
Motor RPM:	1725	1729		
Speeds:	1	60 Hz		
Heater Size:	NL	CB		
Heater Amps.:	NL	CB		
FAN	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Supply Air CFM:				
Return Air CFM:				
Exhaust Air CFM:	400	367		
Outside Air CFM:				
Suction Pressure:	NL	-0.37		
Discharge Pressure:	NL	NA		
Fan Static Pressure:	1	NA		
External Pressure:	NL	NA		
RPM	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Fan RPM:	NL	1043		
Motor Drive:	NL	1VP30		
Motor Size/Bore:	NL	1//2		
Fan Drive:	NL	AK51		
Fan Size/Bore:	NL	3/4		
Belt Size / Number:	NL	1L210/1		
Shafts C-C:	NL	4 3/4"		
Turns Open:	NL	0		

Comments:

Project: 3rd District Middlesex Court
Address: Medford, MA
Date: 8/6/2021 **Project No.** 21-207

AIR DISTRIBUTION

SYSTEM: EF-11

SUPPLY [ ] RETURN [ ] EXHAUST [X]

ROOM OR LOCATION	UNIT NUMBER	UNIT SIZE	AREAxK FACTOR	DESIGN FT/MIN	TEST FT/MIN	DESIGN CFM	TESTED CFM
1098 Shower	1	20X20	FH	NA	NA	200	179
1096 Shower	2	20X20	FH	NA	NA	200	188
					TOTALS:	400	367

Comments: