Wrentham District Court
Wrentham, MA

HVAC SYSTEM EVALUATIONS COVID-19

Office of Court Management

October 12, 2021

Tighe&Bond

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Section 1
Existing Conditions & Site Observations

Tighe & Bond visited the Wrentham District Courthouse on March 17, 2021. While on site we inspected the air handling equipment located in the mechanical spaces and toured the facility to determine if the areas generally matched usages noted on the architectural plans.

Site Visit Attendees:

- *Office of Court Management:*
  - Mike Mullen, Courthouse Facilities Staff
- *Tighe & Bond*
  - Todd Holland, PE, Senior Mechanical Engineer
  - Tim Bill, Staff Mechanical Engineer

1.1 Existing Ventilation System

The Wrentham District Courthouse was constructed in 1955 and is approximately 19,500 square feet in size. The building has a full basement, two above-grade stories, mechanical spaces in the attic, and a cupola. A two-story addition, constructed in 2000, provides an accessible entry and lobby with an elevator to the second floor. One constant volume single zone rooftop unit (RTU) and two constant volume single zone air handling units (AHUs) provide conditioned air to the courtrooms and adult probation offices.

RTU-1, installed in 2000, serves the First Session Court. This rooftop unit contains a supply fan, direct expansion (DX) cooling coil, electric resistance heating coil, and 2" MERV-8 filters. There is a rooftop exhaust fan that serves the First Session Court, it has two-speed controls and appears to be sized to run at high speed with RTU-1 in economizer mode, but facilities personnel indicated this was no longer operational. This unit is in fair to poor condition, and is at the end of its expected life. The courtroom is designed to have supplemental outdoor air provided by unit ventilators that have the fans controlled by toggle switches on the outside of the unit. None of these fans were switched on at the time of our visit, facilities personnel indicated they are usually shut off for noise considerations.

AHU-1, also installed in 2000, serves the Second Session Court. This indoor horizontal unit contains a supply fan, DX cooling coil, electric resistance heating coil, 2" MERV-10 filters, and a split 5-ton condensing unit located on the flat roof. There is an outdoor air damper for AHU-1, but it appeared to be fully closed during the walk-through. This unit is in good to fair condition, and is nearing the end of its expected life. There is an inline exhaust fan with two-speed controls and appears to be sized to run at high speed with AHU-1 in economizer or increased outdoor air mode. There are unit ventilators in the space that are currently operating just as convectors, with hot water but no fan.

Besides the courtrooms, there are other perimeter spaces served by heating-only unit ventilators. The outdoor air dampers in these are not operational, according to facilities personnel.

AHU-2 appears to have been installed in the past year, and contains a supply fan, DX cooling coil, 2" MERV-8 filters, and a split 3.5-ton condensing unit located on the flat roof. The ductwork for AHU-2 was reconfigured when the Third Session Court was converted into a conference room and extension of the adult probation office. There is currently no ventilation air being provided to the offices and conference room. Courthouse facility personnel indicated that there are plans to reconnect the capped outdoor air hood to bring in ventilation air to the space. This unit appears to be in very good condition.

Several mini-split systems provide cooling to various office areas, a server room, each floor of the entry addition, and the corridor outside the Second Session and Third Session courtrooms on the second floor. These use a ceiling cassette or wall cassette paired with condensing units mounted outdoors on grade. None of these mini-splits provides ventilation air. There are several window AC units in the boiler room that will be installed for summer. There are many interior spaces that have no mechanical ventilation.

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)	Pre/Final Filters	Condition
RTU-1	2,400	825	2" MERV-8	Fair to Poor
AHU-1	2,100	750	2" MERV-10	Good to Fair
AHU-2	1,400	Unknown	2" MERV-8	Very Good

Photo 1 – Rooftop Air Handler RTU-1

Two exhaust fans, located in the attic and original to the building, serve the public toilet rooms on the basement level, and private toilet rooms in offices on the upper levels. These fans discharge through louvers in the cupola, and are in fair condition. Although the original mechanical drawings show these fans serving the holding cells, we could see no exhaust grilles in the cells at the time of our visit.

The lockup area has no mechanical ventilation. There is an operable window near the officer's station.

An HB Smith-Mills watertube boiler provides steam to the perimeter radiation. The boiler is original to the 1955 construction, and is oil fired with a buried 3000-gallon tank in the parking lot outside the boiler room. The facility plans to convert the boiler to gas in the future.

Photo 1 – Representative Exhaust Fan

1.2 Existing Control System

Programmable thermostats with seven-day timeclocks control the existing HVAC air handling equipment. We did not see any evidence or components of a Building Management System (BMS) during our site visit.

All air handlers were set to run the fan in "auto" mode, which runs the supply fan only when the unit is actively heating or cooling, therefore spaces are not receiving ventilation air when there is no call for temperature control.

We are not aware of any demand control ventilation sequences in use at this courthouse.

Section 2
Recommendations

Below is a list of recommendations for the Wrentham District Courthouse. Please refer to the "Master Recommendation List" for further explanation and requirements of the stated recommendations.

Building areas without adequate ventilation and filtration significantly increase the risk of spreading viruses like COVID-19, 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

Two of the three air handling units are over 20 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)
RTU-1	2,400	825	863	**875**
AHU-1	2,100	750	512	**750**
AHU-2	1,400	Unknown	249	**250**

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.

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 leaving air conditions similar to the original design 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)	217	132	85
Total Supply Air (CFM/Person)	27	34	16
Outdoor Air (CFM/Person)	8	6	13

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.

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)***
First Session	118	2,400	20	875	7
Second Session	70	2,100	30	750	11

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.

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)***
First Session	28	2,400	86	875	31
Second Session	20	2,100	105	750	38

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

RTB-6: *Test and balance all air handler cooling coils.*

Confirm that the refrigerant systems are operating correctly to ensure the DX coils are 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.*

2.4 Control System Recommendations

We recommend the following for the control system:

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

This can be implementing by starting the occupied hours two hours before people arrive to occupy the space. Unoccupied hours should not start until after cleaning staff have left the building.

RC-4: *Confirm the economizer control sequences are operational.*

It appears that RTU-1 and AHU-1 may have been designed with economizer sequences that work in concert with their designated exhaust fans, EF-1 and EF-2, respectively. We recommend investigating and testing these sequences, and repairing or replacing the motors and speed controls for EF-1 and EF-2 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. Refer to the "Overview of Recommendations" document for further guidance on installing portable HEPA filters.

Below is a list of specific areas where we recommend placing portable HEPA filtration units, including offices if those spaces are regularly occupied by more than one person. If any of these spaces have only a single occupant, a HEPA filter is not needed.

Basement:

- Officers' Room
- Conference Rooms
- Office Area

First Floor:

- Main Courtroom
- Library
- Main Lobby
- General Office
- Cashier
- Clerk's Office
- Probation Office

Second Floor:

- Corridor
- Courtroom No. 2
- Small Claims Office
- Probation Offices
- Civil Clerk's Office

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 Run Supply Fans Continuously During Occupied Hours

All three air handling units were set to run the fan in "auto" mode, which runs the supply fan only when the unit is actively heating or cooling. This should be changed on each of the systems to run the supply fans continuously in occupied mode, to supply ventilation air to the spaces. Note that this may cause comfort issues because supply air temperature can fluctuate as the heating and cooling is staged on and off, and the systems may not have been designed to operate like this originally.

2.7.2 Replace Motors and Speed Controls for Exhaust Fans

EF-1 and EF-2 serve the First and Second Session Courts. They were originally designed with two-speed motors, which run at full or half speed, and can only approximate the airflow needed to match minimum and maximum outdoor airflows of the accompanying air handlers. Replacing the motors and installing variable frequency drives (VFDs) will allow the fans to follow the air handlers and provide proper pressurization of the spaces. Additional controls may be required to be provided to implement this recommendation.

2.7.3 Repair Unit Ventilators

Repair unit ventilators that are not operational. Replace actuators in units where the actuators have failed. Once repairs are made, reestablish the control sequence to allow the fans to operate continuously during occupied periods. If noise is a consideration, consider replacing the fan motors with electronically commutated (EC) motors that have solid-state controls to allow operation and lower airflows to reduce noise levels. Additional controls may be required to be provided to implement this recommendation.

2.7.4 Repair or Replace Holding Cell Exhaust Fans

We recommend repairing or replacing the exhaust systems serving the holding cells. This will likely entail installing new ductwork, as we did not see any exhaust grilles in the cells.

2.7.5 Add Ventilation to All Occupied Areas

Several interior office spaces that do not have operable windows also do not have any mechanical ventilation. Consider adding ventilation systems to serve these areas.

2.7.6 Mechanical Ventilation Feasibility Study

Most of the Courthouse is not mechanically ventilated. Operable windows do exist, and natural ventilation is acceptable per code, however in reality windows are typically not opened during cold or hot outdoor air temperatures. We recommend a study of the

Courthouse to determine how feasible it is to install mechanical ventilation in all occupied spaces.

2.7.7 Replace Rooftop Unit

Outdoor rooftop air handling units in this size range have a life expectancy of 15 years. RTU-1 is approximately 21 years old and appears to be in fair condition. It uses R-22 refrigerant, an ozone-depleting chemical that has been phased out of production, making it expensive to replace or replenish when a failure occurs. Consider replacing this unit in the next 1-3 years. A replacement unit will not only use a more environmentally friendly refrigerant, it will be more energy efficient, and can use heat pump technology to minimize the use of electric resistance heat.

Section 3
Testing & Balancing Results

Milharmer Associates visited the Wrentham District Courthouse on September 9, 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	2,400	875	1,525	2,542	**0**	2,538
AHU-1	2,100	750	1,350	1,198	**295**	890
AHU-2	1,400	250	1,150	1,289	**0**	1,019

TABLE 6
Exhaust Fan Testing & Balancing Results

Unit	**Serving**	**Design Return/Exhaust Airflow (CFM)**	**Actual Return/Exhaust Airflow (CFM)**
EF-2	Unknown	Unknown	476
EX-F4	Unknown	Unknown	1,802
EX-F5	Unknown	Unknown	948

The typical balancing tolerance for air systems is ±10% of the design airflow.

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

1. RTU-1 supply fan is performing within the acceptable range, however the outside air damper is completely shut. This unit is providing no ventilation air to the courtroom. We recommend opening the OA damper and balancing to the recommended airflow.
2. The filters in RTU-1 are dirty and should be replaced.
3. AHU-1 is operating below the design airflow. A sheave change may be required to increase the airflow to the design value.

4. AHU-2 supply fan is performing within the acceptable airflow range, however the outside air damper has been sealed shut due to water leakage. We recommend investigating the cause of the water leakage and opening the OA damper.
5. The measured motor amperage for AHU-2 is 2.9, right at the nameplate FLA.
6. The design airflows of the exhaust fans are unclear to Tighe & Bond. If drawings do not exist that indicate what each exhaust fan serves, we recommend a site investigation to help identify what spaces each fan serves.

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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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: **Wrentham District Court**
60 East St., Wrentham, MA

Project No.: **21-495** **Project Date:** **9/9/2021**

MECHANICAL CONTRACTOR
Tighe & Bond

3384

A N.E.B.B. Certified Company

Project:	Wrentham District Court		
Address:	60 East St., Wrentham, MA		
Date:	9/9/2021	**Project No.**	21-495

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

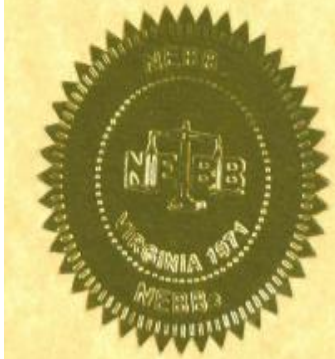
NEBB Certification Number

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:	Wrentham District Court		
Address:	60 East St., Wrentham, MA		
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Address: 60 East St., Wrentham, MA
Date: 9/9/2021 **Project No.** 21-495

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:	Wrentham District Court		
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REPORT SUMMARY

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

1. RTU-1 - OA damper has been completely shut by the facility and the filters are dirty and need to be replaced.

2. AHU-1 is low on airflow and requires a sheave change to increase airflow to design.

3. AHU-2 OA damper has been sealed shut due to water leakage.

Project:	Wrentham District Court		
Address:	60 East St., Wrentham, MA		
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REPORT SUMMARY

AIR HANDLING UNITS

UNIT	SUPPLY	RETURN	OUTSIDE AIR
RTU-1	2,542 CFM	2,538 CFM	*1
AHU-1	2,100CFM	1,198 CFM	295 CFM *2
AHU-2	1,289 CFM	1,019 CFM	*3

*1 Filters need to be replaced and OA Damper has been completely shut.
*2. Unit is low on flow and requires a sheave change.
*3 OA damper has been sealed shut due to water leakage.

FANS

UNIT	EXHAUST
EF-2	476 CFM
EX-F4	1,802 CFM
EX-F5	948 CFM

Project: Wrentham District Court
Address: 60 East St., Wrentham, MA
Date: 9/9/2021 **Project No.** 21-495

FAN DATA SHEET

	FAN NO.	RTU-1	FAN NO.	
Serves / Location:		Roof		
Manufacturer:	Carrier			
Model Number:	50 TFF008---501GA			
Size:	NL			
Serial Number:	1801G31304			
MOTOR	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Manufacturer:	NL	MARATHON		
Frame Number:	NL	56Y		
Horsepower:	NL	NA		
Brake Horsepower:	NL	NA		
Safety Factor:	NL	1.15		
Volts/Phase:	208-230	203/3		
Motor Amperage:	5.2	3.9		
Motor RPM:	1725	1727		
Speeds:	NL	1		
Heater Size:	NL	CB		
Heater Amps.:	NL	CB		
FAN	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Supply Air CFM:	2400	2542		
Return Air CFM:	1525	2538		
Exhaust Air CFM:				
Outside Air CFM:	875	4 *1		
Suction Pressure:	NL	-.68 / -.12		
Discharge Pressure:	NL	0.42		
Fan Static Pressure:	NL	1.1		
External Pressure:	NL	0.54		
RPM	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Fan RPM:	NL	986		
Motor Drive:	NL	4" OD		
Motor Size/Bore:	NL	5/8		
Fan Drive:	NL	7" OD		
Fan Size/Bore:	NL	1"		
Belt Size / Number:	NL	AX48-1		
Shafts C-C:	NL	17"		
Turns Open:	NL	Open 100%		

Comments: ***1 Filters require replacement, outside air damper closed.**

Project: Wrentham District Court
Address: 60 East St., Wrentham, MA
Date: 9/9/2021 **Project No.** 21-495

TRAVERSE DATA

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

DUCT SIZE (ROUND)		" DIAMETER			Sq Ft =	0.00
DUCT SIZE (RECT.)	26	" WIDTH x	14	" DEPTH	Sq Ft =	2.53

AIR DENSITY DATA

STATIC PRESS @ CL:	0.42	InWg.	DESIGN CFM =	NL
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	2542
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**2546**

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	751	888	1030	1006	1137		
B	712	937	1096	1157	1218		
C	858	898	1071	1084	1243		
D							
E							
F							
G							
H							
I							

NO. OF READINGS = 15 AVERAGE FPM = 1006

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Dave Burns

Project: Wrentham District Court
Address: 60 East St., Wrentham, MA
Date: 9/9/2021 **Project No.** 21-495

TRAVERSE DATA

SYSTEM: RTU-1 TRAVERSE NUMBER : T1
Return A TRAVERSE LOCATION: Roof

DUCT SIZE (ROUND)		" DIAMETER			Sq Ft =	0.00
DUCT SIZE (RECT.)	14	" WIDTH x	14	" DEPTH	Sq Ft =	1.36

AIR DENSITY DATA

STATIC PRESS @ CL:	-0.11	InWg.	DESIGN CFM =	NL
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	808
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**809**

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	580	427	467				
B	696	584	539				
C	806	669	577				
D							
E							
F							
G							
H							
I							

NO. OF READINGS = 9 AVERAGE FPM = 594

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Dave Burns

Project: Wrentham District Court
Address: 60 East St., Wrentham, MA
Date: 9/9/2021 **Project No.** 21-495

TRAVERSE DATA

SYSTEM: RTU-1 TRAVERSE NUMBER : T2
Return B TRAVERSE LOCATION: Roof

DUCT SIZE (ROUND)		" DIAMETER			Sq Ft =	0.00
DUCT SIZE (RECT.)	14	" WIDTH x	14	" DEPTH	Sq Ft =	1.36

AIR DENSITY DATA

STATIC PRESS @ CL:	-0.14	InWg.	DESIGN CFM =	NL
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	1730
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**1730**

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	1009	1587	1182				
B	1248	1409	1103				
C	1412	1342	1156				
D							
E							
F							
G							
H							
I							

NO. OF READINGS = 9 AVERAGE FPM = 1272

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Dave Burns

Project: Wrentham District Court
Address: 60 East St., Wrentham, MA
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TRAVERSE DATA

SYSTEM: RTU-1 TRAVERSE NUMBER : T1
Outside Air TRAVERSE LOCATION: Roof

DUCT SIZE (ROUND)		" DIAMETER		Sq Ft =	0.00
DUCT SIZE (RECT.)	34	" WIDTH x	24 " DEPTH	Sq Ft =	5.67

AIR DENSITY DATA

STATIC PRESS @ CL:		InWg.	DESIGN CFM =	NL
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	*1
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**0**

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

*1 Outside air damper closed, filters require replacement.

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

NO. OF READINGS = 0 AVERAGE FPM = #DIV/0!

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Dave Burns

Project: Wrentham District Court
Address: 60 East St., Wrentham, MA
Date: 9/9/2021 **Project No.** 21-495

FAN DATA SHEET

	FAN NO. AHU-1		FAN NO.	
Serves / Location:		Attic		
Manufacturer:	Carrier			
Model Number:	40RM--007--B610HC			
Size:	NL			
Serial Number:	1401F73771			
MOTOR	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Manufacturer:	NL	GE		
Frame Number:	NL	56Y		
Horsepower:	NL	NA		
Brake Horsepower:	NL	NA		
Safety Factor:	NL	1.15		
Volts/Phase:	208-230/3	204/3		
Motor Amperage:	5.2	2.6/2.14/2.3		
Motor RPM:	1725	1729		
Speeds:	NL	1		
Heater Size:	NL	NA		
Heater Amps.:	NL	NA		
FAN	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Supply Air CFM:	2100	1198		
Return Air CFM:	1350	890		
Exhaust Air CFM:				
Outside Air CFM:	750	295		
Suction Pressure:	NL	-.61 / -.44		
Discharge Pressure:	NL	0.06		
Fan Static Pressure:	NL	0.67		
External Pressure:	NL	0.5		
RPM	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Fan RPM:	NL	768		
Motor Drive:	NL	4" OD		
Motor Size/Bore:	NL	7/8		
Fan Drive:	NL	9" OD		
Fan Size/Bore:	NL	1"		
Belt Size / Number:	NL	4L410 x 1		
Shafts C-C:	NL	9 3/4		
Turns Open:	NL	5		

Comments:

Project: Wrentham District Court
Address: 60 East St., Wrentham, MA
Date: 9/9/2021 **Project No.** 21-495

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
CR	1	SR	FH	NA	NA	NL	196
CR	2	SR	FH	NA	NA	NL	193
CR	3	SR	FH	NA	NA	NL	215
CR	4	SR	FH	NA	NA	NL	207
CR	5	SR	FH	NA	NA	NL	189
CR	6	SR	FH	NA	NA	NL	198
					TOTALS:	NL	1198

Comments:

Project: Wrentham District Court
Address: 60 East St., Wrentham, MA
Date: 9/9/2021 **Project No.** 21-495

TRAVERSE DATA

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

DUCT SIZE (ROUND)		" DIAMETER			Sq Ft =	0.00
DUCT SIZE (RECT.)	20	" WIDTH x	16	" DEPTH	Sq Ft =	2.22

AIR DENSITY DATA

STATIC PRESS @ CL:	-0.57	InWg.	DESIGN CFM =	NL
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	890
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**889**

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	598	352	214	226	139		
B	504	410	436	277	200		
C	605	528	536	417	278		
D	605	621	484	313	266		
E							
F							
G							
H							
I							

NO. OF READINGS = 20 AVERAGE FPM = 400

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Dave Burns

Project: Wrentham District Court
Address: 60 East St., Wrentham, MA
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TRAVERSE DATA

SYSTEM: AHU-1 TRAVERSE NUMBER : T1
Outside Air TRAVERSE LOCATION: Attic

DUCT SIZE (ROUND)		" DIAMETER		Sq Ft =	0.00
DUCT SIZE (RECT.)	20	" WIDTH x	16 " DEPTH	Sq Ft =	2.22

AIR DENSITY DATA

STATIC PRESS @ CL:	-0.45	InWg.	DESIGN CFM =	NL
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	295
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**294**

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	1109	413	278	1275	152		
B	-165	-279	-272	-228	-131		
C	-135	98	-202	-206	-299		
D	363	236	142	197	305		
E							
F							
G							
H							
I							

NO. OF READINGS = 20 AVERAGE FPM = 133

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Dave Burns

Project: Wrentham District Court
Address: 60 East St., Wrentham, MA
Date: 9/9/2021 **Project No.** 21-495

FAN DATA SHEET

	FAN NO. AHU-2		FAN NO.	
Serves / Location:		Attic		
Manufacturer:	Carrier			
Model Number:	FB4ANF042			
Size:	NL			
Serial Number:	0602A63147			
MOTOR	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Manufacturer:	NL	NA		
Frame Number:	NL	NA		
Horsepower:	NL	1/2		
Brake Horsepower:	NL	NA		
Safety Factor:	NL	NL		
Volts/Phase:	208-230	203/1		
Motor Amperage:	2.9	2.9		
Motor RPM:	NL	DIRECT DRIVE		
Speeds:	NL	1		
Heater Size:	NL	CB		
Heater Amps.:	NL	CB		
FAN	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Supply Air CFM:	1400	1289		
Return Air CFM:	NL	1019 *2		
Exhaust Air CFM:				
Outside Air CFM:	NL	*1		
Suction Pressure:	NL	-0.2		
Discharge Pressure:	NL	0.08		
Fan Static Pressure:	NL	0.28		
External Pressure:	NL	NA		
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: ***1 Capped due to roof leak.**

***2 Slight leakage around filter access.**

Project: Wrentham District Court
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TRAVERSE DATA

SYSTEM: AHU-2 TRAVERSE NUMBER : T1
Supply TRAVERSE LOCATION: Attic

DUCT SIZE (ROUND)		" DIAMETER			Sq Ft =	0.00
DUCT SIZE (RECT.)	18	" WIDTH x	12	" DEPTH	Sq Ft =	1.50

AIR DENSITY DATA

STATIC PRESS @ CL:	0.05	InWg.	DESIGN CFM =	NL
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	1289
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**1290**

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	452	574	791	1095	1411		
B	470	667	844	909	1327		
C	584	627	932	841	1365		
D							
E							
F							
G							
H							
I							

NO. OF READINGS = 15 AVERAGE FPM = 859

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Dave Burns

Project: Wrentham District Court
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TRAVERSE DATA

SYSTEM: AHU-2 TRAVERSE NUMBER : T1
Return A TRAVERSE LOCATION: Attic

DUCT SIZE (ROUND)		" DIAMETER			Sq Ft =	0.00
DUCT SIZE (RECT.)	18	" WIDTH x	12	" DEPTH	Sq Ft =	1.50

AIR DENSITY DATA

STATIC PRESS @ CL:	-0.15	InWg.	DESIGN CFM =	NL
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	668
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**668**

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	447	549	437	351	289		
B	509	457	395	433	408		
C	540	534	442	443	444		
D							
E							
F							
G							
H							
I							

NO. OF READINGS = 15 AVERAGE FPM = 445

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Dave Burns

Project: Wrentham District Court
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TRAVERSE DATA

SYSTEM: AHU-2 TRAVERSE NUMBER : T2
Return B TRAVERSE LOCATION: Attic

DUCT SIZE (ROUND) 9 " DIAMETER Sq Ft = 0.44
DUCT SIZE (RECT.) " WIDTH x " DEPTH Sq Ft = 0.00

AIR DENSITY DATA
STATIC PRESS @ CL: -0.17 InWg. DESIGN CFM = NL
DUCT AIR TEMP : 70 Deg F ACTUAL CFM = 351
BAROMETRIC PRESS : 29.92 In Hg. SCFM= **351**

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	755	799					
B	829	772					
C	850	833					
D	820	789					
E	715	855					
F	752	791					
G							
H							
I							

NO. OF READINGS = 12 AVERAGE FPM = 797

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Dave Burns

Project: Wrentham District Court
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TRAVERSE DATA

SYSTEM: AHU-2 TRAVERSE NUMBER : T1
Outside Air 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:		InWg.	DESIGN CFM =	NL
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	*1
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**0**

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

*1Duct is disconnected and capped due to roof leak.

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

NO. OF READINGS = 0 AVERAGE FPM =

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Dave Burns

Project: Wrentham District Court
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FAN DATA SHEET

	FAN NO.	EF-2	FAN NO.	
Serves / Location:		Attic		
Manufacturer:	PENN Ventilation			
Model Number:	Z1CZ			
Size:	NL			
Serial Number:	TAG ILLEGIBLE			
MOTOR	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Manufacturer:	NL	NL		
Frame Number:	NL	NL		
Horsepower:	NL	NL		
Brake Horsepower:	NL	NL		
Safety Factor:	NL	NL		
Volts/Phase:	NL	115/1		
Motor Amperage:	NL	NA		
Motor RPM:	NL	INLINE		
Speeds:	NL	1		
Heater Size:	NL	CB		
Heater Amps.:	NL	CB		
FAN	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Supply Air CFM:				
Return Air CFM:				
Exhaust Air CFM:	NL	476		
Outside Air CFM:				
Suction Pressure:	NL	-0.42		
Discharge Pressure:	NL	0.015		
Fan Static Pressure:	NL	NA		
External Pressure:	NL	0.435		
RPM	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Fan RPM:	NL	INLINE		
Motor Drive:	NL	INLINE		
Motor Size/Bore:	NL	INLINE		
Fan Drive:	NL	INLINE		
Fan Size/Bore:	NL	INLINE		
Belt Size / Number:	NL	INLINE		
Shafts C-C:	NL	INLINE		
Turns Open:	NL	INLINE		

Comments:

Project: Wrentham District Court
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TRAVERSE DATA

SYSTEM: EF-2 TRAVERSE NUMBER : T1
TRAVERSE LOCATION: Attic

DUCT SIZE (ROUND)		" DIAMETER			Sq Ft =	
DUCT SIZE (RECT.)	20	" WIDTH x	16	" DEPTH	Sq Ft =	2.22

AIR DENSITY DATA				
STATIC PRESS @ CL:	-0.38	InWg.	DESIGN CFM =	NL
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	476
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**476**

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	371	275	257	206	197		
B	368	247	167	92	131		
C	348	192	193	137	44		
D	314	273	237	124	112		
E							
F							
G							
H							
I							

NO. OF READINGS = 20 AVERAGE FPM = 214

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Dave Burns

Project: Wrentham District Court
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FAN DATA SHEET

	FAN NO. EX-F4		FAN NO. EX-F5	
Serves / Location:		Attic		Attic
Manufacturer:	Trane Centrifugal Fan		Trane Cetrifugal Fan	
Model Number:	BI 2 SW S1 2		BI 21 SW S1 2	
Size:	18		15	
Serial Number:	EE5958		EE5957	
MOTOR	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Manufacturer:	NL	DAYTON	NL	DAYTON
Frame Number:	NL	56H	NL	56
Horsepower:	NL	1	NL	3/4
Brake Horsepower:	NL	NA	NL	NA
Safety Factor:	NL	1.25	NL	1.15
Volts/Phase:	115/1	115/1	115/1	115/1
Motor Amperage:	13.6	9.7	11	9.1
Motor RPM:	1725	1727	1725	1725
Speeds:	NL	1	NL	1
Heater Size:	NL	CB	NL	CB
Heater Amps.:	NL	CB	NL	CB
FAN	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Supply Air CFM:				
Return Air CFM:				
Exhaust Air CFM:	NL	1802	NL	948
Outside Air CFM:				
Suction Pressure:	NL	-0.27	NL	-0.2
Discharge Pressure:	NL	0.31	NL	0.36
Fan Static Pressure:	NL	NA	NL	NA
External Pressure:	NL	0.58	NL	0.56
RPM	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Fan RPM:	NL	663	NL	1031
Motor Drive:	NL	AK25	NL	JVL34
Motor Size/Bore:	NL	5/8	NL	5/8
Fan Drive:	NL	BK650	NL	BK57
Fan Size/Bore:	NL	1 3/16	NL	1"
Belt Size / Number:	NL	4L560x1	NL	A49x1
Shafts C-C:	NL	21 1/2	NL	19"
Turns Open:	NL	FIXED	NL	Open 100%

Comments:

Project: Wrentham District Court
Address: 60 East St., Wrentham, MA
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TRAVERSE DATA

SYSTEM: EX-F4 TRAVERSE NUMBER : T1
TRAVERSE LOCATION: Attic

DUCT SIZE (ROUND)	20	" DIAMETER	Sq Ft =	2.18
DUCT SIZE (RECT.)		" WIDTH x " DEPTH	Sq Ft =	0.00

AIR DENSITY DATA

STATIC PRESS @ CL:	-0.25	InWg.	DESIGN CFM =	NL
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	1802
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**1802**

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	735	716	376	1003			
B	1011	719	848	1025			
C	770	762	628	1014			
D	635	775	949	1010			
E	722	764	1014	1051			
F							
G							
H							
I							

NO. OF READINGS = 20 AVERAGE FPM = 826

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Dave Burns

Project: Wrentham District Court
Address: 60 East St., Wrentham, MA
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TRAVERSE DATA

SYSTEM: EX-F5 TRAVERSE NUMBER : T1
TRAVERSE LOCATION: Attic

DUCT SIZE (ROUND)		" DIAMETER			Sq Ft =	0.00
DUCT SIZE (RECT.)	22	" WIDTH x	12	" DEPTH	Sq Ft =	1.83

AIR DENSITY DATA

STATIC PRESS @ CL:	0.36	InWg.	DESIGN CFM =	NL
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	948
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**950**

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	676	506	202				
B	852	591	213				
C	750	527	350				
D	745	460	282				
E	701	509	267				
F	749	526	404				
G							
H							
I							

NO. OF READINGS = 18 AVERAGE FPM = 517

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Dave Burns