PLYMOUTH TRIAL COURT
HVAC SYSTEM EVALUATION SUMMARY

Visited on September 16, 2020. Inspected seven indoor air handling units, various mechanical spaces, and toured the holding area on the basement level to determine if the systems and spaces corresponded to the mechanical plans. This building was constructed in 2007 and is approximately 189,000 square feet in size. The design and construction of the mechanical systems appears to be excellent, and well maintained since the building was opened. Space conditions were comfortable, and systems were quiet.

1.0 Airflow Rate Per Person (Reduced Occupancy)

		Total Air		*Outdoor Air*	
Courtroom	*Total People*	*Supply Airflow (CFM)*	*Airflow Rate (CFM/Person)*	*Outside Airflow (CFM)*	*Airflow Rate (CFM/Person)*
Courtroom A	23	3,850	167	2,291	100
Courtroom B	23	3,850	167	1,960	85
Courtroom C	21	3,850	183	1,960	93
Courtroom D	23	3,850	167	2,053	89
Courtroom E	23	3,850	167	2,053	89
Courtroom F	22	3,195	145	661	30
Arraignment Courtroom	25	2,785	111	1,657	66
Juvenile Courtroom	23	2,680	117	1,429	62
Superior Courtroom	31	4,540	146	2,702	87
Jury Pool Room	28	5,020	179	2,677	96

2.0 Recommendations

Section	Recommendation/Finding	Action
2.1	**Filtration Efficiency**	
RF-1	Replace 12" MERV 11 filters with MERV 13	Complete
2.2	**Testing and Balancing**	
RTB-1	Test and rebalance air handling unit minimum outside air flow rate	Complete
RTB-2	Rebalance system return and exhaust air flow rate	Complete
2.3	**Equipment Maintenance and Upgrades**	
RE-2	Clean heating and cooling coils and drain pans	Complete
2.4	**Control System**	
RC-1	Implement a pre and post-occupancy flush sequence	Complete
RC-3	Install controls to introduce outside air beyond the minimum requirements	Complete
RC-5	Disable demand control ventilation sequences	Complete
RC-6	Monitor relative humidity	Complete

2.5	Additional Filtration and Air Cleaning	
RFC-1	Install portable HEPA filters in high traffic areas – *if courthouse is to operate at a high occupancy (i.e. 50-75% or greater), install portable HEPA filters in high traffic areas.*	In-progress
2.6	Humidity Control	
	No actionable items listed – continuous monitoring for seasonal changes	On-going
2.7	Other Recommendations	
2.7.1	Airflow Stations: Design and install an air handling system to serve the basement	Deferred – included in 5 year Capital Plan
2.7.2	Face & Bypass Damper Sequences	Complete

Plymouth Trial Court
Plymouth, MA

HVAC SYSTEM EVALUATION COVID-19

Office of Court Management

December 6, 2020

Tighe&Bond

100% Recyclable

Section 1
Existing Conditions & Site Observations

Tighe & Bond visited the Plymouth Trial Court on September 16, 2020. While on site, we inspected seven indoor air handling units, various mechanical spaces, and toured the holding area on the basement level to determine if the systems and spaces corresponded to the mechanical plans. This building was constructed in 2007 and is approximately 189,000 square feet in size. The design and construction of the mechanical systems appears to be excellent, and well maintained since the building was opened. Space conditions were comfortable, and systems were quiet.

Site Visit Attendees:

- Office of Court Management:
  - Ronald DePesa, Manager of Court Facilities
  - Mark Ronan, Facilities
- Tighe & Bond:
  - Todd Holland, PE, Senior Mechanical Engineer
  - Caitlin DeWolfe, Staff Engineer

1.1 Existing Ventilation System

Heating, air conditioning, and ventilation for most of the building is provided by seven McQuay air handling units (AHUs) located in three mechanical rooms. Each unit has a filter section, chilled water and hot water coils, steam humidifier (decommissioned), supply fan, and discharge damper. All AHUs except AHU-5 also have mixing boxes with outdoor air (OA) and return air (RA) dampers, airflow measuring stations, and CO_2 sensors in the return air streams. AHU-1, AHU-2, and AHU-4 have and face and bypass dampers, which allow supply air to bypass the cooling and heating coils when heating and cooling are not required. Supply fans are variable speed, set to maintain static pressure in the distribution duct (2.0" w.g.).

A pair of RA fans, operating in parallel, serve AHUs 1, 2, 3, and 4. RA fans are variable speed, set to follow supply airflow, with an offset to allow for makeup for exhaust fans serving toilet rooms and ancillary spaces, in order to maintain positive building pressurization.

A temperature-based (dry bulb) economizer sequence was being followed during the site visit, because OA temperature was 65°F. All AHUs had their OA dampers 100% open, and RA dampers shut, with the exception being AHU-5 because that system is 100% recirculated air.

AHUs 1, 2, 3, and 4 have CO_2 sensors in the return air stream. These sensors are used for a demand control ventilation sequence that opens the OA damper above a minimum setting when a setpoint is exceeded.

At the time of the site visit, none of the AHUs were actively heating or cooling, all chilled and hot water control valves were closed. However, the bypass dampers were also closed.

Each AHU contains two sets of filters. 2" thick pleated pre-filters are 30% (MERV-7 or MERV-8) are followed by 12" thick box filters rated 60-65% (MERV-11). The upstream face of the adjacent cooling coils appeared to be clean.

The Plymouth Court was designed with a humidification system, which has been decommissioned. There is a Cleaver Brooks gas-fired steam boiler, with low-pressure distribution to direct steam injection humidifiers in the air handlers. According to staff, there was excessive liquid water carryover when they were operating, which corroded downstream components in the AHUs and created IAQ problems.

The AHUs are in very good condition. Courthouse staff noted that there have been few problems, outside the issues with the humidifiers. The electric actuators appear to be in very good condition, as do the dampers, mixed air plenums, and OA intakes. All the OA intakes appeared to be reasonably clean and clear of debris, with no evidence of water collection or excessive corrosion.

Unlike in some other facilities, each holding cell has its own ceiling supply diffuser for ventilation air. Air is removed from each cell by a perforated exhaust grille in the wall behind the toilet/sink fixture. The door to each cell is not solid, the lower half is a reinforced metal screen with what appears to be 50% free area.

TABLE 1
Existing Air Handling Units

Unit	***Original Design Airflow (CFM)***	***Original Design Min. O.A. (CFM)***	***Filters***	***Condition***
AHU-1	40,500	21,600	2" MERV-8, 12" MERV-11	Excellent
AHU-2	24,750	12,200	2" MERV-8, 12" MERV-11	Excellent
AHU-3	29,000	5,420	2" MERV-8, 12" MERV-11	Excellent
AHU-4	34,700	20,650	2" MERV-8, 12" MERV-11	Excellent
AHU-5	7,500	0	2" MERV-8, 12" MERV-11	Excellent
AHU-6	13,000	1,580	2" MERV-8, 12" MERV-11	Excellent
AHU-7	8,200	2,180	2" MERV-8, 12" MERV-11	Excellent

The building is cooled by a pair of McQuay centrifugal water-cooled chillers, 300 tons each, using R134a refrigerant. Space heating loads are served by two HB Smith gas-fired hydronic boilers.

1.2 Existing Control System

The Courthouse has an Automated Logic DDC control system. It is tied to the existing boilers, chillers, AHUs, exhaust fans, perimeter radiation, unit heaters, pumps, and VAV terminal boxes.

Section 2
Recommendations

Below is list of immediate recommendations that we propose for the Plymouth District Court. Please refer to the "Master Recommendation List" for further explanation and requirements of the stated recommendations.

2.1 Filtration Efficiency Recommendations

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

RF-1: *Replace the 12" MERV-11 filters with MERV-13 filters.*

TAB Contractor and/or Engineer shall verify that the air handlers can accommodate a MERV-13 filter.

2.2 Testing & Balancing Recommendations

The ASHRAE climatic data for outdoor air conditions in Plymouth states a summer design condition of 88.7°F/73.0°F DB/WB and a winter condition of 6.1°F. In reviewing the originally designed entering mixed air temperatures for the chilled water and hot water coils in the air handling units, we've determined the air handlers AHU-3 and AHU-6 cannot accommodate the 2015 code required ventilation air under peak conditions. It appears AHU-1 and AHU-4 are providing excessive ventilation air. Prior to rebalancing efforts, dampers and actuators should be tested to ensure they are operating correctly. We recommend the following measures be implemented:

RTB-1: *Test and rebalance air handling unit supply, return, and minimum outside air flow rates.*

We recommend rebalancing the air handler outside airflow rates to the values shown in Table 2. 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. The return fans will have to be rebalanced to accommodate the change in the outside air flow rate.

TABLE 2
Recommended Air Handler O.A. Flow Rates

Unit	*Original Design Airflow (CFM)*	*Original Design Min. O.A. (CFM)*	*Current Code Min. O.A. Requirements (CFM)*	Recommended Minimum O.A. (CFM)
AHU-1	40,500	21,600	15,700	21,600
AHU-2	24,750	12,200	5,150	12,200
AHU-3	29,000	5,420	5,300	5,420
AHU-4	34,700	20,650	13,900	20,650
AHU-5	7,500	0	0	0
AHU-6	13,000	1,580	2,800	2,800
AHU-7	8,200	2,180	2,000	2,180

The average airflow rate per person is shown below in Table 3. These values are based on the original design supply airflow rate and the recommended outdoor airflow rates as shown in Table 2 above. The airflow rate per person is based on full occupancy, but assumes a diversity factor of 70%, meaning the maximum number of occupants assumed to be in all zones at any one time equates to 70% of the code default occupancy.

TABLE 3
Average Airflow Rate per Person

	All Spaces	*Courtrooms*	*Non-Courtroom Spaces*
Total Occupancy (People)	1,637	897	740
Total Supply Air (CFM/Person)	96	43	161
Outdoor Air (CFM/Person)	22	22	61

The airflow rate per person for each Courtroom and Jury Pool Room is shown below in Table 4. These values are based on full occupancy, the original design supply airflow rate, and the code required outdoor airflow rate, without taking diversity into account. The airflow rate per person assumes the full supply airflow is being delivered to the room. At times when the supply airflow is reduced due to the space temperature being satisfied, the airflow rate per person will also be reduced.

TABLE 4
Airflow Rate per Person – Courtrooms (Full Occupancy)

		Total Air		Outdoor Air	
Courtroom	***Total People***	***Supply Airflow (CFM)***	***Airflow Rate (CFM/Person)***	***Outside Airflow (CFM)***	***Airflow Rate (CFM/Person)***
Courtroom A	123	3,850	31	2,291	19
Courtroom B	107	3,850	36	1,960	18
Courtroom C	107	3,850	36	1,960	18
Courtroom D	107	3,850	36	2,053	19
Courtroom E	104	3,850	37	2,053	20
Courtroom F	120	3,195	27	661	6
Arraignment Courtroom	141	2,785	20	1,657	12
Juvenile Courtroom	105	2,680	26	1,429	14
Superior Courtroom	167	4,540	27	2,702	16
Jury Pool Room	137	5,020	37	2,677	20

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 (Reduced Occupancy)***	***Supply Airflow (CFM)***	***Airflow Rate (CFM/Person)***	***Outside Airflow (CFM)***	***Airflow Rate (CFM/Person)***
Courtroom A	23	3,850	167	2,291	100
Courtroom B	23	3,850	167	1,960	85
Courtroom C	21	3,850	183	1,960	93
Courtroom D	23	3,850	167	2,053	89
Courtroom E	23	3,850	167	2,053	89
Courtroom F	22	3,195	145	661	30
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Superior Courtroom	31	4,540	146	2,702	87
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RTB-2: *Rebalance system return and exhaust air flow rate*

To accommodate the revised outdoor air flow rates and to help provide a positive building pressure, the return fans will have to be rebalanced.

RTB-3: *Increase outside air flow rate beyond minimum under non-peak conditions for AHU-2, AHU-3, AHU-6, and AHU-7.*

The units are in excellent condition and we believe the units can accommodate additional outdoor air under non-peak conditions. We do not believe this would cause a threat of a potential coil to freeze given the amount of outside air as a percentage of total supply air, however cold spots on the coil may develop due to poor mixing. This may cause nuisance freeze stat trips via the existing freeze stat.

2.3 Equipment Maintenance & Upgrades

We recommend the following equipment maintenance and upgrades:

RE-2: *Clean Heating and Cooling Coils and Drain Pans*

Check sequence for face and bypass damper operation. Opening the bypass dampers when cooling and heating is not required allow the fans to slow down and save energy by reducing pressure loss through the coils. This will have the added benefit of keeping the coils cleaner.

2.4 Control System

We recommend the following control system upgrades:

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

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

RC-5: *Disable demand control ventilation sequences.*

Disable sequences that reduce ventilation based on CO_2 readings. If the sequences cannot be overridden, CO_2 setpoints can be dropped to 400 ppm to achieve the same result.

RC-6: Monitor Relative Humidity

Trend space humidity levels via the existing BMS. Considering the air handler humidifiers have been decommissioned, maintaining ASHRAE's recommended humidity levels in the building will be challenging in winter, and recording how many hours will be outside that envelope can help determine if future action is warranted.

2.5 Additional Filtration and Air Cleaning

RFC-1: *Install portable HEPA filters.*

If the Courthouse is to operate at a high capacity (i.e. 50%-75% occupancy or greater), we recommend installing portable HEPA filters in high traffic areas, such as entrance lobbies or places outside courtrooms where people may congregate.

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 Airflow Stations

The Plymouth District Court has airflow measuring stations on many of the supply, return, and outdoor air ducts. There were a few that were registering zero flow at the time of our visit, even though dampers were open, fans were operating, and we were otherwise able to verify airflow. The zero flow condition was seen on the OA for AHU-4, and RA #3 for F-1 & F-2. These flow stations should be checked and repaired as needed.

In addition to some airflow readings being zero cfm, there were a few substantial deviations from setpoint, tabulated below. In some cases the reading fluctuated wildly. These readings, flow stations, and sequences should be checked, adjusted, and repaired as needed to get the airflows to match setpoints in operation.

TABLE 5
Airflow Setpoints vs. Measurements

Unit	Air Stream	Airflow Setpoint (CFM)	Airflow Measurement (CFM)
AHU-1	OA	8,100	6,116 to 10,594
AHU-2	OA	6,100	3,453
AHU-3	OA	2,410	1,648
AHU-6	RA	958	1,417
AHU-7	RA	3,357	1,706

2.7.2 Face & Bypass Damper Sequences

AHUs 1, 2, and 4 have face and bypass dampers that allow air to bypass the coils when cooling and heating is not required, but the bypasses were closed at the time of our visit. These sequences should be checked, as opening the bypass dampers would allow the fans to slow down and save energy by reducing the pressure loss through the coils. This would have the added benefit of keeping the coils cleaner.

Section 3
Testing & Balancing Results

On October 30, 2020 Milharmer Associates, Inc. visited the Plymouth Trial Court to test the airflow rates of the air handling units and the exhaust fans. The Office of Court Management's Automatic Temperature Controls (ATC) Contractor was also on site to assist in the balancing process. A summary of the tested airflow rates versus the design airflow rates are shown below in Tables 6 and 7. Their full testing and balancing report is attached.

TABLE 6
Air Handler Testing & Balancing Results

	Design			Actual		
Unit	**Total Supply Fan Airflow (CFM)**	**Recommended Outdoor Airflow (CFM)**	**Return Fan Airflow (CFM)**	**Supply Fan Airflow (CFM)**	**Outdoor Airflow (CFM)**	**Return Fan Airflow (CFM)**
AHU-1	40,500	21,600	18,900	30,413	Not Measurable	Not Measurable
AHU-2	24,750	12,200	12,550	25,421	12,710	12,710
AHU-3	29,000	5,420	23,580	31,383	7,393	23,990
AHU-4	34,700	20,650	14,050	33,679	20,660	13,022
AHU-5	7,500	0	7,500	7,450	0	7,450
AHU-6	13,000	2,800	10,200	13,139	2,914	10,225
AHU-7	8,200	2,180	6,020	8,685	2,448	6,237

TABLE 7
Exhaust Fan Testing & Balancing Results

Unit	Serving	Design Exhaust Fan Airflow	Actual Exhaust Fan Airflow
F-6	Toilet Exhaust	5,380	6,030
F-9	Toilet Exhaust	1,966	2,360
F-14	Toilet Exhaust	2,400	2,271
F-17	Toilet Exhaust	3,720	3,892
F-1	AHU-1,2,3,4 Return Air	55,000	Not Measurable
F-2	AHU-1,2,3,4 Return Air	55,000	Not Measurable
F-29	AHU-7 Return	7,380	6,642
F-33	AHU-6 Return	11,500	10,975

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

1. With the exception of AHU-1, all air handler supply and return air flow rates are operating within acceptable airflow ranges
2. AHU-1 supply airflow is significantly less than the design airflow rate. According to Milharmer Associates investigation, the VFD serving the supply fan was operating at 60 hertz (Hz), which is the recommended maximum frequency a motor should operate at. In order to balance AHU-1 to the specified airflow rate, a sheave change is required, and/or the VFD may have its maximum speed adjusted higher than 70 Hz. The latter option should be investigated with the AHU manufacturer and ensure the motor does not run higher that the nameplate full load amps.
3. The outdoor air flow rates for AHU-2, AHU-4, AHU-6, and AHU-7 are within acceptable range of the recommended airflow rates.
4. AHU-3 outdoor airflow rate is more than designed or recommended, however the heating and cooling coils appear to have adequate capacity to accommodate this OA flow rate. We suggest maintaining this OA flow rate, but monitor the supply air temperature on summer and winter design days to verify the proper supply air temperature setpoints are maintained. If they are not, we recommend rebalancing the OA flow rate to the recommended value of 5,420 CFM.
5. All toilet exhaust fan flow rates are within acceptable range of design.
6. All air handlers appear to have adequate capacity to accommodate a MERV 13 filter.

Milharmer Associates also noted the following findings in their report:

1. The ATC Contractor could not calibrate the outdoor airflow stations for AHU-1, AHU-3, AHU-6, and AHU-7.
    a. AHU-1 airflow station appears to be in a poor location, with inadequate straight runs of duct upstream and downstream, which would result in inaccurate airflow readings.
    b. Further troubleshooting by the ATC Contractor to correct the airflow stations is recommended.
2. Milharmer could not measure F-1 and F-2 flow rates due to poor traverse locations to obtain measurements.

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

SURVEY REPORT

Project: **Plymouth Trial Court**
52 Obery St., Plymouth, MA

Project No.: **20-547** **Project Date:** **10/30/2020**

MECHANICAL CONTRACTOR
Tighe & Bond

3384

A N.E.B.B. Certified Company

Project:	Plymouth Trial Court		
Address:	52 Obery St., Plymouth, MA		
Date:	10/30/2020	**Project No.**	20-547

CERTIFICATION

Submitted & Certified by:

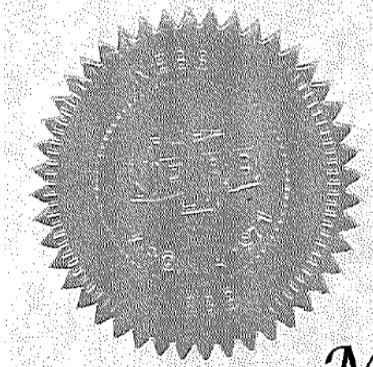
Milharmer Associates, Inc.

Certification No.: ***3384*** Certification Expiration Date: **3-31-21**

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

THIS IS TO CERTIFY THAT

Milharmer Associates, Inc.

HAS MET ALL REQUIREMENTS FOR NEBB CERTIFICATION IN THE FOLLOWING DISCIPLINE

Testing, Adjusting and Balancing of Environmental Systems

FOR THE NEBB BOARD OF DIRECTORS

March 31, 2021

Expiration Date

NEBB President

3384

NEBB Certification Number

NEBB President-Elect

NEBB Certification Board

NEBB Certified Professional

Scott F. Miller

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

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.

March 31, 2021

Expiration Date

23541

NEBB Certificant Number

Richard Farrell

NEBB Certification Board Chairman

Cynthia Heath

NEBB Certification Director

The NEBB Certification Board retains sole ownership of all certificates. The NEBB Certification Board Policy Manual governs use of this certificate.

Project:	Plymouth Trial Court		
Address:	52 Obery St., Plymouth, MA		
Date:	10/30/2020	**Project No.**	20-547

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Address: 52 Obery St., Plymouth, MA
Date: 10/30/2020 **Project No.** 20-547

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 Protection For Motors Located at Starter Motor
AC or ACU	Air Conditioner Unit		
ACCU	Air Cooled Condensing Unit		
ADJ P.D.	Adjusted Pitch Diameter		
AMP	Amperage	HEPA	High Efficiency Particulate Arrestance
AVG	Average		
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 Air Conditioning
CH	Chiller		
CHWR	Chilled Water Return	HWR	Hot Water Return or Heating Water Return
CHW or CHWS	Chilled Water Supply		
CT	Cooling Tower	HWS	Hot Water Supply or Heating Water Supply
CWR	Condenser Water Return		
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:	Plymouth Trial Court		
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Date:	10/30/2020	**Project No.**	20-547

REPORT SUMMARY

The following is the report for Plymouth Trial Court. A survey was performed on AHU-1 through AHU-7 and the toilet exhaust fans. In addition to the airflow testing, we worked with the ATC contractor to calibrate the air flow stations and we have listed deficiencies below that were found during the testing. Testing on the Air Handling Units was performed with the VAV Boxes overridden to the full cooling positions and the Outside Air Damper set to it minimum position. The minimum outside air was set to the new calculated setpoints from Tighe&Bond. The following is a list of deficiencies found during testing along with some recommendations moving forward.

1. AHU-1 Outside Air Flow Station will not calibrate. The flow station is located in a section of ductwork that has a duct transition on both sides of the air flow station resulting in poor flow across the station. Additionally, AHU-1 was tested at 75% of design airflow with the unit running at 60 Hz and all VAV boxes in the full cooling position. A sheave change would be required to increase airflow to design.

2. AHU-3 Outside Air Flow Station will not calibrate after numerous attempts with the controls contractor. Location does not appear to be a problem, further troubleshooting is required by controls or AFS manufacturer.

3. AHU-6 Outside Air Flow Station will not calibrate after numerous attempts with the controls contractor. Location does not appear to be a problem, further troubleshooting is required by controls or AFS manufacturer.

4. AHU-7 has issues with the Supply and Outside Air Flow stations which would not calibrate with the controls contractor. Location does not appear to be an issue, we recommend further troubleshooting by controls and AFS manufacturer.

5. F-1 & F-2 total airflow was measured but the air flow stations will not calibrate with controls contractor and further troubleshooting is required.

6. F-9 is running at 17% below design airflow while the motor is at nameplate amps.

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Overall, the HVAC equipment appears to be running at design or capable of achieving design airflow throughout the facility. Based on the operating points at design, all Air Handling Units appear to have sufficient capacity to increase the filter efficiency to MERV 13/14. It is recommended that all inoperable airflow stations be investigated by the ATC contractor and a manufacturers representative as we were unable to calibrate the flow stations using industry standard procedures.

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REPORT SUMMARY

AIR HANDLING UNITS

UNIT	SUPPLY	RETURN	OUTSIDE AIR
AHU-1	30,413 CFM		
AHU-2	25,421 CFM	12,710 CFM	12, 711 CFM
AHU-3	31,383 CFM	23,990 CFM	7,393 CFM
AHU-4	33,679 CFM	13,022 CFM	20,660 CFM
AHU-5	7,450 CFM	7,450 CFM	NA
AHU-6	13,139 CFM	10,225 CFM	2,914 CFM
AHU-7	8,685 CFM	6,237 CFM	2,448 CFM

EXHAUST FANS

UNIT	EXHAUST
F-29	6,642 CFM
F-33	10,975 CFM
F-6	6,030 CFM
F-9	1,966 CFM
F-14	2.271 CFM
F-17	3.892 CFM

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FAN DATA SHEET

	FAN NO. AHU-1		FAN NO. AHU-2	
Serves / Location:		Mech Room		Mech Room
Manufacturer:	McQuay		McQuay	
Model Number:	CAH080GDAC		CAH050GDAC	
Size:	NL		NL	
Serial Number:	FBOU060500874		FBOU060500876	
MOTOR	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Manufacturer:	NL	CENTURY	NL	BALDOR
Frame Number:	NL	365T	NL	324T
Horsepower:	NL	75	NL	40
Brake Horsepower:	NL	NA	NL	NA
Safety Factor:	NL	1.15	NL	1.15
Volts/Phase:	460/3	477	460/3	477
Motor Amperage:	87	49.2	46	24.7
Motor RPM:	1785	1788	1775	1398
Speeds:	VFD	60Hz	VFD	46.9
Heater Size:	NL	IA	NL	IA
Heater Amps.:	NL	IA	NL	IA
FAN	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Supply Air CFM:	40500	30413	24750	25421
Return Air CFM:	16900		12550	12710
Exhaust Air CFM:				
Outside Air CFM:	21600	*1	12200	12711
Suction Pressure:	NL	-1.87	NL	-1.57
Discharge Pressure:	NL	1.5	NL	1.21
Fan Static Pressure:	NL	3.37	NL	2.78
External Pressure:	NL	NA	NL	NA
RPM	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Fan RPM:	NL		NL	
Motor Drive:	NL	4B5V86	NL	3B5V90
Motor Size/Bore:	NL	B2 3/8	NL	B2 1/8
Fan Drive:	NL	4B5V124	NL	3TB110
Fan Size/Bore:	NL	B2 7/16	NL	Q1 2 11/16
Belt Size / Number:	NL	5VX900/4	NL	BX70/3
Shafts C-C:	NL	28"	NL	26 1/4
Turns Open:	NL	FIXED	NL	FIXED

Comments: ***1 OSA measuring station is not working, minimum outside air cannot be set up.**

Project:	Plymouth Trial Court		
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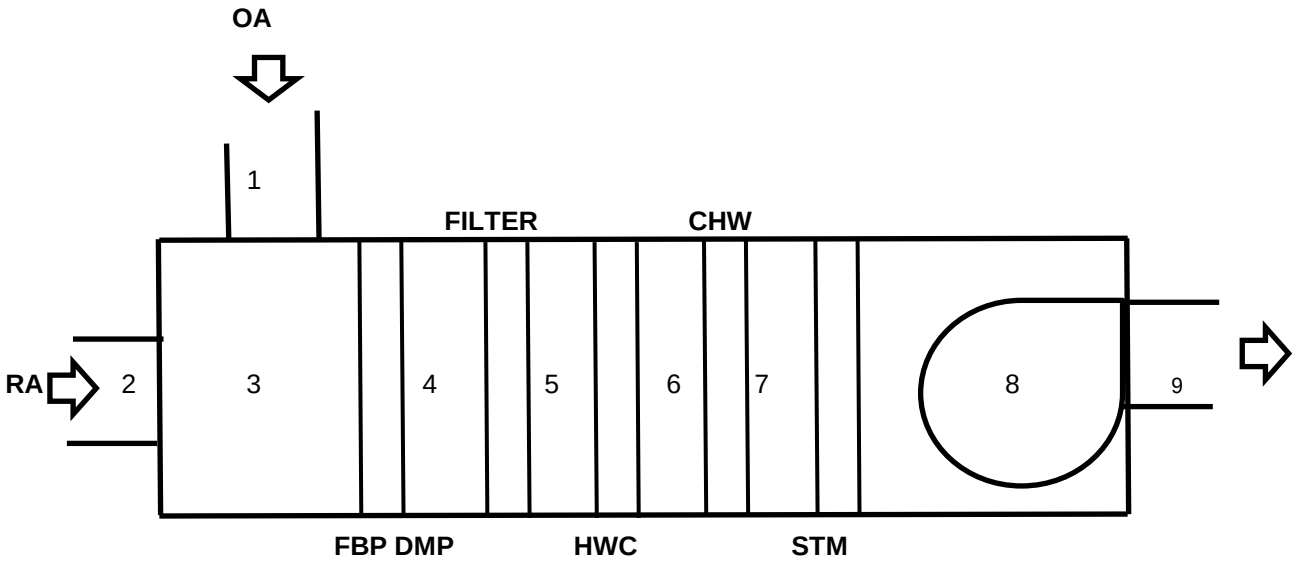
AHU-1 STATIC PROFILE



LOCATION	STATIC
1	-.11"
2	-.12"
3	-.48"
4	-.67"
5	-91"
6	-1.29"
7	-1.81"
8	-1.87"
9	+1.5"

** Pressures measured with Face and By-Pass 100% open to coils and unit at 60 Hz.

Project:	Plymouth Trial Court		
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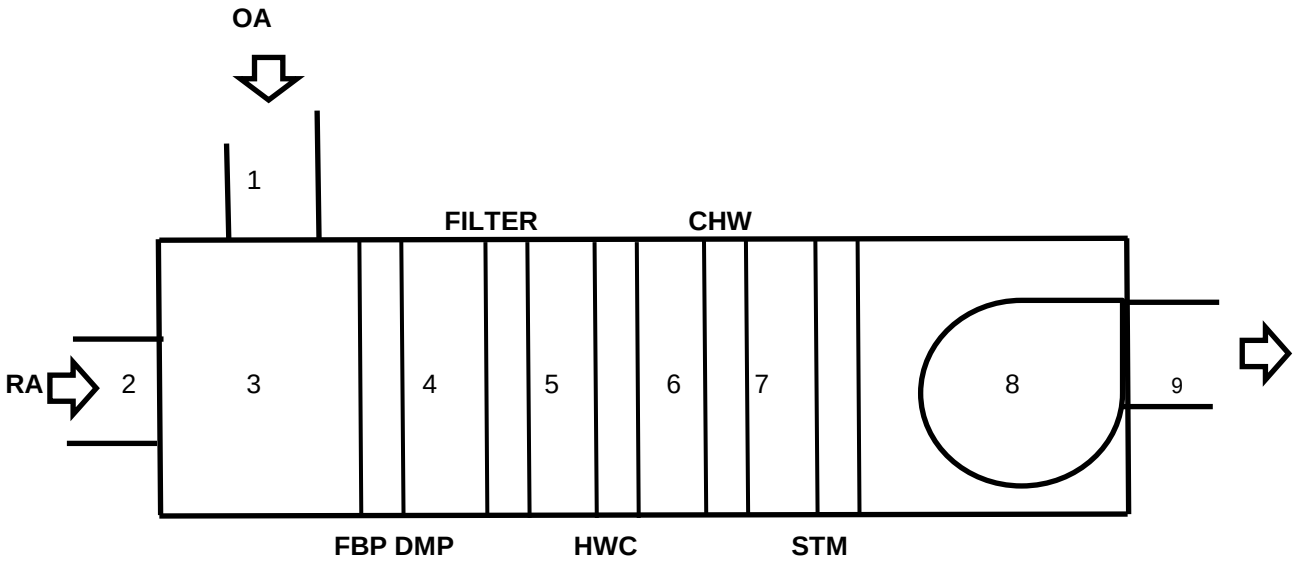
AHU-2 STATIC PROFILE



LOCATION	STATIC
1	-.14"
2	-.19"
3	-.42"
4	-.59"
5	-84"
6	-1.21"
7	-1.55"
8	-1.57"
9	+1.21"

** Pressures measured with Face and By-Pass 100% open to coils and unit at 46.9 hz.

Project: Plymouth Trial Court
Address: 52 Obery St., Plymouth, MA
Date: 10/30/2020 **Project No.** 20-547

TRAVERSE DATA

SYSTEM: AHU-1 TRAVERSE NUMBER : T1
Supply TRAVERSE LOCATION: Supply Duct

DUCT SIZE (ROUND)		" DIAMETER			Sq Ft =	0.00
DUCT SIZE (RECT.)	132	" WIDTH x	52	" DEPTH	Sq Ft =	47.67

AIR DENSITY DATA

STATIC PRESS @ CL:	1.87	InWg.	DESIGN CFM =	40500
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	30413
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**30570**

AIR DENSITY RATIO CORRECTION = 1.01
SCFM CORRECTION FACTOR 1.01
ACTUAL DENSITY 0.075

TEST HOLE	1	2	3	4	5	6	7
A	687	694	715	781	737	710	707
B	634	665	653	673	681	674	691
C	630	648	633	614	638	637	685
D	681	615	557	533	529	481	475
E							
F							
G							
H							
I							

NO. OF READINGS = 40 AVERAGE FPM = 638

J	639	474	518				
K	633	681	412				
L	753	713	355				
M	659	938	688				
N							
O							
P							
Q							
R							

TECHNICIAN: David Burns

Project: Plymouth Trial Court
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TRAVERSE DATA

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

DUCT SIZE (ROUND)		" DIAMETER			Sq Ft =	0.00
DUCT SIZE (RECT.)	116	" WIDTH x	26	" DEPTH	Sq Ft =	20.94

AIR DENSITY DATA

STATIC PRESS @ CL:	-0.86	InWg.	DESIGN CFM =	24700
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	25461
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**25421**

AIR DENSITY RATIO CORRECTION = 1.00 Supply Fan FMS = 1.89
SCFM CORRECTION FACTOR 1.00
ACTUAL DENSITY 0.075

TEST HOLE	1	2	3	4	5	6	7
A	1955	1821	1688	1809	1781	1679	1511
B	1811	1622	1710	1616	1511	1456	1078
C	1376	1096	1057	1316	1074	643	888
D	1200	1418	1086	512	0	0	0
E							
F							
G							
H							
I							

NO. OF READINGS = 40 AVERAGE FPM = 1216

J	1569	1508	1511				
K	1449	1241	1315				
L	759	1271	1278				
M	353	316	1341				
N							
O							
P							
Q							
R							

TECHNICIAN: _____

Project: Plymouth Trial Court
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TRAVERSE DATA

SYSTEM: AHU-2 TRAVERSE NUMBER : T1
Outside Air TRAVERSE LOCATION: OSA

DUCT SIZE (ROUND)		" DIAMETER			Sq Ft =	0.00
DUCT SIZE (RECT.)	116	" WIDTH x	26	" DEPTH	Sq Ft =	20.94

AIR DENSITY DATA

STATIC PRESS @ CL:	-0.51	InWg.	DESIGN CFM =	12200
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	12724
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**12715**

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	973	929	844	868	926	873	726
B	906	827	889	792	725	699	538
C	674	537	550	671	536	334	453
D	590	693	521	263	0	0	0
E							
F							
G							
H							
I							

NO. OF READINGS = 40 AVERAGE FPM = 608

J	816	709	710				
K	782	608	658				
L	357	689	613				
M	194	183	644				
N							
O							
P							
Q							
R							

TECHNICIAN: _____

Project: Plymouth Trial Court
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FAN DATA SHEET

	FAN NO. AHU-3		FAN NO. AHU-4	
Serves / Location:		Mech Room		Mech Room
Manufacturer:	McQuay		McQuay	
Model Number:	CAH065GDAC		CAC061GBAM	
Size:	NL		NL	
Serial Number:	FBOU060500875		FBOU060500878	
MOTOR	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Manufacturer:	NL	BALDOR	NL	BALDOR
Frame Number:	NL	326T	NL	326T
Horsepower:	NL	50	NL	50
Brake Horsepower:	NL	NA	NL	NA
Safety Factor:	NL	1.15	NL	1.15
Volts/Phase:	460/3	460/3	460/3	460/3
Motor Amperage:	57	43.9	57	37.5
Motor RPM:	1775	1784	1775	1786
Speeds:	VFD	60Hz	VFD	60Hz
Heater Size:	NL	VFD Protected	NL	VFD Protected
Heater Amps.:	NL	VFD Protected	NL	VFD Protected
FAN	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Supply Air CFM:	29000	31383	34700	33679
Return Air CFM:	23580	23990	14050	13022
Exhaust Air CFM:				
Outside Air CFM:	5420	5892 *1	20650	20660
Suction Pressure:	NL	-1.61	NL	-1.4
Discharge Pressure:	NL	2.13	NL	2
Fan Static Pressure:	NL	3.64	NL	3.4
External Pressure:	NL	NA	NL	NA
RPM	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Fan RPM:	NL	NA	NL	NA
Motor Drive:	NL	3B5V90	NL	3B5V74
Motor Size/Bore:	NL	B2 1/8	NL	B2 1/8
Fan Drive:	NL	3B5V124	NL	3B5V90
Fan Size/Bore:	NL	B2 7/16	NL	B2 7/16
Belt Size / Number:	NL	5VX930/3	NL	5VX840x3
Shafts C-C:	NL	25 1/2	NL	26"
Turns Open:	NL	FIXED	NL	FIXED

Comments: ***1 Outside air flow station not reading properly.**

Project:	Plymouth Trial Court		
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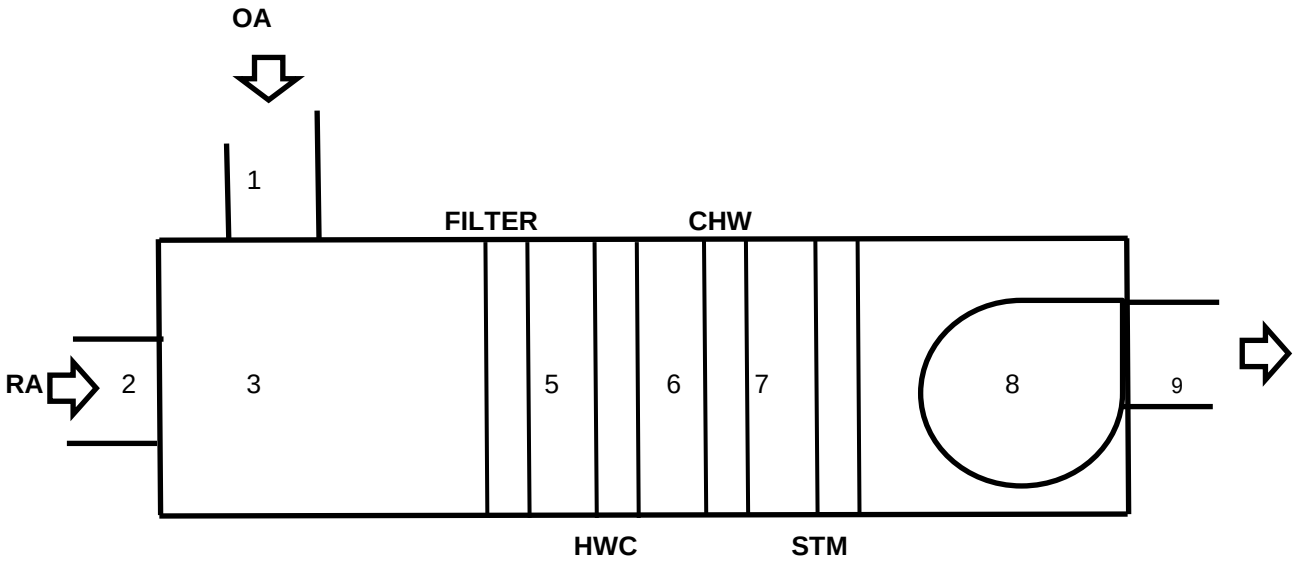
AHU-3 STATIC PROFILE



LOCATION	STATIC
1	-.14"
2	-.19"
3	-.49"
5	-.78"
6	-1.09"
7	-1.55"
8	-1.61"
9	+2.13"

** Pressures measured with unit at 60 hz.

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TRAVERSE DATA

SYSTEM: AHU-3 TRAVERSE NUMBER : T1
Supply TRAVERSE LOCATION: Mech Room

DUCT SIZE (ROUND)		" DIAMETER			Sq Ft =	0.00
DUCT SIZE (RECT.)	66	" WIDTH x	36	" DEPTH	Sq Ft =	16.50

AIR DENSITY DATA

STATIC PRESS @ CL:	2.13	InWg.	DESIGN CFM =	29000
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	31383
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**31565**

AIR DENSITY RATIO CORRECTION = 1.01
SCFM CORRECTION FACTOR 1.01
ACTUAL DENSITY 0.075

TEST HOLE	1	2	3	4	5	6	7
A	1868	2025	2025	2028	1910	2033	2253
B	2325	2372	2293	2055	1529	2035	2196
C	2309	2348	2229	2128	1788	1829	2021
D	2039	2162	2178	2104	1875	1575	1842
E	1731	1720	1998	2014	1868	1468	1644
F	1566	1524	1931	1780	1706	1251	1457
G							
H							
I							

NO. OF READINGS = 66 AVERAGE FPM = 1902

J	2069	2197	2266	2144			
K	2171	2196	2199	1988			
L	2037	2038	1910	1641			
M	1926	1977	1867	1565			
N	1787	1889	1621	1411			
O	1258	1471	1554	1333			
P							
Q							
R							

TECHNICIAN: David Burns

Project: Plymouth Trial Court
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TRAVERSE DATA

SYSTEM: AHU-3 TRAVERSE NUMBER : T1
Return TRAVERSE LOCATION: Mech Room

DUCT SIZE (ROUND)		" DIAMETER			Sq Ft =	0.00
DUCT SIZE (RECT.)	122	" WIDTH x	34	" DEPTH	Sq Ft =	28.81

AIR DENSITY DATA

STATIC PRESS @ CL:	NA	InWg.	DESIGN CFM =	23580
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	23996
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**24010**

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	871	855	896	878	841	906	
B	739	781	852	847	833	872	
C	723	766	916	938	867	901	
D	715	762	743	822	848	821	
E							
F							
G							
H							
I							

NO. OF READINGS = 24 AVERAGE FPM = 833

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: David Burns

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TRAVERSE DATA

SYSTEM: AHU-4 TRAVERSE NUMBER : T1
Supply TRAVERSE LOCATION: Supply

DUCT SIZE (ROUND)		" DIAMETER			Sq Ft =	0.00
DUCT SIZE (RECT.)	53	" WIDTH x	40	" DEPTH	Sq Ft =	14.72

AIR DENSITY DATA

STATIC PRESS @ CL:	1.4	InWg.	DESIGN CFM =	34700
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	33679
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**33814**

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	1873	2341	2147	2274	2298	2478	2394
B	1476	2323	2139	2277	2374	2516	2427
C	1483	2376	2335	2292	2353	2452	2691
D	1512	2284	2319	2317	2339	2431	2525
E							
F							
G							
H							
I							

NO. OF READINGS = 32 AVERAGE FPM = 2288

J	2073						
K	2444						
L	2836						
M	2821						
N							
O							
P							
Q							
R							

TECHNICIAN: David Burns

Project: Plymouth Trial Court
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TRAVERSE DATA

SYSTEM: AHU-4 TRAVERSE NUMBER : T1
Return TRAVERSE LOCATION: Return Inlet

DUCT SIZE (ROUND)		" DIAMETER			Sq Ft =	0.00
DUCT SIZE (RECT.)	122	" WIDTH x	28	" DEPTH	Sq Ft =	23.72

AIR DENSITY DATA

STATIC PRESS @ CL:	NA	InWg.	DESIGN CFM =	14050
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	13022
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**13030**

AIR DENSITY RATIO CORRECTION = 1.00 AFMS = 1.32
SCFM CORRECTION FACTOR 1.00
ACTUAL DENSITY 0.075

TEST HOLE	1	2	3	4	5	6	7
A	595	611	616	621	550	513	
B	538	632	671	606	546	521	
C	555	567	576	574	533	527	
D	634	536	229	451	481	493	
E							
F							
G							
H							
I							

NO. OF READINGS = 24 AVERAGE FPM = 549

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: David Burns

Project: Plymouth Trial Court
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TRAVERSE DATA

SYSTEM: AHU-4 TRAVERSE NUMBER : T1
Outside Air TRAVERSE LOCATION: OSA Intake

DUCT SIZE (ROUND)		" DIAMETER			Sq Ft =	0.00
DUCT SIZE (RECT.)	122	" WIDTH x	28	" DEPTH	Sq Ft =	23.72

AIR DENSITY DATA

STATIC PRESS @ CL:	NA	InWg.	DESIGN CFM =	20650
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	20660
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**20672**

AIR DENSITY RATIO CORRECTION = 1.00 AFMS = 1.24
SCFM CORRECTION FACTOR 1.00
ACTUAL DENSITY 0.075

TEST HOLE	1	2	3	4	5	6	7
A	1017	1063	1040	1042	1062	1073	
B	911	934	925	939	963	1009	
C	828	871	804	816	868	845	
D	515	686	773	635	691	586	
E							
F							
G							
H							
I							

NO. OF READINGS = 24 AVERAGE FPM = 871

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: David Burns

Project: Plymouth Trial Court
Address: 52 Obery St., Plymouth, MA
Date: 10/30/2020 **Project No.** 20-547

FAN DATA SHEET

	FAN NO. AHU-5		FAN NO. AHU-6	
Serves / Location:	Vestibule	Mech Mezz.	BSMT Library	Mech Rm. 006
Manufacturer:	McQuay		McQuay	
Model Number:	CAH014GDAC		CAH030GDAC	
Size:	NL		NL	
Serial Number:	FBOU060500660		FBOU0500656	
MOTOR	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Manufacturer:	NL	BALDOR	NL	BALDOR
Frame Number:	NL	215T	NL	256T
Horsepower:	NL	10	NL	20
Brake Horsepower:	NL	NA	NL	NA
Safety Factor:	NL	1.15	NL	1.15
Volts/Phase:	460/3	460/3	460/3	460/3
Motor Amperage:	12	11.6	24	15
Motor RPM:	1770	1774	1765	1451
Speeds:	VFD	100%	VFD	49Hz
Heater Size:	NL	VFD Protected	NL	VFD Protected
Heater Amps.:	NL	VFD Protected	NL	VFD Protected
FAN	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Supply Air CFM:	7500	7450	13000	13139
Return Air CFM:	7500	7450	10200	10225
Exhaust Air CFM:				
Outside Air CFM:	*1		2800	2914 *2
Suction Pressure:	NL	-0.84	NL	-0.96
Discharge Pressure:	NL	0.53	NL	1.12
Fan Static Pressure:	NL	NA	NL	NA
External Pressure:	NL	1.37	NL	2.08
RPM	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Fan RPM:	NL	NA	NL	NA
Motor Drive:	NL	3BK50H	NL	3B5V67
Motor Size/Bore:	NL	H1 3/8 - 5/16	NL	B1 5/8
Fan Drive:	NL	3B5V62	NL	3B5V60
Fan Size/Bore:	NL	B1 15/16	NL	B1 3/16
Belt Size / Number:	NL	B41x3	NL	BX46x3
Shafts C-C:	NL	13"	NL	16"
Turns Open:	NL	FIXED	NL	FIXED

Comments: ***1 Uit does not have outside air.**

***2 OSAD 20%, rad @ 100%.**

Project:	Plymouth Trial Court		
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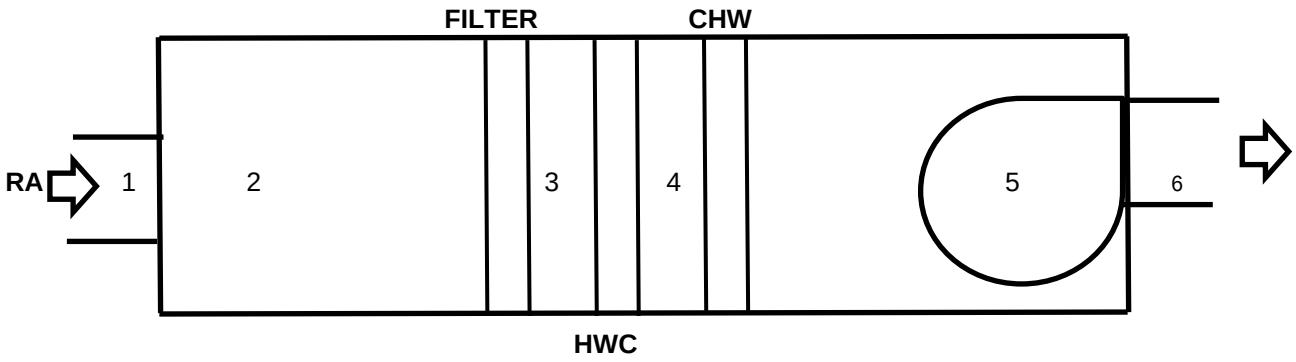
AHU-5 STATIC PROFILE



LOCATION	STATIC
1	-.16"
2	-.20"
3	-.36"
4	-.52"
5	-.84"
6	+.53"

Project:	Plymouth Trial Court		
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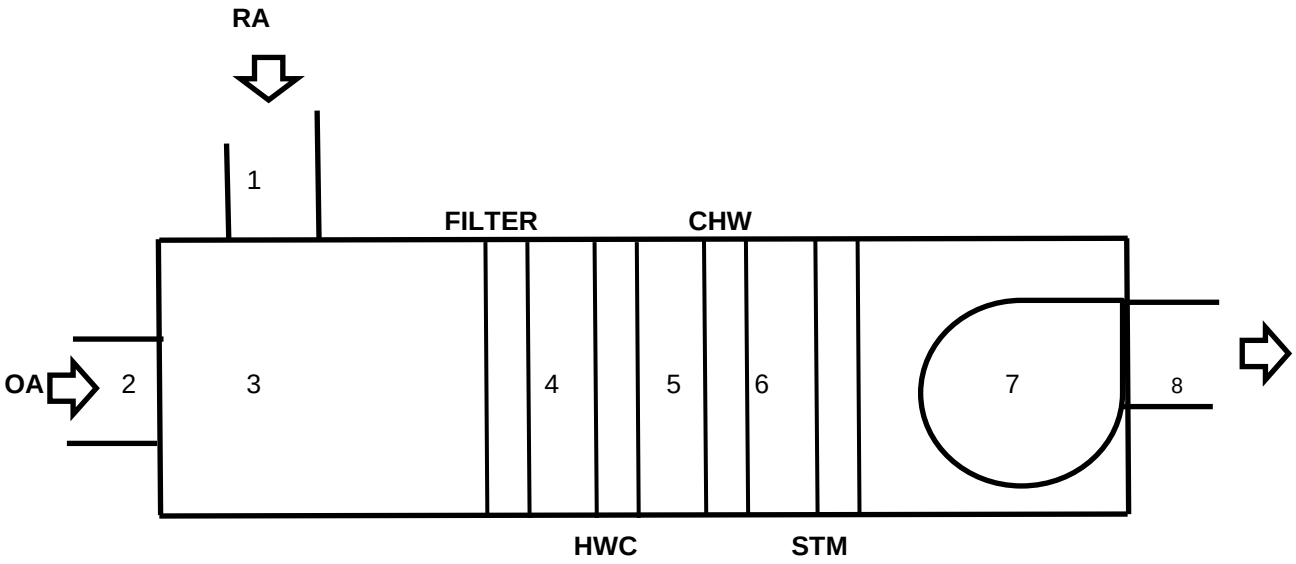
AHU-6 STATIC PROFILE



LOCATION	STATIC
1	-.14"
2	-.18"
3	-.37"
4	-.54"
5	-.69"
6	-.92"
7	-.96"
8	+1.12"

** Pressures measured with unit at 49 Hz.

Project: Plymouth Trial Court
Address: 52 Obery St., Plymouth, MA
Date: 10/30/2020 **Project No.** 20-547

TRAVERSE DATA

SYSTEM: AHU-5 TRAVERSE NUMBER : T1
Supply TRAVERSE LOCATION: Mech. Rm / Unit Return

DUCT SIZE (ROUND)		" DIAMETER			Sq Ft =	0.00
DUCT SIZE (RECT.)	42	" WIDTH x	18	" DEPTH	Sq Ft =	5.25

AIR DENSITY DATA

STATIC PRESS @ CL:	1.36	InWg.	DESIGN CFM =	7500
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	7450
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**7479**

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	1459	1561	1567	1107	1287	1047	772
B	1724	1754	1757	1724	1811	1050	826
C	1752	1923	1664	1711	1851	1383	813
D	1097	1648	1375	1321	1530	1475	758
E							
F							
G							
H							
I							

NO. OF READINGS = 28 AVERAGE FPM = 1419

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: David Burns

Project: Plymouth Trial Court
Address: 52 Obery St., Plymouth, MA
Date: 10/30/2020 **Project No.** 20-547

TRAVERSE DATA

SYSTEM: AHU-6 TRAVERSE NUMBER : T1
Supply TRAVERSE LOCATION: Unit

DUCT SIZE (ROUND)		" DIAMETER			Sq Ft =	0.00
DUCT SIZE (RECT.)	94	" WIDTH x	55	" DEPTH	Sq Ft =	35.90

AIR DENSITY DATA

STATIC PRESS @ CL:	NA	InWg.	DESIGN CFM =	13000
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	13139
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**13147**

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	274	401	426	474	316	386	378
B	288	414	431	455	322	364	326
C	291	410	401	455	323	371	333
D	283	307	399	433	304	363	308
E							
F							
G							
H							
I							

NO. OF READINGS = 28 AVERAGE FPM = 366

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: David Burns

Project: Plymouth Trial Court
Address: 52 Obery St., Plymouth, MA
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TRAVERSE DATA

SYSTEM: AHU-6 TRAVERSE NUMBER : T1
Return TRAVERSE LOCATION: Mech. Room

DUCT SIZE (ROUND)		" DIAMETER			Sq Ft =	0.00
DUCT SIZE (RECT.)	60	" WIDTH x	30	" DEPTH	Sq Ft =	12.50

AIR DENSITY DATA

STATIC PRESS @ CL:	-0.02	InWg.	DESIGN CFM =	10200
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	10225
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**10231**

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	860	1041	1004	977	818	368	
B	868	1027	1006	908	822	355	
C	857	1031	1018	909	817	246	
D	914	1085	1003	784	804	216	
E	1017	1005	1001	782	794	204	
F							
G							
H							
I							

NO. OF READINGS = 30 AVERAGE FPM = 818

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: David Burns

Project: Plymouth Trial Court
Address: 52 Obery St., Plymouth, MA
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TRAVERSE DATA

SYSTEM: AHU-6 TRAVERSE NUMBER : T1
Outside Air TRAVERSE LOCATION: OSA Intake

DUCT SIZE (ROUND)		" DIAMETER			Sq Ft =	0.00
DUCT SIZE (RECT.)	83	" WIDTH x	24	" DEPTH	Sq Ft =	13.83

AIR DENSITY DATA

STATIC PRESS @ CL:	NA	InWg.	DESIGN CFM =	2800
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	2918
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**2920**

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	214	217	224	226	219	228	
B	222	233	225	227	207	215	
C	206	210	219	225	204	211	
D	194	193	178	164	209	197	
E							
F							
G							
H							
I							

NO. OF READINGS = 24 AVERAGE FPM = 211

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: David Burns

Project: Plymouth Trial Court
Address: 52 Obery St., Plymouth, MA
Date: 10/30/2020 **Project No.** 20-547

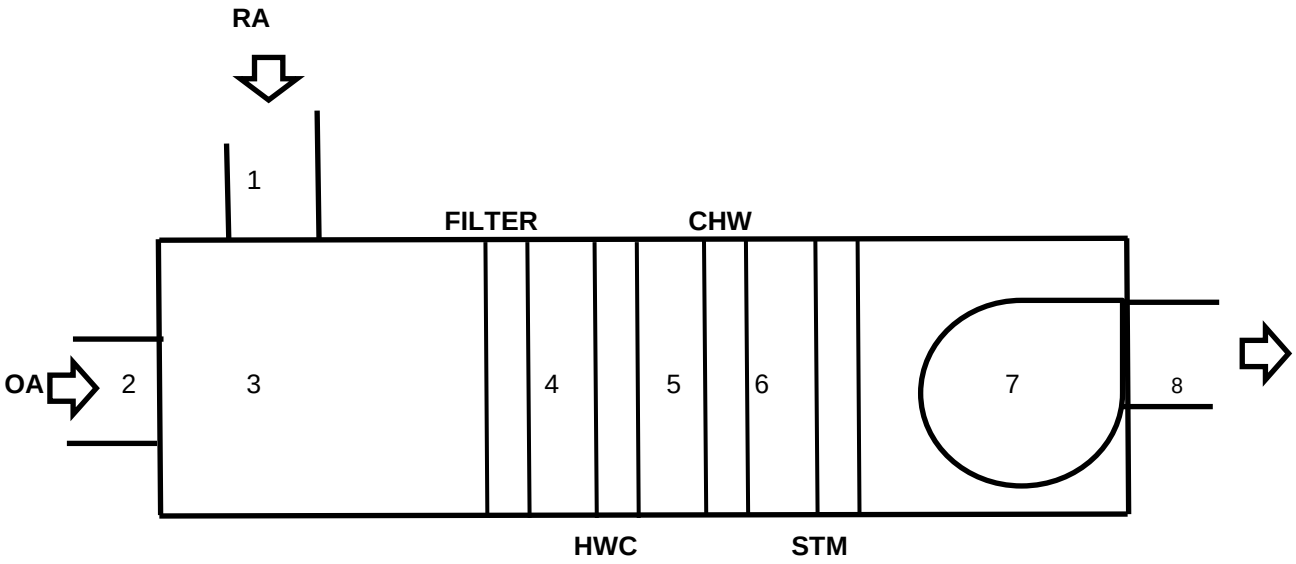
FAN DATA SHEET

	FAN NO.	AHU-7	FAN NO.	
Serves / Location:	Third Fl Library	Mech Mezz.		
Manufacturer:	McQuay			
Model Number:	CAH017GDAC			
Size:	NL			
Serial Number:	FBOU060500655			
MOTOR	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Manufacturer:	NL	BALDOR		
Frame Number:	NL	215T		
Horsepower:	NL	10		
Brake Horsepower:	NL	NA		
Safety Factor:	NL	1.15		
Volts/Phase:	460/3	460/3		
Motor Amperage:	12.5	9.6		
Motor RPM:	1770	1419		
Speeds:	VFD	48Hz		
Heater Size:	NL	VFD Protected		
Heater Amps.:	NL	VFD Protected		
FAN	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Supply Air CFM:	8200	8685		
Return Air CFM:	6020	6237		
Exhaust Air CFM:				
Outside Air CFM:	2180	2448		
Suction Pressure:	NL	-1.1		
Discharge Pressure:	NL	0.68		
Fan Static Pressure:	NL	NA		
External Pressure:	NL	1.78		
RPM	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Fan RPM:	NL	NA		
Motor Drive:	NL	3BK50H		
Motor Size/Bore:	NL	H1 3/8 - 5/16		
Fan Drive:	NL	2B5V64		
Fan Size/Bore:	NL	B1 15/16		
Belt Size / Number:	NL	B41x3		
Shafts C-C:	NL	13"		
Turns Open:	NL	FIXED		

Comments:

Project:	Plymouth Trial Court		
Address:	52 Obery St., Plymouth, MA		
Date:	10/30/2020	**Project No.**	20-547

AHU-6 STATIC PROFILE



LOCATION	STATIC
1	-.12"
2	-.10"
3	-.20"
4	-.39"
5	-.59"
6	-.94"
7	-1.1"
8	+.68""

** Pressures measured with unit at 48 Hz.

Project: Plymouth Trial Court
Address: 52 Obery St., Plymouth, MA
Date: 10/30/2020 **Project No.** 20-547

TRAVERSE DATA

SYSTEM: AHU-7 TRAVERSE NUMBER : T1
Supply TRAVERSE LOCATION: Mech. Rm.

DUCT SIZE (ROUND)		" DIAMETER			Sq Ft =	0.00
DUCT SIZE (RECT.)	30	" WIDTH x	24	" DEPTH	Sq Ft =	5.00

AIR DENSITY DATA

STATIC PRESS @ CL:	0.68	InWg.	DESIGN CFM =	8200
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	8685
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**8704**

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	1331	2220	2275	2436	2527		
B	1447	1210	2229	2161	2152		
C	1529	781	1026	2161	2306		
D	698	616	1069	2132	2425		
E							
F							
G							
H							
I							

NO. OF READINGS = 20 AVERAGE FPM = 1737

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: David Burns

Project: Plymouth Trial Court
Address: 52 Obery St., Plymouth, MA
Date: 10/30/2020 **Project No.** 20-547

TRAVERSE DATA

SYSTEM: AHU-7 TRAVERSE NUMBER : T1
Return F-29 Traverse 1 TRAVERSE LOCATION: Unit return

DUCT SIZE (ROUND)		" DIAMETER			Sq Ft =	0.00
DUCT SIZE (RECT.)	36	" WIDTH x	36	" DEPTH	Sq Ft =	9.00

AIR DENSITY DATA

STATIC PRESS @ CL:	0.05	InWg.	DESIGN CFM =	6020
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	6237
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**6241**

AIR DENSITY RATIO CORRECTION = 1.00 Return AFMS Cal = 4.06
SCFM CORRECTION FACTOR 1.00
ACTUAL DENSITY 0.075

TEST HOLE	1	2	3	4	5	6	7
A	850	838	667	671	672	686	
B	710	843	658	636	655	693	
C	690	789	669	627	678	712	
D	670	711	663	633	683	644	
E	864	747	655	655	674	620	
F	758	778	644	623	606	585	
G							
H							
I							

NO. OF READINGS = 36 AVERAGE FPM = 693

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: David Burns

Project: Plymouth Trial Court
Address: 52 Obery St., Plymouth, MA
Date: 10/30/2020 **Project No.** 20-547

TRAVERSE DATA

SYSTEM: AHU-7 TRAVERSE NUMBER : T1
Outside Air 20% TRAVERSE LOCATION: OSA Intake

DUCT SIZE (ROUND)		" DIAMETER			Sq Ft =	0.00
DUCT SIZE (RECT.)	76	" WIDTH x	42	" DEPTH	Sq Ft =	22.17

AIR DENSITY DATA

STATIC PRESS @ CL:	NA	InWg.	DESIGN CFM =	2180
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	2448
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**2449**

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	131	114	83				
B	127	110	96				
C	107	109	109				
D	115	117	78				
E							
F							
G							
H							
I							

NO. OF READINGS = 12 AVERAGE FPM = 110

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: David Burns

Project: Plymouth Trial Court
Address: 52 Obery St., Plymouth, MA
Date: 10/30/2020 **Project No.** 20-547

FAN DATA SHEET

	FAN NO. F-29		FAN NO. F-33	
Serves / Location:	AHU-7 Return	Mech Space	AHU-6	Boiler Room
Manufacturer:	COOK		COOK	
Model Number:	225 TCNH		270 SQ1	
Size:	NL		NL	
Serial Number:	010S8862646/00/0002101		010S917717-00/0000701	
MOTOR	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Manufacturer:	NL	BALDOR	NL	BALDOR
Frame Number:	NL	113T	NL	184T
Horsepower:	NL	7.5	NL	5
Brake Horsepower:	NL	NA	NL	NA
Safety Factor:	NL	1.15	NL	1.15
Volts/Phase:	460/3	460/3	460/3	460/3
Motor Amperage:	9.7	6.1	6.6	6
Motor RPM:	1770	1785	1750	1755
Speeds:	VFD	60Hz	VFD	60Hz
Heater Size:	NL	VFD Protected	NL	VFD Protected
Heater Amps.:	NL	VFD Protected	NL	VFD Protected
FAN	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Supply Air CFM:				
Return Air CFM:				
Exhaust Air CFM:	7380	6642	11500	10975
Outside Air CFM:				
Suction Pressure:	NL		NL	-1.25
Discharge Pressure:	NL		NL	0.02
Fan Static Pressure:	NL		NL	NA
External Pressure:	NL		NL	1.27
RPM	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Fan RPM:	NL	INLINE	NL	INLINE
Motor Drive:	NL	2B54	NL	2VP50
Motor Size/Bore:	NL	1 3/8	NL	
Fan Drive:	NL	INLINE	NL	INLINE
Fan Size/Bore:	NL	INLINE	NL	INLINE
Belt Size / Number:	NL	AX71x2	NL	AX71x2
Shafts C-C:	NL	INLINE	NL	INLINE
Turns Open:	NL	FIXED	NL	FIXED

Comments:

Project: Plymouth Trial Court
Address: 52 Obery St., Plymouth, MA
Date: 10/30/2020 **Project No.** 20-547

TRAVERSE DATA

SYSTEM: F-29 TRAVERSE NUMBER : T1
TRAVERSE LOCATION: Exhaust AFMS

DUCT SIZE (ROUND)		" DIAMETER			Sq Ft =	0.00
DUCT SIZE (RECT.)	36	" WIDTH x	36	" DEPTH	Sq Ft =	9.00

AIR DENSITY DATA

STATIC PRESS @ CL:	0.05	InWg.	DESIGN CFM =	7380
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	6642
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**6647**

AIR DENSITY RATIO CORRECTION = 1.00 Exhaust AFMS Cal = .80
SCFM CORRECTION FACTOR 1.00
ACTUAL DENSITY 0.075

TEST HOLE	1	2	3	4	5	6	7
A	665	834	805	730	848	690	
B	847	860	804	825	821	921	
C	716	772	708	809	715	658	
D	686	682	614	685	592	681	
E	870	768	684	766	724	579	
F	764	783	755	784	754	375	
G							
H							
I							

NO. OF READINGS = 36 AVERAGE FPM = 738

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: David Burns

Project: Plymouth Trial Court
Address: 52 Obery St., Plymouth, MA
Date: 10/30/2020 **Project No.** 20-547

TRAVERSE DATA

SYSTEM: F-33 TRAVERSE NUMBER : T1
TRAVERSE LOCATION: Mech Room

DUCT SIZE (ROUND)		" DIAMETER			Sq Ft =	0.00
DUCT SIZE (RECT.)	60	" WIDTH x	30	" DEPTH	Sq Ft =	12.50

AIR DENSITY DATA

STATIC PRESS @ CL:	0.02	InWg.	DESIGN CFM =	11500
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	10975
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**10982**

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	856	943	968	739	971	807	548
B	725	1058	1060	784	908	651	831
C	918	1074	1006	798	751	727	736
D	957	1153	976	978	508	467	958
E							
F							
G							
H							
I							

NO. OF READINGS = 32 AVERAGE FPM = 878

J	1011						
K	1172						
L	1056						
M	1004						
N							
O							
P							
Q							
R							

TECHNICIAN: David Burns

Project: Plymouth Trial Court
Address: 52 Obery St., Plymouth, MA
Date: 10/30/2020 **Project No.** 20-547

FAN DATA SHEET

	FAN NO. F-6		FAN NO. F-9	
Serves / Location:	Toilet Exhaust	Mech Space	Toilet Exhaust	Roof
Manufacturer:	COOK		COOK	
Model Number:	225 SQNH		188 ACRUH	
Size:	NL		NL	
Serial Number:	010S882646-01/0018801		010S882646-01/0022701	
MOTOR	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Manufacturer:	NL	BALDOR	NL	BALDOR
Frame Number:	NL	184T	NL	145T
Horsepower:	NL	5	NL	1.5
Brake Horsepower:	NL	NA	NL	NA
Safety Factor:	NL	1.15	NL	1.15
Volts/Phase:	460/3	460/3	460/3	460/3
Motor Amperage:	6.6	6.1	2.2	2
Motor RPM:	1750	1754	1755	1760
Speeds:	NL	1	NL	1
Heater Size:	NL	NA	NL	NA
Heater Amps.:	NL	NA	NL	NA
FAN	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Supply Air CFM:				
Return Air CFM:				
Exhaust Air CFM:	5380	6030	2360	1966
Outside Air CFM:				
Suction Pressure:	NL	-1.5	NL	-1.72
Discharge Pressure:	NL	0.4	NL	0.37
Fan Static Pressure:	NL	NA	NL	NA
External Pressure:	NL	1.54	NL	2.09
RPM	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Fan RPM:	NL	INLINE	NL	
Motor Drive:	NL	2VP44	NL	1VP44
Motor Size/Bore:	NL	7/8	NL	7/8
Fan Drive:	NL	INLINE	NL	AK36
Fan Size/Bore:	NL	INLINE	NL	INLINE
Belt Size / Number:	NL	4L640x2	NL	A23x1
Shafts C-C:	NL	INLINE	NL	6 1/4
Turns Open:	NL	CLOSED 100%	NL	1

Comments:

Project: Plymouth Trial Court
Address: 52 Obery St., Plymouth, MA
Date: 10/30/2020 **Project No.** 20-547

TRAVERSE DATA

SYSTEM: F-6 TRAVERSE NUMBER : T1
TRAVERSE LOCATION: Back Mezz.

DUCT SIZE (ROUND)		" DIAMETER			Sq Ft =	0.00
DUCT SIZE (RECT.)	30	" WIDTH x	18	" DEPTH	Sq Ft =	3.75

AIR DENSITY DATA				
STATIC PRESS @ CL:	-1.5	InWg.	DESIGN CFM =	5380
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	6030
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**6011**

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	1443	1655	1928	1976	1734		
B	1747	1687	1547	1527	1610		
C	1716	1566	1501	1552	1533		
D	1637	1636	1402	1393	1375		
E							
F							
G							
H							
I							

NO. OF READINGS = 20 AVERAGE FPM = 1608

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: David Burns

Project: Plymouth Trial Court
Address: 52 Obery St., Plymouth, MA
Date: 10/30/2020 **Project No.** 20-547

TRAVERSE DATA

SYSTEM: F-9 TRAVERSE NUMBER : T1
TRAVERSE LOCATION: Back Mezz

DUCT SIZE (ROUND)		" DIAMETER		Sq Ft =	0.00
DUCT SIZE (RECT.)	16	" WIDTH x	12 " DEPTH	Sq Ft =	1.33

AIR DENSITY DATA

STATIC PRESS @ CL:	-1.72	InWg.	DESIGN CFM =	2360
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	1966
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**1959**

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	1456	1348	1440	1499			
B	1525	1616	1715	1468			
C	1665	1745	1652	1279			
D	1218	1456	1124	1448			
E							
F							
G							
H							
I							

NO. OF READINGS = 16 AVERAGE FPM = 1478

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: David Burns

Project: Plymouth Trial Court
Address: 52 Obery St., Plymouth, MA
Date: 10/30/2020 **Project No.** 20-547

FAN DATA SHEET

	FAN NO. F-14		FAN NO. F-17	
Serves / Location:	Toilet Exhaust	Mech Space	Toilet Exhaust	Mech Space
Manufacturer:	COOK		COOK	
Model Number:	165 SQNH		180 SQNH	
Size:	NL		NL	
Serial Number:	010S882646-01/0005201		010S882646-01/0008501	
MOTOR	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Manufacturer:	NL	BALDOR	NL	BALDOR
Frame Number:	NL	145T	NL	182T
Horsepower:	NL	1.5	NL	3
Brake Horsepower:	NL	NA	NL	NA
Safety Factor:	NL	1.15	NL	1.15
Volts/Phase:	460/3	460/3	460/3	460/3
Motor Amperage:	2.1	2.1	4	3.6
Motor RPM:	1740	1749	1725	1729
Speeds:	NL	1	NL	1
Heater Size:	NL	NA	NL	NA
Heater Amps.:	NL	NA	NL	NA
FAN	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Supply Air CFM:				
Return Air CFM:				
Exhaust Air CFM:	2400	2271	3720	3892
Outside Air CFM:				
Suction Pressure:	NL	-0.55	NL	-0.72
Discharge Pressure:	NL	0.09	NL	0.18
Fan Static Pressure:	NL	NA	NL	NA
External Pressure:	NL	0.64	NL	0.9
RPM	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Fan RPM:	NL	INLINE	NL	INLINE
Motor Drive:	NL	1VP44	NL	1VL50
Motor Size/Bore:	NL	7/8	NL	1 1/8
Fan Drive:	NL	INLINE	NL	INLINE
Fan Size/Bore:	NL	INLINE	NL	INLINE
Belt Size / Number:	NL	A47x1	NL	AX54x1
Shafts C-C:	NL	INLINE	NL	INLINE
Turns Open:	NL	4	NL	5

Comments:

Project: Plymouth Trial Court
Address: 52 Obery St., Plymouth, MA
Date: 10/30/2020 **Project No.** 20-547

TRAVERSE DATA

SYSTEM: F-14 TRAVERSE NUMBER : T1
TRAVERSE LOCATION: Back Mezz.

DUCT SIZE (ROUND)		" DIAMETER			Sq Ft =	0.00
DUCT SIZE (RECT.)	36	" WIDTH x	12	" DEPTH	Sq Ft =	3.00

AIR DENSITY DATA

STATIC PRESS @ CL:	-0.55	InWg.	DESIGN CFM =	2400
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	2271
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**2269**

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	720	1116	766	845	575	519	
B	833	1177	602	680	614	632	
C	862	837	924	655	664	611	
D							
E							
F							
G							
H							
I							

NO. OF READINGS = 18 AVERAGE FPM = 757

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: David Burns

Project: Plymouth Trial Court
Address: 52 Obery St., Plymouth, MA
Date: 10/30/2020 **Project No.** 20-547

TRAVERSE DATA

SYSTEM: F-17 TRAVERSE NUMBER : T1
TRAVERSE LOCATION: Mech Room

DUCT SIZE (ROUND)		" DIAMETER			Sq Ft =	0.00
DUCT SIZE (RECT.)	36	" WIDTH x	16	" DEPTH	Sq Ft =	4.00

AIR DENSITY DATA

STATIC PRESS @ CL:	-0.72	InWg.	DESIGN CFM =	3720
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	3892
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**3887**

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	441	1000	1013	1022	1173	842	
B	838	1081	1152	1156	1207	829	
C	860	1003	1076	986	1195	1040	
D	747	805	955	930	1100	907	
E							
F							
G							
H							
I							

NO. OF READINGS = 24 AVERAGE FPM = 973

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: David Burns