CHELSEA TRIAL COURT
HVAC SYSTEM EVALUATION SUMMARY

Visited August 18, 2020. While on site, inspected the air handling equipment located in the mechanical rooms and toured the facility to determine if the spaces generally matched usages noted on the architectural plans. The Chelsea Trial Courthouse was constructed in 1999 and is approximately 79,500 square feet in size. Eleven York indoor air handling units (AHU) provide ventilation air to the building. According to the 1996 design drawings, AHU-1 through AHU-5 are constant volume units and serve the Courtrooms, and AHU-6 through AHU-11 serve the remainder of the building and are variable air volume units

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)*
Jury Pool Room	10	810	81	445	44
Courtroom 1	31	3,900	126	2,100	68
Courtroom 2	13	2,100	162	1,150	88
Courtroom 3	14	1,700	121	975	70
Courtroom 4	25	2,878	115	1,600	64
Courtroom 5	21	2,551	121	1,400	67

2.0 Recommendations

Section	Recommendation/Finding	Action
2.1	**Filtration Efficiency**	
RF-1	Replace 2” MERV-8 filters with MERV-13 filters	Complete
2.2	**Testing and Balancing**	
RTB-1	Test and rebalance air handling unit supply air and minimum outside air flow rates	Complete
RTB-2	Rebalance system return air flow rate	Complete
2.3	**Equipment Maintenance and Upgrades**	
RE-1	Test existing air handling system dampers and actuators for proper operation	Complete
RE-2	Clean air handler coils	Complete
RE-7	Test the existing air handler control valves and actuators for proper operation	Complete
2.4	**Control System**	
RC-1	Implement a pre-occupancy flush sequence	Complete
RC-4	Confirm the economizer control sequence is operational	Complete
RC-5	Disable demand control ventilation sequences	Complete
2.5	**Additional Filtration and Air Cleaning**	
RFC-1	Install portable HEPA filters	Complete

2.6	Humidity Control	
	No actionable items listed – continuous monitoring for seasonal changes	On-going
2.7	Other Recommendations	
2.7.1	Replace Pneumatic Damper and Valve Actuators with Electronic Actuators	Complete
2.7.2	Convert Chilled and Hot Water System to Variable Flow Systems	Deferred – included in 5 year capital plan
2.7.3	Replace AHU-2 and AHU-3	Deferred – included in 5 year capital plan

Chelsea District Court
Chelsea, MA

HVAC SYSTEM EVALUATIONS COVID-19

Office of Court Management

June 4, 2021

Tighe&Bond

100% Recyclable

Section 1
Existing Conditions & Site Observations

Tighe & Bond visited the Chelsea District Courthouse on August 18, 2020. While on site we inspected the air handling equipment located in the mechanical rooms and toured the facility to determine if the spaces generally matched usages noted on the architectural plans.

Site Visit Attendees:

- *Office of Court Management:*
  - Jonathan Talley, Courthouse Facilities Staff
- *Tighe & Bond*
  - Jason Urso, PE, Senior Mechanical Engineer
  - Timothy Bill, Staff Engineer

1.1 Existing Ventilation System

The Chelsea District Courthouse was constructed in 1999 and is approximately 79,500 square feet in size. Eleven York indoor air handling units (AHU) provide ventilation air to the building. According to the 1996 design drawings, AHU-1 through AHU-5 are constant volume units and serve the Courtrooms, and AHU-6 through AHU-11 serve the remainder of the building and are variable air volume units. Each unit contains a supply fan, hot water heating coil, chilled water cooling coil, and a 2" MERV 8 filter. AHU-4 and AHU-7 through AHU-11 contain return fans. Air is returned to the remaining air handlers by a separate return fan. Supply air from AHU-6 through AHU-11 is distributed to zones via VAV boxes. Three-way hot and chilled water valves control the supply of hot and chilled water to air handler coils. The presence of three-way valves typically indicates that the hydronic systems are constant volume flow.

The air handlers are approximately 21 years old and most air handlers are in fair or poor condition. Most outdoor air dampers are rusted and in fair or poor condition and all visible coils were dirty. The supply fan motors for AHU-1, AHU-7, AHU-8, AHU-9, and AHU-11 and the return fan motors for AHU-4 and AHU-8 have been replaced The outdoor air dampers appeared to be closed or mostly closed in AHU-2, AHU-3, AHU-4, AHU-7, AHU-8.

Air is supplied to and exhausted from detainee areas. According to the 1996 drawings, slightly more air is exhausted from the cells than supplied, creating a negative pressure inside the cells.

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

TABLE 1
Existing Air Handling Units

Unit	Original Design Airflow (CFM)	Original Design Min. O.A. (CFM)	Filters	Condition
AHU-1	3,900	2,100	MERV 8	Fair
AHU-2	2,878	1,600	MERV 8	Poor
AHU-3	2,551	1,400	MERV 8	Fair/Poor
AHU-4	1,700	960	MERV 8	Good
AHU-5	2,100	1,150	MERV 8	Fair
AHU-6	1,700	930	MERV 8	Fair
AHU-7	7,986	4,300	MERV 8	Fair
AHU-8	8,487	4,600	MERV 8	Fair
AHU-9	8,938	4,900	MERV 8	Good
AHU-10	7,700	4,200	MERV 8	Good
AHU-11	9,500	5,200	MERV 8	Fair

Photo 1 – Representative Air Handler

1.2 Existing Control System

An Automated Logic Building Management System (BMS) was installed in approximately 2015. The air handling units, VAV boxes, finned tube radiation, exhaust fans, hot water boiler plant and chilled water plant are all controlled by the BMS. The control system cycles the air handling units on and off based on an occupancy schedule. Carbon dioxide is monitored in the Courtrooms and the outdoor air dampers in AHU-1 through AHU-5 modulate to maintain a CO_2 setpoint of 800 ppm. The system also monitors the pressure drop across the filters and implements an economizer sequence. The air handling unit dampers and control valves have pneumatic actuators.

The air handling unit damper and hot and chilled water control valve actuators are older, pneumatic style. The piping at several control valves are rusted and piping insulation in the vicinity of the control valves are water stained, indicating the valves or the pipe fittings have leaked in the past.

Section 2
Recommendations

Below is a list of recommendations that we propose for the Chelsea District Courthouse. 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 2" MERV-8 filters with MERV-13 filters.*

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

2.2 Testing & Balancing Recommendations

Air Solutions & Balancing LLC performed air testing and balancing in 2015. It appears the air handlers, return fans, VAV boxes, and all air inlets and outlets throughout the Courthouse were tested. Table 2 describes the air handler airflow rates and Table 3 describes the toilet exhaust and holding cell exhaust fan airflow rates from the TAB report.

TABLE 2
2015 Air Handler Testing & Balancing Results

	Design			Actual		
Unit	Total Supply Fan Airflow (CFM)	Recommended Outdoor Airflow (CFM)	Return Airflow (CFM)	Supply Fan Airflow (CFM)	Outdoor Airflow (CFM)	Return Airflow (CFM)
AHU-1	3,900	2,100	1,800	4,179	0	4,173
AHU-2	2,878	1,600	1,278	2,994	Not Listed	2,085
AHU-3	2,551	1,400	1,151	2,662	Not Listed	2,106
AHU-4	1,700	975	725	1,850	Not Listed	1,650
AHU-5	2,100	1,150	950	2,635	Not Listed	1,874
AHU-6	1,700	930	770	1,562	Not Listed	1,155
AHU-7	7,986	4,300	3,686	6,985	Not Listed	5,820
AHU-8	8,487	4,600	3,887	7,035	Not Listed	8,978
AHU-9	8,938	4,900	4,038	9,152	Not Listed	7,095
AHU-10	7,700	4,200	3,500	7,029	Not Listed	3,646
AHU-11	9,500	5,200	4,300	10,426	Not Listed	10,247

It appears that most air handlers were delivering less outside air than originally designed at the time this TAB exercise was completed. AHU-1 appears to be recirculating almost all air and providing close to no outdoor air. Based on the return air airflow rates documented, AHU-3, AHU-4, and AHU-11 appear to be providing less than the specified outdoor air flow rates. These three units also do not appear to be providing the code minimum outdoor air flow rates, noted in Table 4. AHU-2, AHU-5, AHU-6, AHU-9, and AHU-10 also do not appear to be providing the originally specified outdoor air flow rate, however, they do appear to be providing the code required outdoor air. All air handlers appear to be suppling a total supply airflow within acceptable range of the designed rates, with the exception of AHU-7, and AHU-8.

Table 3 describes the reported exhaust airflow rates from the 2015 TAB report for the exhaust fans serving restrooms and holding areas. EF-6, EF-12, EF-13, and EF-16 are exhausting significantly less than originally specified.

TABLE 3
2015 Exhaust Fan Testing & Balancing Results

Unit	Serving	Original Design Airflow (CFM)	TAB Reported Airflow (CFM)
EF-6	Toilet Room 322	400	70
EF-7	3rd Floor Restrooms	200	210
EF-8	Restrooms	390	354
EF-9	Restrooms	200	275
EF-12	Public West Restrooms	500	191
EF-13	Holding Area 2nd & 3rd Floor	600	329
EF-15	1st Floor Restrooms	875	1,079
EF-16	Holding Cells Basement	2,420	1,924

The 2015 TAB report identifies several issues that may be the cause for the airflow discrepancies for both the air handlers and the exhaust fans. Examples include the outdoor air damper in AHU-1 will not open when commanded by the BMS. Also, many outdoor, return, and exhaust air dampers will only fully open or fully close instead of partially modulating open. Prior to the rebalancing efforts noted below, we recommend further investigation into the possible solutions noted in the 2015 TAB report.

We recommend the following testing and balancing measures be implemented:

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

We recommend testing and balancing the outdoor air flow rates for all air handling units to the recommended minimum O.A. rates listed in Table 4.

TABLE 4
Recommended Air Handler O.A. Flow Rates

Unit	Original Supply Airflow (CFM)	Original Design Min. O.A. (CFM)	Current Code Min. O.A. Requirements (CFM)	Recommended Minimum O.A. (CFM)
AHU-1	3,900	2,100	1,100	**2,100**
AHU-2	2,878	1,600	975	**1,600**
AHU-3	2,551	1,400	875	**1,400**
AHU-4	1,700	960	975	**975**
AHU-5	2,100	1,150	600	**1,150**
AHU-6	1,700	930	200	**930**
AHU-7	7,986	4,300	1,050	**4,300**
AHU-8	8,487	4,600	2,550	**4,600**
AHU-9	8,938	4,900	1,200	**4,900**
AHU-10	7,700	4,200	3,650	**4,200**
AHU-11	9,500	5,200	1,275	**5,200**

The average airflow rate per person is shown below in Table 5. These values are based on the original design supply airflow rate and the recommended outdoor air flow rates shown in Table 4 above. 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 5
Average Airflow Rate per Person

	All spaces	***Courtrooms***	***Non-Courtroom Spaces***
Total Occupancy (People)	715	400	315
Total Supply Air (CFM/Person)	80	33	140
Outdoor Air (CFM/Person)	44	18	76

The airflow rate per person for each Courtroom and the Jury Pool Room is shown below in Table 6. These values are based on full occupancy without taking

diversity into account, the original design supply airflow rate, and the recommended outdoor airflow rate. The airflow rate per person assumes the full supply airflow is being delivered to the room. At times when the supply airflow is reduced due to the space temperature being satisfied, the airflow rate per person will also be reduced.

TABLE 6
Airflow Rate per Person (Full Occupancy)

		Total Air		*Outdoor Air*	
Courtroom	***Total People***	***Supply Airflow (CFM)***	***Airflow Rate (CFM/Person)***	***Outside Airflow (CFM)***	***Airflow Rate (CFM/Person)***
Jury Pool Room	30	810	27	445	15
Courtroom 1	149	3,900	26	2,100	14
Courtroom 2	82	2,100	26	1,150	14
Courtroom 3	88	1,700	19	975	11
Courtroom 4	133	2,878	22	1,600	12
Courtroom 5	119	2,551	21	1,400	12

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

The airflow rate per person for each Courtroom and the Jury Pool Room, based on a reduced occupancy schedule determined by the Office of Court Management, is shown below in Table 6a. 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 6a
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)***
Jury Pool Room	10	810	81	445	44
Courtroom 1	31	3,900	126	2,100	68
Courtroom 2	13	2,100	162	1,150	88
Courtroom 3	14	1,700	121	975	70
Courtroom 4	25	2,878	115	1,600	64
Courtroom 5	21	2,551	121	1,400	67

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

The system return fans should also be tested and balanced.

Further investigation of the VAV box tested airflow rates noted in the 2015 TAB report can identify areas that are not receiving the full design airflow rate.

The 2015 TAB report indicates that the chilled water flow rates for all air handlers are within acceptable range except AHU-9 and AHU-11. The report also suggests that the hot

water flow rates for all air handlers are within acceptable range except AHU-2, AHU-8, AHU-9, and AHU-11. Further investigation is required to determine the cause of chilled and hot water flow to these air handling units.

We do not recommend increasing the outdoor air flow rate beyond the recommended outdoor air flow rates. The originally designed outdoor air flow rates already exceed the code required rates.

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*

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

We presume VAV box controllers were installed as part of the 2015 control system upgrade and are working properly.

2.4 Control System Recommendations

We recommend the following for the control system:

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

RC-4: *Confirm the economizer control sequence is operational.*

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

2.5 Additional Filtration and Air Cleaning

We recommend the installation of the following air cleaning devices:

RFC-1: *Install portable HEPA filters.*

If the Courthouse is to operate at a high capacity (i.e. 50% occupancy or greater), we recommend installing portable HEPA filters in high traffic areas, such as entrance lobbies. They should also be considered for Courtrooms, depending on the occupancy of the room and how much noise is generated from the filters. The noise levels will vary depending on the manufacturer.

2.6 Humidity Control

Installing duct mounted or portable humidifiers can help maintain the relative humidity levels recommended by ASHRAE. The feasibility of using duct mounted humidification or portable humidifiers 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. We are not aware if this building was constructed to handle a humidification system.

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 Replace Pneumatic Damper and Valve Actuators with Electronic Actuators

We recommend replacing pneumatic damper and valve actuators with electronic actuators and tying them into the Building Management System. Pneumatic control is an old and obsolete technology. These systems tend to leak air, may result in poor control of the HVAC equipment, cause the air compressor to run more frequently and increase energy usage. A BMS can monitor the position of electronic valves, trend valve position data, and report alarms.

If the existing pneumatic system can cycle damper and valve actuators and position the valves and dampers in their correct position repeatedly, then immediate replacement is not necessary. If the system cannot cycle the actuators to correct damper or valve positions, this may cause too little or too much outdoor air flow and water flow through the units, affecting the quantity of ventilation air and heating and cooling capacity of the coils.

2.7.2 Convert Chilled and Hot Water Systems to Variable Flow Systems

According to the 2015 BMS as-built drawings and sequences, the hot and chilled water pumps are constant flow systems. Constant flow pumps circulate the same volume of water to air handling units regardless of whether the water is required or not. If air handlers do not require this water, the three-way valves serving the air handler coils bypass the coil and is pumped back to the chiller or boiler plant. We recommend investigating the possibility of converting these systems to variable flow. The three-way air handler valves would have to be replaced with two-way valves, as well as any other three-way valves that are in the system. Variable frequency drives (VFD) may be able to be connected to the existing hot and chilled water pumps, allowing the pumps to vary the flow rate to match the demand. This recommendation is an energy saving measure and does not affect the indoor air quality of the building.

2.7.3 Replace AHU-2 and AHU-3

AHU-2 appears to be in poor condition and AHU-3 is in fair to poor condition. Consider replacing these units within 5 years.

Section 3
Testing & Balancing Results

Milharmer Associates, Inc. visited the Chelsea District Courthouse on April 27, 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 7 and 8. The full testing and balancing report is attached.

TABLE 7
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	3,900	2,100	1,800	4,427	2,316	2,111
AHU-2	2,878	1,600	1,278	3,186	1,637	1,549
AHU-3	2,551	1,400	1,151	2,832	1,428	1,404
AHU-4	1,700	960	740	2,517	960	1,557
AHU-5	2,100	1,150	950	2,276	-	1,847
AHU-6	1,700	930	770	1,501	896	605
AHU-7	7,986	4,300	3,686	8,791	4,208	4,583
AHU-8	8,487	4,600	3,887	8,576	-	-
AHU-9	8,938	4,900	4,038	7,811	4,760	3,951
AHU-10	7,700	4,200	3,500	8,311	4,060	4,251
AHU-11	9,500	5,200	4,300	9,876	5,472	4,404

TABLE 8
Exhaust Fan Testing & Balancing Results

Unit	Serving	Design Return/Exhaust Airflow (CFM)	Actual Return/Exhaust Airflow (CFM)
EF-6	Staff Lounge	400	103
EF-7	Bathroom	200	202
EF-8	Bathroom	390	246
EF-9	Bathroom	200	245
EF-12	Bathroom	500	189
EF-13	2nd/ 3rd Floor Holding	600	279
EF-15	Bathroom	875	903
EF-16	Holding Cells	2,420	2,030

Typical balancing tolerances for air systems is ±10% of the design airflow. In VAV systems, airflow issues may reside in downstream VAV boxes resulting in a total supply airflow reading at the air handler less than the designed value. Further investigation is required to determine the cause of a low airflow reading at the air handling unit.

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

1. AHU-6 and 9 are performing slightly below the acceptable airflow tolerance range.
2. Based on the 1996 design plans provided to Tighe & Bond, AHU-4 is supplying almost 50% more airflow than the original design. The air handler cooling and heating coils may not be able to condition this quantity of supply air properly. Unless the supply airflow rate for AHU-4 was modified after the 1996 design, we recommend balancing the total supply airflow rate back to the original design value.
3. AHU-5 supply fan is operating within the acceptable airflow range, however the outside air damper is not functional and will not open. We recommend the ATC Contractor investigate the issue and repair/replace the damper and/or actuator as required and then retest and balance the outdoor air flow rate.
4. AHU-8 supply fan is operating within the acceptable airflow range, however the outside air damper is not functional and will not open. We recommend the ATC Contractor investigate the issue and repair/replace the damper and/or actuator as required and then retest and balance the outdoor air flow rate.
5. All other air handlers are performing within the acceptable airflow tolerance range.

6. Exhaust fans EF-6,8,12,13, and 16 are not performing within acceptable range. These fans are from the original construction in 1996. According to the TAB report, the supply airflow cannot be adjusted at the fan. We recommend replacing these fans to achieve the design airflow.
7. The chilled and hot water systems were not operating at the time of the visit, therefore coil flow rates could not be tested.

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: **Chelsea Trial Court**
Chelsea, MA

Project No.: **21-012** **Project Date:** **4/27/2021**

MECHANICAL CONTRACTOR

3384

A N.E.B.B. Certified Company

Project:	Chelsea Trial Court		
Address:	Chelsea, MA		
Date:	4/27/2021	**Project No.**	21-012

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

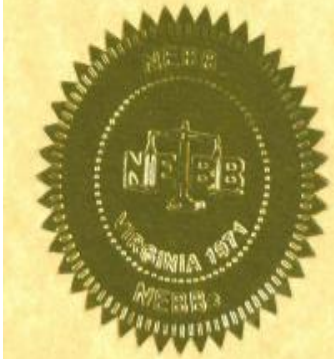
NEBB Certification Number

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

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Project:	Chelsea Trial Court		
Address:	Chelsea, MA		
Date:	4/27/2021	**Project No.**	21-012

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:	Chelsea Trial Court		
Address:	Chelsea, MA		
Date:	4/27/2021	**Project No.**	21-012

REPORT SUMMARY

The following is the report for the Chelsea Trial Court. A survey was performed on AHU-1 thru AHU-11 and the toilet exhaust fans with the following comments:

1. Chilled water was not running during testing.

2. AHU-5 - Outside air damper is binding up and will not open.

3. AHU-8 - Outside air damper will not open and needs to be investigated by the ATC contractor.

4. Toilet exhaust fans have been tested and some are below design with no adjustment as they are direct drive fans.

Project:	Chelsea Trial Court		
Address:	Chelsea, MA		
Date:	4/27/2021	**Project No.**	21-012

REPORT SUMMARY

AIR HANDLING UNITS

UNIT	SUPPLY	RETURN	OUTSIDE AIR
AHU-1	4,427 CFM	2,111 CFM	2,316 CFM
AHU-2	3,186 CFM	1,549 CFM	1,637 CFM
AHU-3	2,832 CFM	1,404 CFM	1,428 CFM
AHU-4	2,517 CFM	1,557 CFM	960 CFM
AHU-5	2,276 CFM	*1	*1
AHU-6	1,501 CFM	605 CFM	896 CFM
AHU-7	8,791 CFM	4,583 CFM	4,208 CFM
AHU-8	8,576 CFM	*1	*1
AHU-9	7,811 CFM	3,951 CFM	4,760 CFM
AHU-10	8,311 CFM	4,251 CFM	4,060 CFM
AHU-11	9,876 CFM	4,404 CFM	5,472 CFM

Project: Chelsea Trial Court
Address: Chelsea, MA
Date: 4/27/2021 **Project No.** 21-012

FAN DATA SHEET

	FAN NO. AHU-1		FAN NO. AHU-2	
Serves / Location:	Court Rm #1 / Basement Mech		Court Rm #4 / Basement Mech	
Manufacturer:	York		York	
Model Number:	APBOFSFC12X12		CSI5OFOFCII10X9	
Size:	NL		NL	
Serial Number:	CNFM-022413		CKGM-024074	
MOTOR	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Manufacturer:	NL	Baldor	NL	Dayton
Frame Number:	NL	184T	NL	184T
Horsepower:	NL	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:	6.6	6.0/6.2/6.2	6.6	5.6/5.7/5.6
Motor RPM:	1750	1765	1750	1765
Speeds:	1	1	1	1
Heater Size:	NL	IA-70	NL	IA-70
Heater Amps.:	NL	NA	NL	NA
FAN	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Supply Air CFM:	3900	4427	2878	3186
Return Air CFM:				
Exhaust Air CFM:				
Outside Air CFM:	2100	2316 *1	1600	1637 *2
Suction Pressure:				
Discharge Pressure:				
Fan Static Pressure:				
External Pressure:				
RPM	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Fan RPM:	NL	NA	NL	NA
Motor Drive:	NL	1VL56	NL	AK46
Motor Size/Bore:	NL	1 1/8"	NL	1"
Fan Drive:	NL	AK58	NL	AK44
Fan Size/Bore:	NL	H 1"	NL	3/4"
Belt Size / Number:	NL	4L600H / 1	NL	AX48 / 1
Shafts C-C:	NL	21"	NL	18"
Turns Open:	NL	1	NL	Fixed

Comments: ***1 Minimum OSA Damper set for 50%**

***2 Minimum OSA Damper set for 30%**

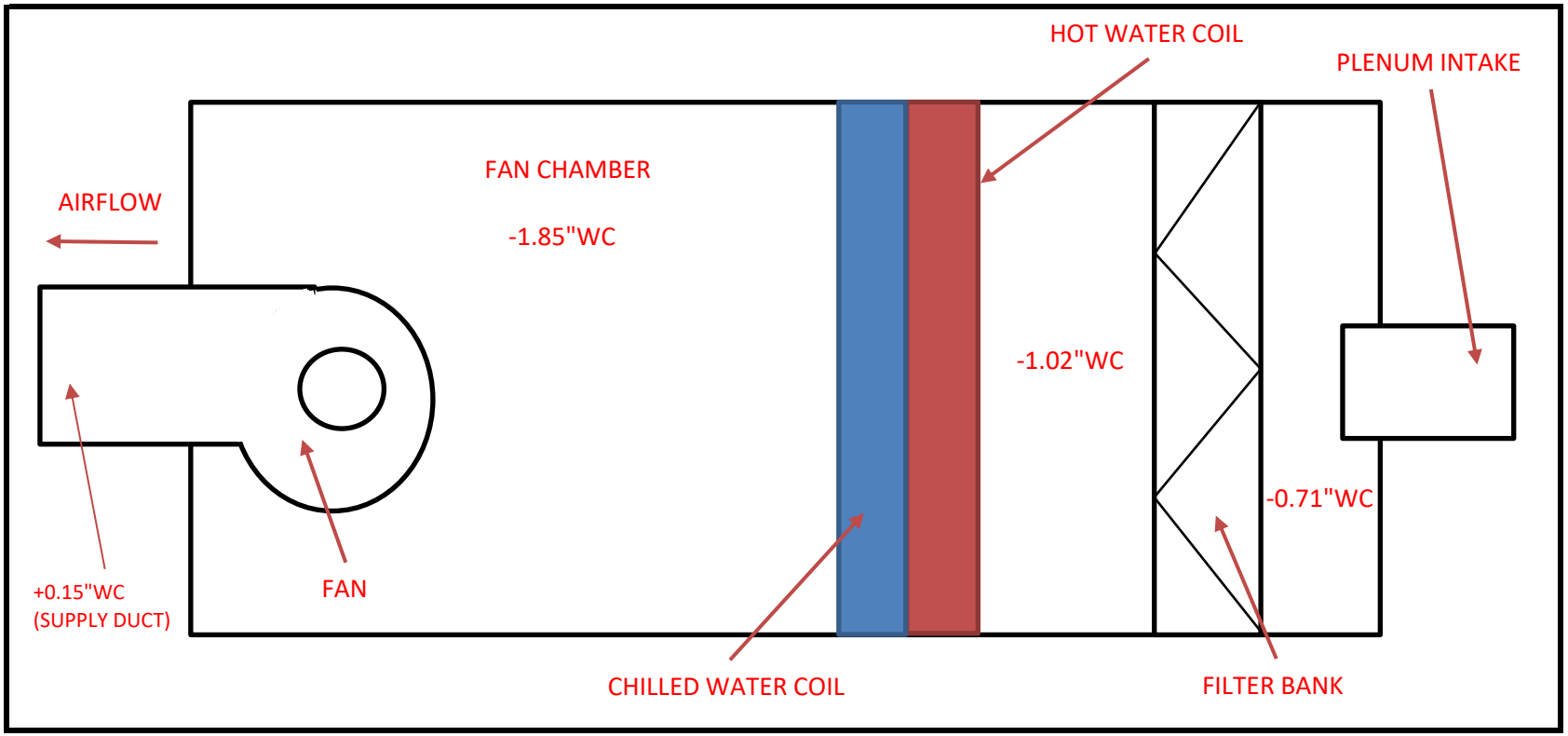
Project: Chelsea Trial Court
Address: Chelsea, MA
Date: 4/27/2021

Project No. **21-012**

STATIC PRESSURE PROFILE

Device: AHU-1

Technician: *G. Miller*



Comments: *FILTERS ARE CONSIDERABLY LOADED
**COILS ARE DIRTY

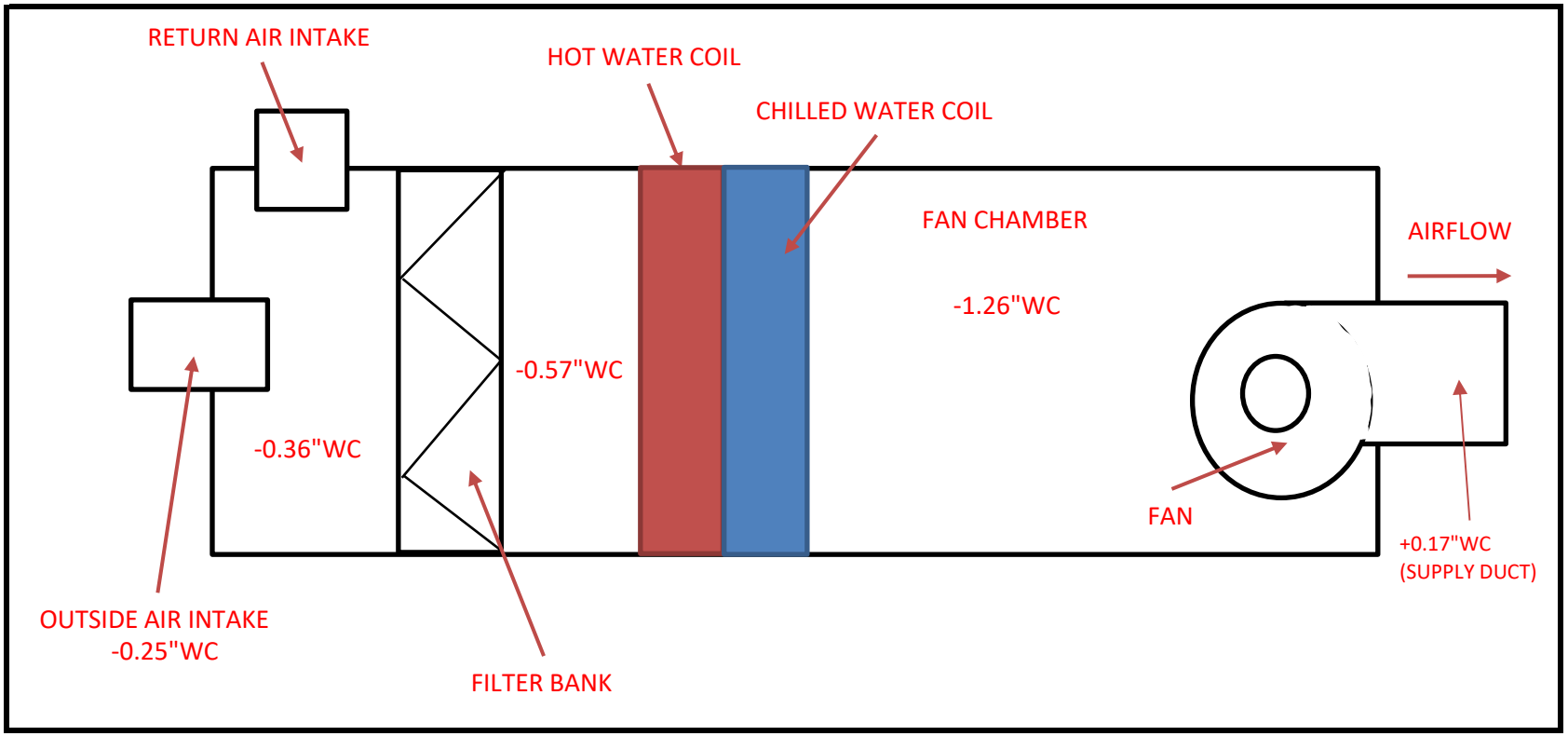
Project: Chelsea Trial Court
Address: Chelsea, MA
Date: 4/27/2021

Project No. **21-012**

STATIC PRESSURE PROFILE

Device: AHU-2

Technician: *G. Miller*



Comments: *FILTERS ARE CONSIDERABLY LOADED
**COILS ARE DIRTY

Project: Chelsea Trial Court
Address: Chelsea, MA
Date: 4/27/2021 **Project No.** 21-012

TRAVERSE DATA

SYSTEM: AHU-1 TRAVERSE NUMBER : T-1
TRAVERSE LOCATION: SUPPLY

DUCT SIZE (ROUND)		" DIAMETER			Sq Ft =	0.00
DUCT SIZE (RECT.)	40	" WIDTH x	16	" DEPTH	Sq Ft =	4.44

AIR DENSITY DATA

STATIC PRESS @ CL:	0.49	InWg.	DESIGN CFM =	3900
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	4419
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**4427**

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	1060	1269	1521	1262	1032	856	545
B	1124	1228	1531	1293	868	962	732
C	1149	1135	1481	1232	759	838	737
D	991	1141	1420	1230	674	794	745
E							
F							
G							
H							
I							

NO. OF READINGS = 32 AVERAGE FPM = 994

J	530						
K	678						
L	493						
M	510						
N							
O							
P							
Q							
R							

TECHNICIAN: Greg Miller

Project: Chelsea Trial Court
Address: Chelsea, MA
Date: 4/27/2021 **Project No.** 21-012

TRAVERSE DATA

SYSTEM: AHU-1 TRAVERSE NUMBER : T-1
TRAVERSE LOCATION: SUPPLY

DUCT SIZE (ROUND)		" DIAMETER			Sq Ft =	0.00
DUCT SIZE (RECT.)	36	" WIDTH x	18	" DEPTH	Sq Ft =	4.50

AIR DENSITY DATA

STATIC PRESS @ CL:	NA	InWg.	DESIGN CFM =	2100
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	2316
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**2317**

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	518	508	518				
B							
C							
D							
E							
F							
G							
H							
I							

NO. OF READINGS = 3 AVERAGE FPM = 515

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Greg Miller

Project: Chelsea Trial Court
Address: Chelsea, MA
Date: 4/27/2021 **Project No.** 21-012

TRAVERSE DATA

SYSTEM: AHU-2 TRAVERSE NUMBER : T-1
TRAVERSE LOCATION: SUPPLY

DUCT SIZE (ROUND)		" DIAMETER			Sq Ft =	0.00
DUCT SIZE (RECT.)	26	" WIDTH x	18	" DEPTH	Sq Ft =	3.25

AIR DENSITY DATA

STATIC PRESS @ CL:	0.57	InWg.	DESIGN CFM =	2878
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	3186
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**3193**

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	1142	819	639	853	819		
B	1107	1025	730	646	771		
C	1280	1146	823	680	1113		
D	1345	1088	1070	1180	1333		
E							
F							
G							
H							
I							

NO. OF READINGS = 20 AVERAGE FPM = 980

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Greg Miller

Project: Chelsea Trial Court
Address: Chelsea, MA
Date: 4/27/2021 **Project No.** 21-012

TRAVERSE DATA

SYSTEM: AHU-2 TRAVERSE NUMBER : T-1
TRAVERSE LOCATION: OSA

DUCT SIZE (ROUND)		" DIAMETER			Sq Ft =	0.00
DUCT SIZE (RECT.)	40	" WIDTH x	14	" DEPTH	Sq Ft =	3.89

AIR DENSITY DATA

STATIC PRESS @ CL:	-0.21	InWg.	DESIGN CFM =	1600
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	1637
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**1637**

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	344	310	313	321	288	345	313
B	423	421	411	507	478	523	566
C	511	499	378	413	422	521	533
D							
E							
F							
G							
H							
I							

NO. OF READINGS = 21 AVERAGE FPM = 421

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Greg Miller

Project: Chelsea Trial Court
Address: Chelsea, MA
Date: 4/27/2021 **Project No.** 21-012

FAN DATA SHEET

	FAN NO. RAF-1		FAN NO. RAF-2	
Serves / Location:	Court Rm #1 / Basement Mech		Court Rm #4 / Basement Mech	
Manufacturer:	Penn		Penn	
Model Number:	REX-27B		NA	
Size:	NL		NL	
Serial Number:	NL		NA	
MOTOR	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Manufacturer:	NL	US Motors	NL	US Motors
Frame Number:	NL	182T	NL	145T
Horsepower:	NL	3	NL	2
Brake Horsepower:	NL	NA	NL	
Safety Factor:	NL	1.15	NL	1.15
Volts/Phase:	460/3	460/3	460/3	460/3
Motor Amperage:	3.9	2.3/2.3/2.4	2.8	2.0/2.1/2.1
Motor RPM:	1770	1781	1740	1769
Speeds:	1	1	1	1
Heater Size:	NL	NA	NL	NA
Heater Amps.:	NL	NA	NL	NA
FAN	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Supply Air CFM:				
Return Air CFM:	3900	4173	2878	2085
Exhaust Air CFM:				
Outside Air CFM:				
Suction Pressure:				
Discharge Pressure:				
Fan Static Pressure:				
External Pressure:				
RPM	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Fan RPM:	NL	NA	NL	NA
Motor Drive:	NL	1VP50	NL	1VL44
Motor Size/Bore:	NL	1 1/8"	NL	7/8"
Fan Drive:	NL	INLINE	NL	INLINE
Fan Size/Bore:	NL	INLINE	NL	INLINE
Belt Size / Number:	NL	B75	NL	A52 / 1
Shafts C-C:	NL	27.5"	NL	20"
Turns Open:	NL	1	NL	1

Comments:

Project: Chelsea Trial Court
Address: Chelsea, MA
Date: 4/27/2021 **Project No.** 21-012

FAN DATA SHEET

	FAN NO. AHU-3		FAN NO. AHU-4	
Serves / Location:	Court Rm #5 / Basement Mech		Court Rm #4 / Basement Mech	
Manufacturer:	York		York	
Model Number:	CSI50F0FCII10X9		AP35	
Size:	NL		NL	
Serial Number:	CKGM-024075		CLGM 02196B	
MOTOR	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Manufacturer:	NL	Baldor	NL	Dayton
Frame Number:	NL	182T	NL	182T
Horsepower:	NL	3	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:	4.2	3.3/3.5/3.3	4	3.2/3.1/3.1
Motor RPM:	1765	1767	1740	1756
Speeds:	1	1	1	1
Heater Size:	NL	IA-70	NL	IA-70
Heater Amps.:	NL	NA	NL	NA
FAN	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Supply Air CFM:	2551	2832	1700	2517
Return Air CFM:				
Exhaust Air CFM:				
Outside Air CFM:	1400	1428 *1	975	960 *2
Suction Pressure:				
Discharge Pressure:				
Fan Static Pressure:				
External Pressure:				
RPM	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Fan RPM:	NL	NA	NL	NA
Motor Drive:	NL	AK44	NL	8450
Motor Size/Bore:	NL	1 1/8"	NL	1 1/8"
Fan Drive:	NL	AK44	NL	AK34
Fan Size/Bore:	NL	3/4"	NL	3/4"
Belt Size / Number:	NL	AP47 / 1	NL	AP45 / 1
Shafts C-C:	NL	17 3/4"	NL	17"
Turns Open:	NL	FIXED	NL	2

Comments: ***1 Mininmum OSA Damper set for 30%**

***2 Mininmum OSA Damper set for 60%**

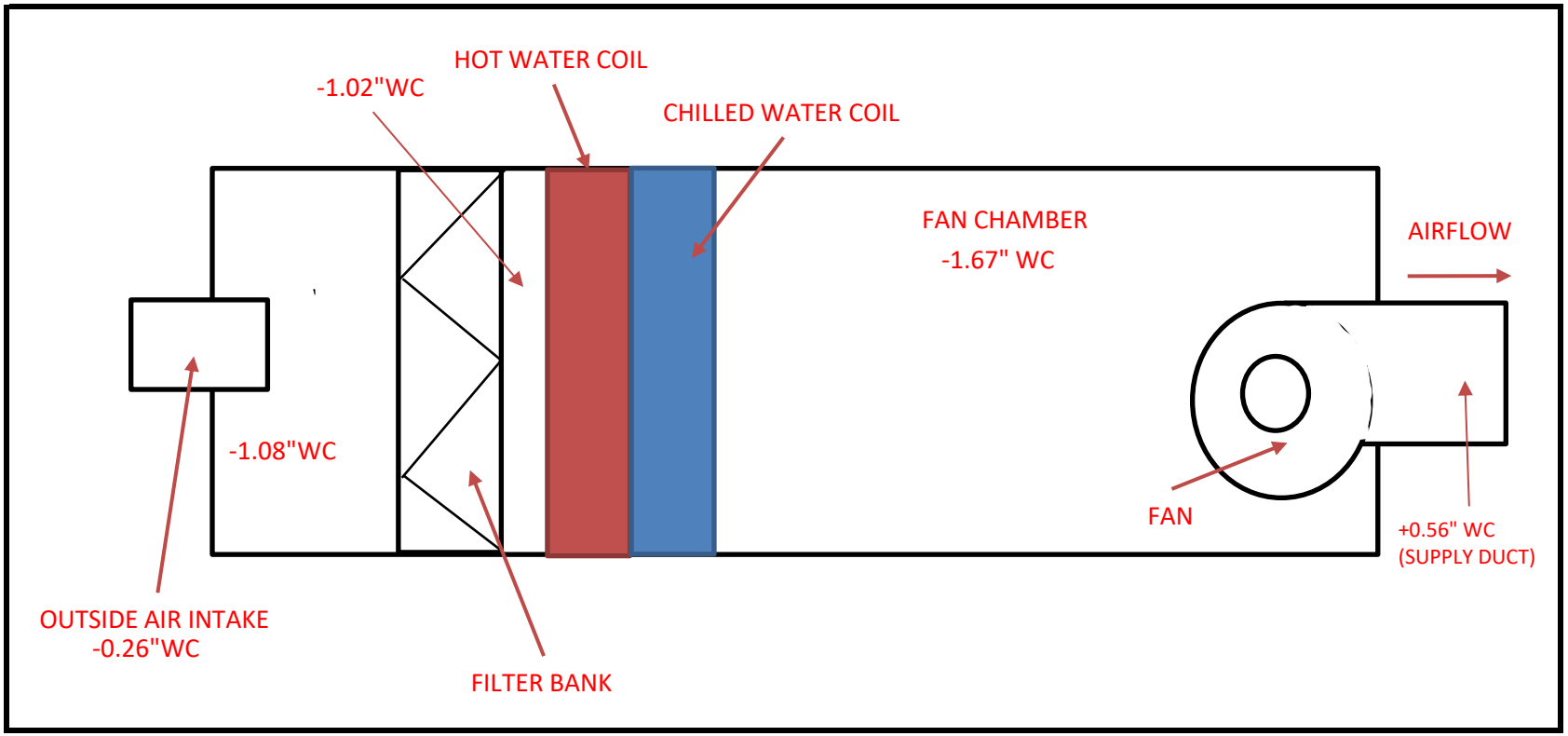
Project: Chelsea Trial Court
Address: Chelsea, MA
Date: 4/27/2021

Project No. **21-012**

STATIC PRESSURE PROFILE

Device: AHU-3

Technician: *G. Miller*



Comments: **COILS ARE DIRTY

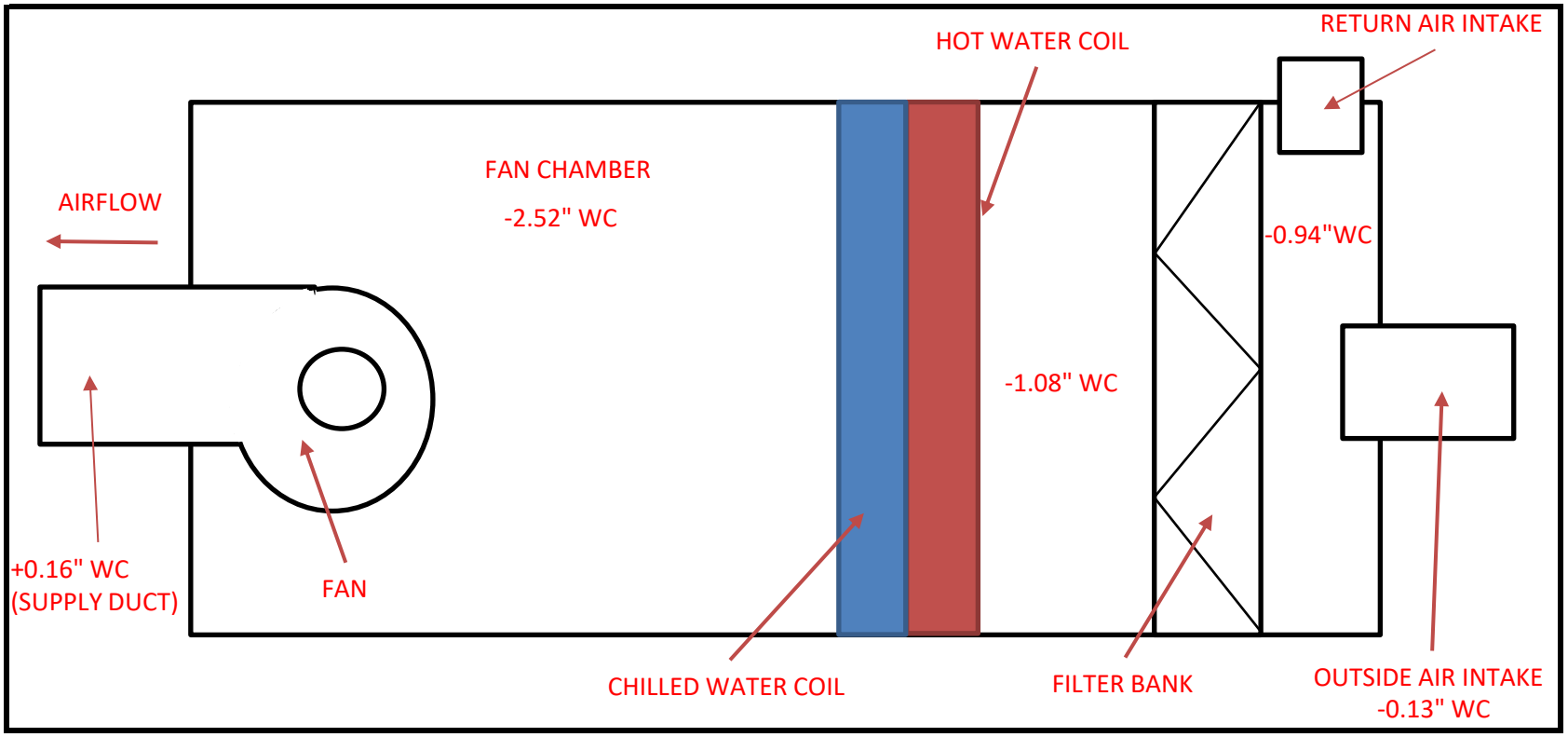
Project: Chelsea Trial Court
Address: Chelsea, MA
Date: 4/27/2021

Project No. **21-012**

STATIC PRESSURE PROFILE

Device: AHU-4

Technician: *G. Miller*



Comments: *COILS ARE DIRTY

Project: Chelsea Trial Court
Address: Chelsea, MA
Date: 4/27/2021 **Project No.** 21-012

TRAVERSE DATA

SYSTEM: AHU-3 TRAVERSE NUMBER : T-1
TRAVERSE LOCATION: SUPPLY

DUCT SIZE (ROUND)		" DIAMETER			Sq Ft =	0.00
DUCT SIZE (RECT.)	26	" WIDTH x	18	" DEPTH	Sq Ft =	3.25

AIR DENSITY DATA

STATIC PRESS @ CL:	0.57	InWg.	DESIGN CFM =	2551
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	2827
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**2832**

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	917	1034	1131	994	701		
B	1061	879	880	902	796		
C	1036	825	848	721	745		
D	983	877	715	709	642		
E							
F							
G							
H							
I							

NO. OF READINGS = 20 AVERAGE FPM = 870

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Greg Miller

Project: Chelsea Trial Court
Address: Chelsea, MA
Date: 4/27/2021 **Project No.** 21-012

TRAVERSE DATA

SYSTEM: AHU-3 TRAVERSE NUMBER : T-1
TRAVERSE LOCATION: OSA

DUCT SIZE (ROUND)		" DIAMETER			Sq Ft =	0.00
DUCT SIZE (RECT.)	40	" WIDTH x	14	" DEPTH	Sq Ft =	3.89

AIR DENSITY DATA

STATIC PRESS @ CL:	-0.18	InWg.	DESIGN CFM =	975
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	1425
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**1425**

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	414	387	345	379	440	433	287
B	277	256	402	388	356	421	433
C	289	301	411	421	378	310	367
D							
E							
F							
G							
H							
I							

NO. OF READINGS = 21 AVERAGE FPM = 366

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Greg Miller

Project: Chelsea Trial Court
Address: Chelsea, MA
Date: 4/27/2021 **Project No.** 21-012

TRAVERSE DATA

SYSTEM: AHU-4 TRAVERSE NUMBER : T-1
TRAVERSE LOCATION: SUPPLY

DUCT SIZE (ROUND)		" DIAMETER			Sq Ft =	0.00
DUCT SIZE (RECT.)	36	" WIDTH x	14	" DEPTH	Sq Ft =	3.50

AIR DENSITY DATA

STATIC PRESS @ CL:	0.42	InWg.	DESIGN CFM =	1700
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	2513
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**2517**

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	680	357	379	637	706		
B	1034	327	465	651	653		
C	1130	1160	929	898	766		
D							
E							
F							
G							
H							
I							

NO. OF READINGS = 15 AVERAGE FPM = 718

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Greg Miller

Project: Chelsea Trial Court
Address: Chelsea, MA
Date: 4/27/2021 **Project No.** 21-012

TRAVERSE DATA

SYSTEM: AHU-4 TRAVERSE NUMBER : T-1
TRAVERSE LOCATION: OSA

DUCT SIZE (ROUND)		" DIAMETER			Sq Ft =	0.00
DUCT SIZE (RECT.)	20	" WIDTH x	20	" DEPTH	Sq Ft =	2.78

AIR DENSITY DATA

STATIC PRESS @ CL:	-0.18	InWg.	DESIGN CFM =	1700
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	960
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**960**

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	345	310	345	455			
B	411	286	403	433			
C	356	303	414	322			
D	278	211	367	288			
E							
F							
G							
H							
I							

NO. OF READINGS = 16 AVERAGE FPM = 345

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Greg Miller

Project: Chelsea Trial Court
Address: Chelsea, MA
Date: 4/27/2021 **Project No.** 21-012

FAN DATA SHEET

	FAN NO. RAF-3		FAN NO. RAF-4	
Serves / Location:	Court Rm #5 / Basement Mech		Court Rm #4 / Basement Mech	
Manufacturer:	Penn		York	
Model Number:	REX-20B		BA0061420	
Size:	NL		NL	
Serial Number:	NL		DLGM-09009B	
MOTOR	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Manufacturer:	NL	US Motors	NL	Dayton
Frame Number:	NL	145T	NL	182T
Horsepower:	NL	2	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:	2.8	,2.0/2.2/2.1	4	2.7/2.6/2.6
Motor RPM:	1740	1765	1740	1755
Speeds:	1	1	1	1
Heater Size:	NL	NA	NL	NA
Heater Amps.:	NL	NA	NL	NA
FAN	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Supply Air CFM:				
Return Air CFM:	2551	2106	1700	1650
Exhaust Air CFM:				
Outside Air CFM:				
Suction Pressure:				
Discharge Pressure:				
Fan Static Pressure:				
External Pressure:				
RPM	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Fan RPM:	NL		NL	
Motor Drive:	NL	1VL44	NL	1VL44
Motor Size/Bore:	NL	7/8"	NL	1 1/8"
Fan Drive:	NL	INLINE	NL	AK39
Fan Size/Bore:	NL	INLINE	NL	3/4"
Belt Size / Number:	NL	A52 / 1	NL	AX43 / 1
Shafts C-C:	NL	20"	NL	16.5"
Turns Open:	NL	1	NL	1

Comments:

Project: Chelsea Trial Court
Address: Chelsea, MA
Date: 4/27/2021 **Project No.** 21-012

FAN DATA SHEET

	FAN NO. AHU-5		FAN NO. AHU-6	
Serves / Location:	Court Rm #2 / Basement Mech.			
Manufacturer:	York		York	
Model Number:	CSI50F0FCII10X9		BA0001220	
Size:	NL		NL	
Serial Number:	CKGM-024076		DNFM - 05006B	
MOTOR	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Manufacturer:	NL	Marathon	NL	AO Smith
Frame Number:	NL	213T	NL	S182T
Horsepower:	NL	7.5	NL	
Brake Horsepower:	NL	NA	NL	NA
Safety Factor:	NL	1.15	NL	1.15
Volts/Phase:	460/3	460/3	460/3	477
Motor Amperage:	9.8	3.1/2.9/3.2	4.3	3.4
Motor RPM:	1760	1776	1765	1775
Speeds:	1	1	VFD	60 Hz
Heater Size:	NL	IA-70	NL	IA
Heater Amps.:	NL	NA	NL	IA
FAN	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Supply Air CFM:	2100	2276	1700	1501
Return Air CFM:				
Exhaust Air CFM:				
Outside Air CFM:	1150	*1	930	896 *2
Suction Pressure:				
Discharge Pressure:				
Fan Static Pressure:				
External Pressure:				
RPM	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Fan RPM:	NL	NA	NL	NA
Motor Drive:	NL	AK28	NL	1VM50
Motor Size/Bore:	NL	7/8"	NL	1 1/8"
Fan Drive:	NL	AK41	NL	AK32
Fan Size/Bore:	NL	3/4"	NL	3/4"
Belt Size / Number:	NL	A44 / 1	NL	AX46 / 1
Shafts C-C:	NL	17 3/4"	NL	27"
Turns Open:	NL	FIXED	NL	3

Comments: ***1 OSA Damper is getting hung up and won't move.**

***2 Mininmum OSA Damper set for 65%**

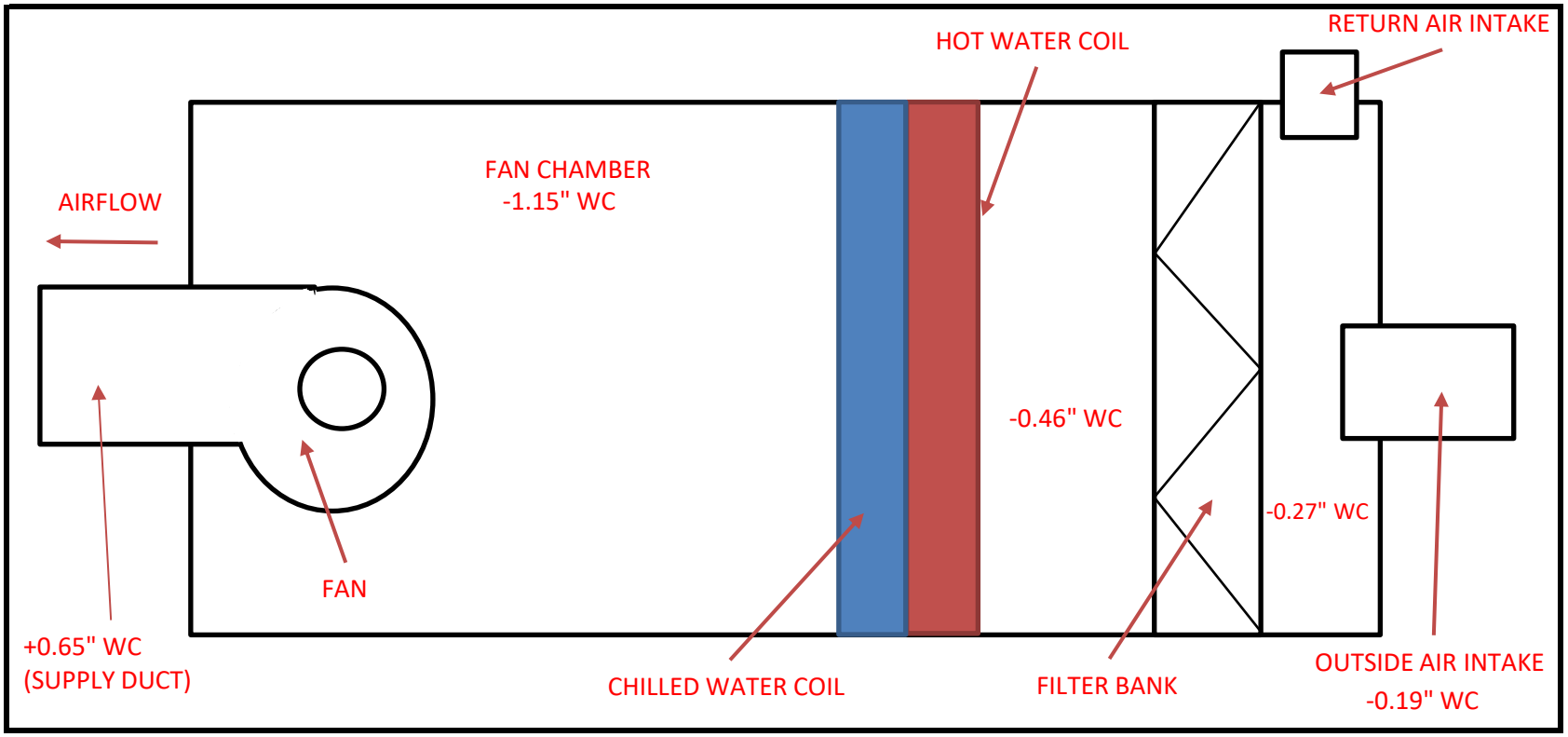
Project: Chelsea Trial Court
Address: Chelsea, MA
Date: 4/27/2021

Project No. **21-012**

STATIC PRESSURE PROFILE

Device: AHU-4

Technician: *G. Miller*



Comments:

S

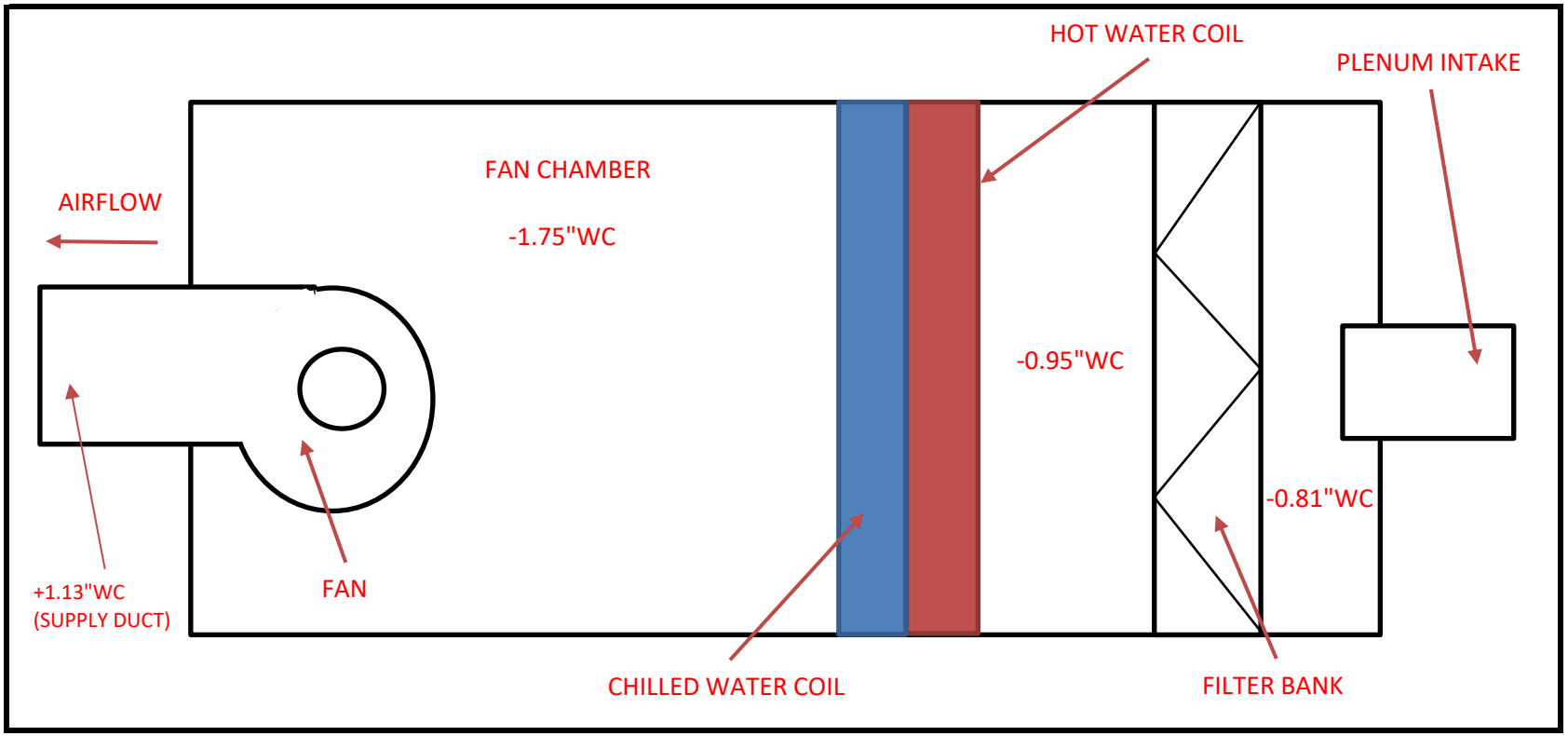
Project: Chelsea Trial Court
Address: Chelsea, MA
Date: 4/27/2021

Project No. **21-012**

STATIC PRESSURE PROFILE

Device: AHU-6

Technician: *G. Miller*



Comments:

Project: Chelsea Trial Court
Address: Chelsea, MA
Date: 4/27/2021 **Project No.** 21-012

TRAVERSE DATA

SYSTEM: AHU-5 TRAVERSE NUMBER : T-1
TRAVERSE LOCATION: SUPPLY

DUCT SIZE (ROUND)		" DIAMETER			Sq Ft =	0.00
DUCT SIZE (RECT.)	30	" WIDTH x	14	" DEPTH	Sq Ft =	2.92

AIR DENSITY DATA

STATIC PRESS @ CL:	0.65	InWg.	DESIGN CFM =	2100
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	2276
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**2281**

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	929	863	754	667	682		
B	737	687	833	822	738		
C	1046	700	692	800	754		
D							
E							
F							
G							
H							
I							

NO. OF READINGS = 15 AVERAGE FPM = 780

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Greg Miller

Project: Chelsea Trial Court
Address: Chelsea, MA
Date: 4/27/2021 **Project No.** 21-012

TRAVERSE DATA

SYSTEM: AHU-5 TRAVERSE NUMBER : T-1
TRAVERSE LOCATION: OSA

DUCT SIZE (ROUND)		" DIAMETER			Sq Ft =	0.00
DUCT SIZE (RECT.)	44	" WIDTH x	16	" DEPTH	Sq Ft =	4.89

AIR DENSITY DATA

STATIC PRESS @ CL:	0.57	InWg.	DESIGN CFM =	1150
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	#DIV/0!
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**#DIV/0!**

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							
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: Greg Miller

Project: Chelsea Trial Court
Address: Chelsea, MA
Date: 4/27/2021 **Project No.** 21-012

TRAVERSE DATA

SYSTEM: AHU-6 TRAVERSE NUMBER : T-1
TRAVERSE LOCATION: SUPPLY

DUCT SIZE (ROUND)		" DIAMETER			Sq Ft =	0.00
DUCT SIZE (RECT.)	20	" WIDTH x	12	" DEPTH	Sq Ft =	1.67

AIR DENSITY DATA

STATIC PRESS @ CL:	0.53	InWg.	DESIGN CFM =	1700
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	1501
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**1504**

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	1544	903	279				
B	1536	620	153				
C	1706	587	84				
D	1411	1646	336				
E							
F							
G							
H							
I							

NO. OF READINGS = 12 AVERAGE FPM = 900

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Greg Miller

Project: Chelsea Trial Court
Address: Chelsea, MA
Date: 4/27/2021 **Project No.** 21-012

TRAVERSE DATA

SYSTEM: AHU-6 TRAVERSE NUMBER : T-1
TRAVERSE LOCATION: OSA

DUCT SIZE (ROUND)		" DIAMETER			Sq Ft =	0.00
DUCT SIZE (RECT.)	24	" WIDTH x	16	" DEPTH	Sq Ft =	2.67

AIR DENSITY DATA

STATIC PRESS @ CL:	-0.18	InWg.	DESIGN CFM =	930
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	896
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**896**

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	323	411	376	417			
B	288	302	389	388			
C	303	245	404	301			
D	277	313	321	319			
E							
F							
G							
H							
I							

NO. OF READINGS = 16 AVERAGE FPM = 336

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Greg Miller

Project: Chelsea Trial Court
Address: Chelsea, MA
Date: 4/27/2021 **Project No.** 21-012

FAN DATA SHEET

	FAN NO. RAF-5		FAN NO. RAF-6	
Serves / Location:	Court Rm #2 / Basement Mech.		Court Rm #4 / Basement Mech	
Manufacturer:	York		PENN	
Model Number:	CSI50F0GCII10X9		REX-20B	
Size:	NL		NL	
Serial Number:	GKGM-024077		NL	
MOTOR	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Manufacturer:	NL	Magnetek	NL	US MOTORS
Frame Number:	NL	N143T	NL	143T
Horsepower:	NL	1	NL	1
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:	1.35	1.0/1.1/1.0	1.5	1.1/1.0/1.1
Motor RPM:	1745	1753	1755	1762
Speeds:	1	1	VFD	1
Heater Size:	NL	NA	NL	IA
Heater Amps.:	NL	NA	NL	IA
FAN	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Supply Air CFM:				
Return Air CFM:	2100	1847	1700	1155
Exhaust Air CFM:				
Outside Air CFM:				
Suction Pressure:				
Discharge Pressure:				
Fan Static Pressure:				
External Pressure:				
RPM	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Fan RPM:	NL	NA	NL	NA
Motor Drive:	NL	AK28	NL	1VL40
Motor Size/Bore:	NL	7/8"	NL	7/8"
Fan Drive:	NL	AK41	NL	INLINE
Fan Size/Bore:	NL	3/4"	NL	INLINE
Belt Size / Number:	NL	A45 / 1	NL	A53 / 1
Shafts C-C:	NL	18"	NL	20"
Turns Open:	NL	FIXED	NL	1

Comments:

Project: Chelsea Trial Court
Address: Chelsea, MA
Date: 4/27/2021 **Project No.** 21-012

FAN DATA SHEET

	FAN NO. AHU-7		FAN NO. AHU-8	
Serves / Location:	1st Fl VAV's / Basement Mech		2nd Fl VAV's / Basement Mech	
Manufacturer:	York		York	
Model Number:	BA0061430		BA0061430	
Size:	NL		NL	
Serial Number:	DLGM-09010B		DLGM - 09005B	
MOTOR	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Manufacturer:	NL	Baldor	NL	Baldor
Frame Number:	NL	215T	NL	215T
Horsepower:	NL	10	NL	10
Brake Horsepower:	NL	NA	NL	NA
Safety Factor:	NL	1.15	NL	1.15
Volts/Phase:	460/3	460	460/3	460
Motor Amperage:	12.5	12.5	12.5	12.5
Motor RPM:	1770	1752	1770	1675
Speeds:	VFD	60 Hz	VFD	56.7 Hz
Heater Size:	NL	IA	NL	IA
Heater Amps.:	NL	IA	NL	IA
FAN	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Supply Air CFM:	7986	8791	8487	8576
Return Air CFM:				
Exhaust Air CFM:				
Outside Air CFM:	4300	4208 *1	4600	*2
Suction Pressure:				
Discharge Pressure:				
Fan Static Pressure:				
External Pressure:				
RPM	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Fan RPM:	NL	NA	NL	NA
Motor Drive:	NL	8450M	NL	2BK57
Motor Size/Bore:	NL	1 1/8"	NL	QT 1 3/8"
Fan Drive:	NL	BK105	NL	2BK80
Fan Size/Bore:	NL	QT 1 3/16"	NL	QT 1 7/16"
Belt Size / Number:	NL	BX53 / 2	NL	B50 / 2
Shafts C-C:	NL	16.5"	NL	16"
Turns Open:	NL	3	NL	FIXED

Comments: ***1 Mininmum OSA Damper set for 65%**

***2 OSA Damper does not move.**

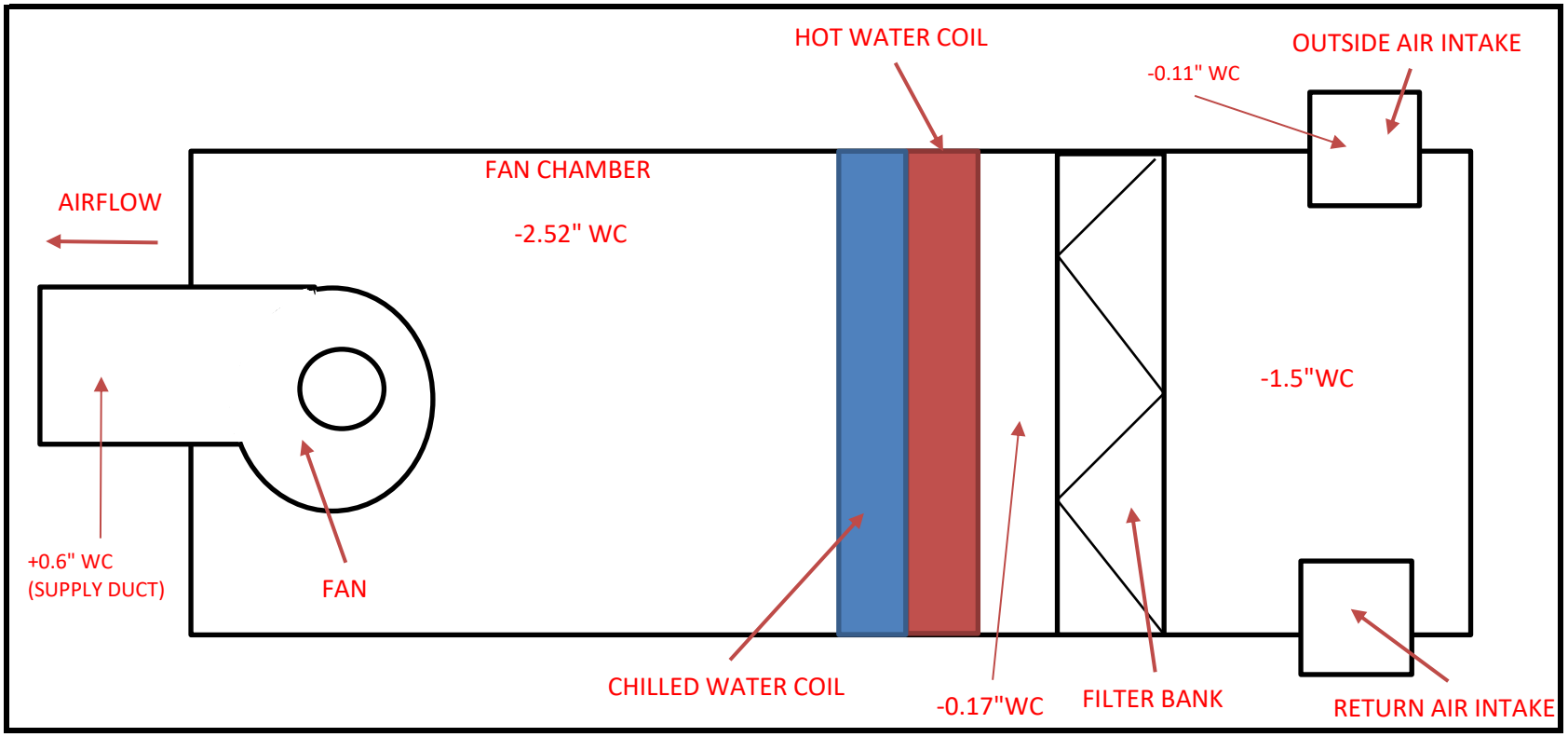
Project: Chelsea Trial Court
Address: Chelsea, MA
Date: 4/27/2021

Project No. **21-012**

STATIC PRESSURE PROFILE

Device: AHU-7

Technician: *G. Miller*



Comments: *FILTERS ARE CONSIDERABLY LOADED
**COILS ARE DIRTY

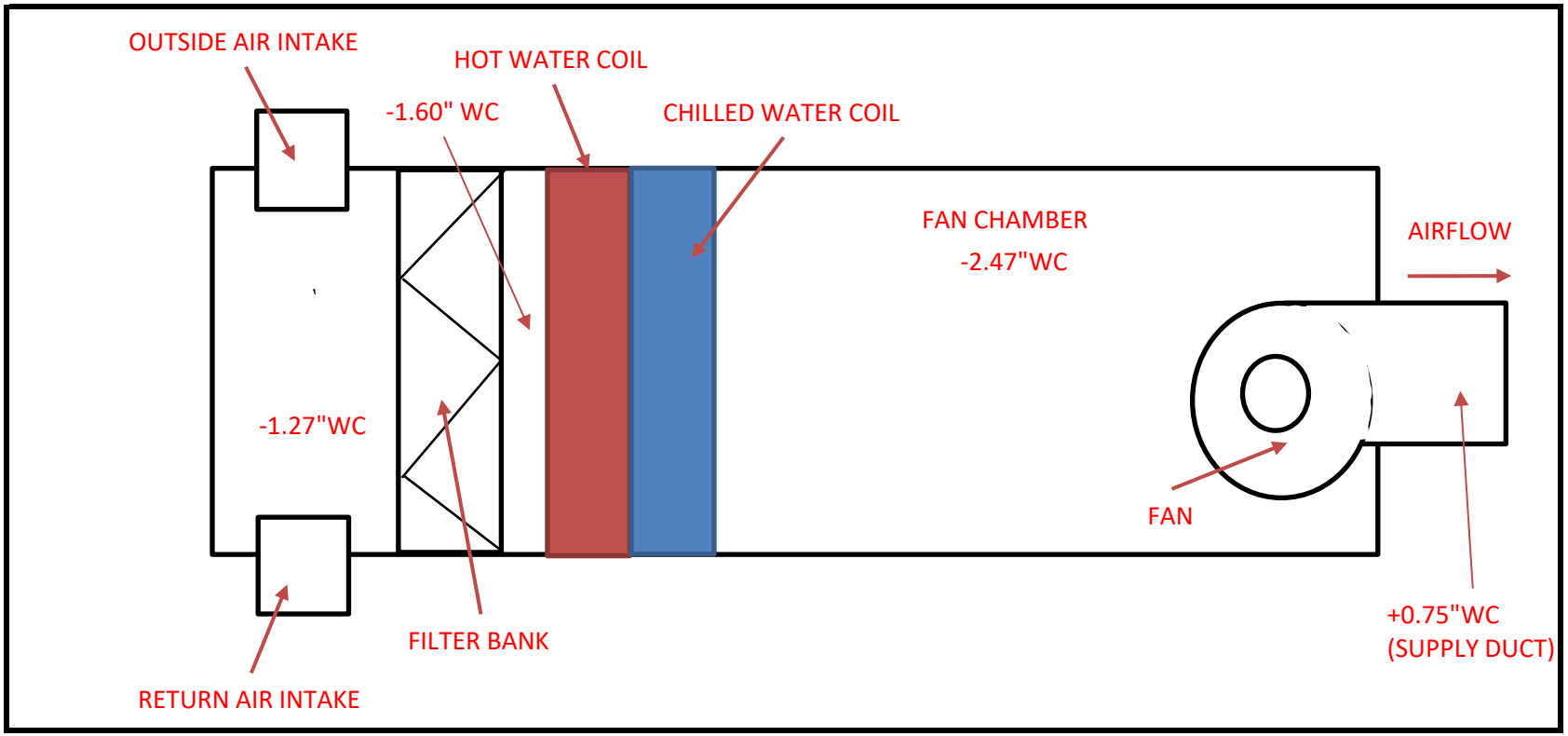
Project: Chelsea Trial Court
Address: Chelsea, MA
Date: 4/27/2021

Project No. **21-012**

STATIC PRESSURE PROFILE

Device: AHU-8

Technician: *G. Miller*



Comments: *FILTERS ARE CONSIDERABLY LOADED
**COILS ARE DIRTY

Project: Chelsea Trial Court
Address: Chelsea, MA
Date: 4/27/2021 **Project No.** 21-012

TRAVERSE DATA

SYSTEM: AHU-7 TRAVERSE NUMBER : T-1
TRAVERSE LOCATION: SUPPLY

DUCT SIZE (ROUND)		" DIAMETER			Sq Ft =	0.00
DUCT SIZE (RECT.)	24	" WIDTH x	40	" DEPTH	Sq Ft =	6.67

AIR DENSITY DATA

STATIC PRESS @ CL:	1.08	InWg.	DESIGN CFM =	7986
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	8762
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**8791**

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	1427	1569	2011	1956			
B	1289	1417	1630	2047			
C	1525	1007	1428	1879			
D	1385	1252	1354	1625			
E	1447	1216	1193	1328			
F	1188	829	322	1524			
G	894	477	0	1583			
H							
I							

NO. OF READINGS = 28 AVERAGE FPM = 1314

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Greg Miller

Project: Chelsea Trial Court
Address: Chelsea, MA
Date: 4/27/2021 **Project No.** 21-012

TRAVERSE DATA

SYSTEM: AHU-7 TRAVERSE NUMBER : T-1
TRAVERSE LOCATION: OSA

DUCT SIZE (ROUND)		" DIAMETER			Sq Ft =	0.00
DUCT SIZE (RECT.)	24	" WIDTH x	36	" DEPTH	Sq Ft =	6.00

AIR DENSITY DATA

STATIC PRESS @ CL:	-0.14	InWg.	DESIGN CFM =	4300
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	4208
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**4209**

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	677	721	822	810			
B	543	833	833	665			
C	614	845	765	689			
D	456	877	802	655			
E	567	676	611	566			
F							
G							
H							
I							

NO. OF READINGS = 20 AVERAGE FPM = 701

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Greg Miller

Project: Chelsea Trial Court
Address: Chelsea, MA
Date: 4/27/2021 **Project No.** 21-012

TRAVERSE DATA

SYSTEM: AHU-8 TRAVERSE NUMBER : T-1
TRAVERSE LOCATION: SUPPLY

DUCT SIZE (ROUND)		" DIAMETER			Sq Ft =	0.00
DUCT SIZE (RECT.)	42	" WIDTH x	24	" DEPTH	Sq Ft =	7.00

AIR DENSITY DATA

STATIC PRESS @ CL:	0.76	InWg.	DESIGN CFM =	8487
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	8576
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**8597**

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	1655	1433	1345	1456	1100	1344	
B	1566	1211	1312	1327	987	1278	
C	1476	1010	1001	1210	1211	1311	
D	1211	1098	899	908	1066	988	
E							
F							
G							
H							
I							

NO. OF READINGS = 24 AVERAGE FPM = 1225

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Greg Miller

Project: Chelsea Trial Court
Address: Chelsea, MA
Date: 4/27/2021 **Project No.** 21-012

TRAVERSE DATA

SYSTEM: AHU-8 TRAVERSE NUMBER : T-1
TRAVERSE LOCATION: OSA

DUCT SIZE (ROUND)		" DIAMETER			Sq Ft =	0.00
DUCT SIZE (RECT.)	56	" WIDTH x	14	" DEPTH	Sq Ft =	5.44

AIR DENSITY DATA

STATIC PRESS @ CL:		InWg.	DESIGN CFM =	4600
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	#DIV/0!
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**#DIV/0!**

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							
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: Greg Miller

Project: Chelsea Trial Court
Address: Chelsea, MA
Date: 4/27/2021 **Project No.** 21-012

FAN DATA SHEET

	FAN NO. RAF-7		FAN NO. RAF-8	
Serves / Location:	1st Fl Return / Basement Mech		2nd Fl Return / Basement Mech	
Manufacturer:	York		York	
Model Number:	BA0061430		CA0060830	
Size:	NL		NL	
Serial Number:	DLGM-09010B		DLGM - 090028B	
MOTOR	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Manufacturer:	NL	Magnetek	NL	Magnetek
Frame Number:	NL	S184T	NL	S184T
Horsepower:	NL	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:	7	4.1/4.0/3.9	7	5.1/4.9/5.0
Motor RPM:	1745	1752	1745	1755
Speeds:	VFD	60 Hz	VFD	60 Hz
Heater Size:	NL	IA	NL	IA
Heater Amps.:	NL	IA	NL	IA
FAN	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Supply Air CFM:				
Return Air CFM:	7986	5820	8487	8978
Exhaust Air CFM:				
Outside Air CFM:				
Suction Pressure:				
Discharge Pressure:				
Fan Static Pressure:				
External Pressure:				
RPM	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Fan RPM:	NL	NA	NL	NA
Motor Drive:	NL	1VP50	NL	1VP50
Motor Size/Bore:	NL	1 1/8"	NL	1 1/8"
Fan Drive:	NL	BK105H	NL	AK124
Fan Size/Bore:	NL	H 1/316"	NL	1 3/16"
Belt Size / Number:	NL	BX53 / 1	NL	AX60 / 1"
Shafts C-C:	NL	16.5"	NL	17.5"
Turns Open:	NL	1	NL	1

Comments:

Project: Chelsea Trial Court
Address: Chelsea, MA
Date: 4/27/2021 **Project No.** 21-012

FAN DATA SHEET

	FAN NO. AHU-9		FAN NO. AHU-10	
Serves / Location:	3rd Floor VAV's / Basement Mech		Basement West VAV's / Basement Mech	
Manufacturer:	York		York	
Model Number:	CA0061433		BA0061230	
Size:	NL		NL	
Serial Number:	DLGM-09026B		DLGM-09007B	
MOTOR	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Manufacturer:	NL	Marathon	NL	AO Smith
Frame Number:	NL	213T	NL	S213T
Horsepower:	NL	7.5	NL	10
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:	9.8	9.6/9.8/9.6	9.7	9.1
Motor RPM:	1760	1777	1760	1769
Speeds:	VFD	60 Hz	VFD	60Hz
Heater Size:	NL	IA	NL	IA
Heater Amps.:	NL	IA	NL	IA
FAN	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Supply Air CFM:	8938	7811	7709	8311
Return Air CFM:				
Exhaust Air CFM:				
Outside Air CFM:	4900	4760 *1	4200	4060 *2
Suction Pressure:				
Discharge Pressure:				
Fan Static Pressure:				
External Pressure:				
RPM	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Fan RPM:	NL	NA	NL	NA
Motor Drive:	NL	8600L	NL	7" OD
Motor Size/Bore:	NL	1 3/8"	NL	1 3/8"
Fan Drive:	NL	BK120	NL	8 3/4" OD
Fan Size/Bore:	NL	1 3/16"	NL	SK 1 3/16"
Belt Size / Number:	NL	BP57 /1	NL	BX59 / 2
Shafts C-C:	NL	15 1/2"	NL	19 1/4"
Turns Open:	NL	3	NL	3

Comments: ***1 Mininmum OSA Damper set for 30%**

***2 Mininmum OSA Damper set for 45%**

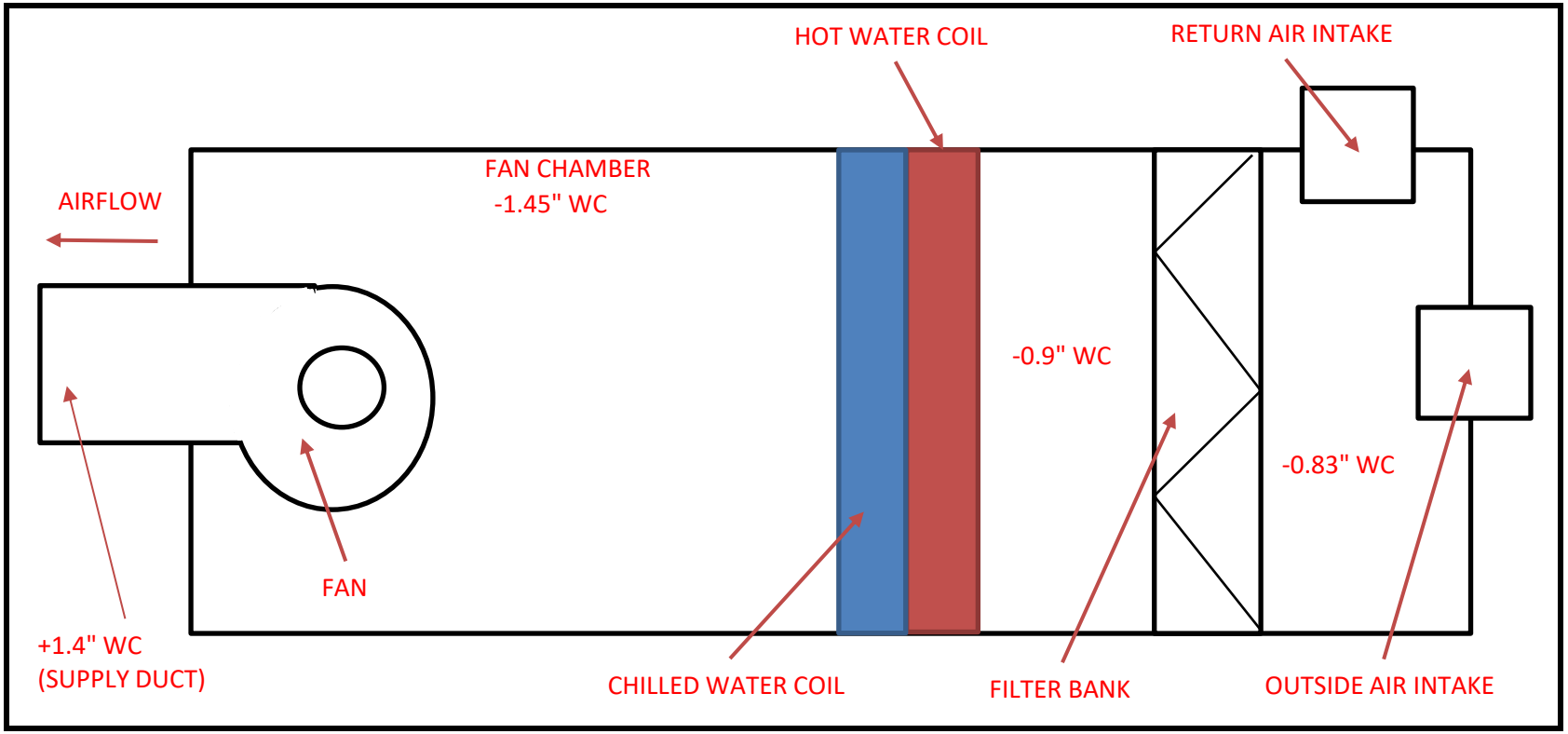
Project: Chelsea Trial Court
Address: Chelsea, MA
Date: 4/27/2021

Project No. **21-012**

STATIC PRESSURE PROFILE

Device: AHU-9

Technician: *G. Miller*



Comments: *FILTERS ARE CONSIDERABLY LOADED

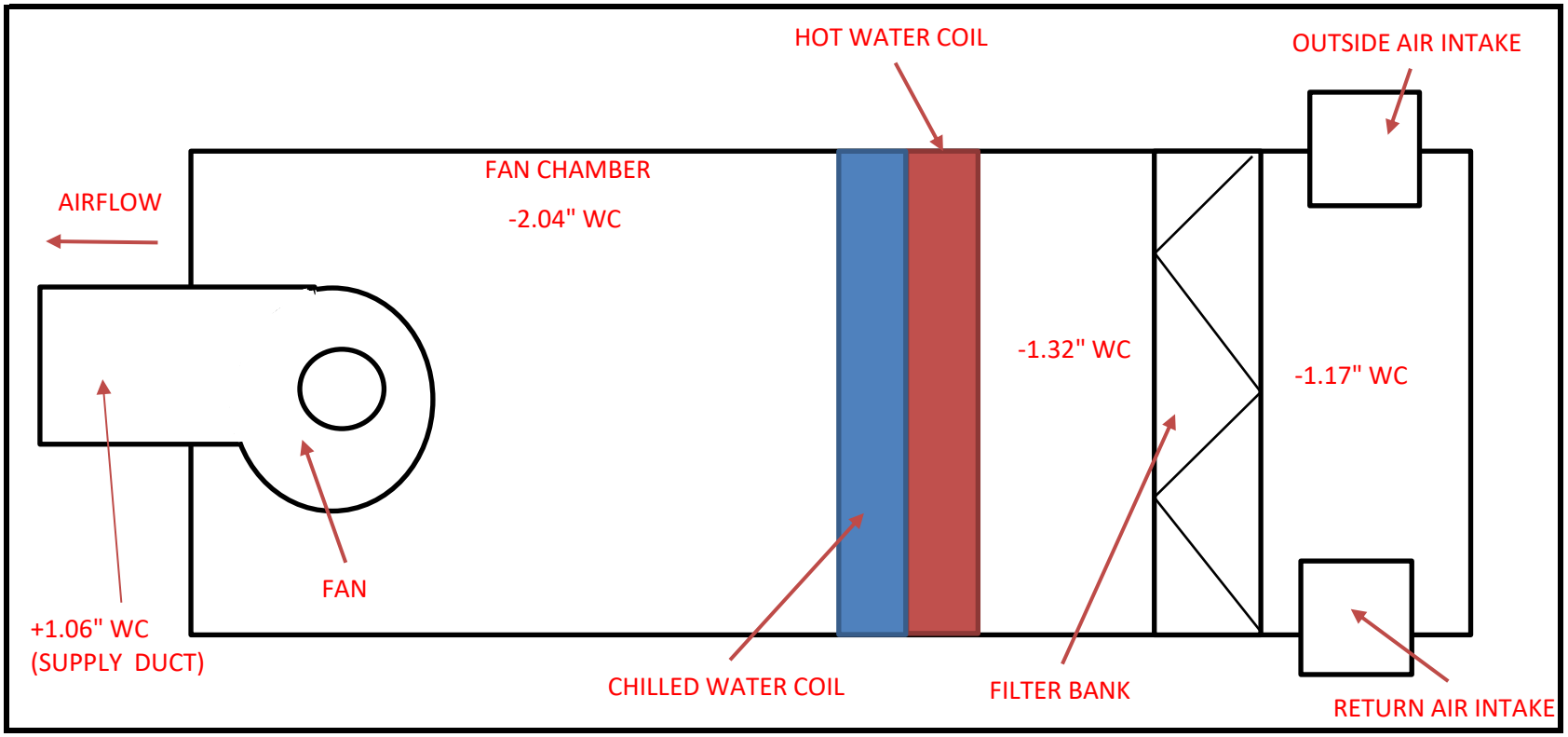
Project: Chelsea Trial Court
Address: Chelsea, MA
Date: 4/27/2021

Project No. **21-012**

STATIC PRESSURE PROFILE

Device: AHU-10

Technician: *G. Miller*



Comments: *FILTERS ARE CONSIDERABLY DIRTY
**COILS ARE DIRTY

Project: Chelsea Trial Court
Address: Chelsea, MA
Date: 4/27/2021 **Project No.** 21-012

TRAVERSE DATA

SYSTEM: AHU-9 TRAVERSE NUMBER : T-1
TRAVERSE LOCATION: SUPPLY

DUCT SIZE (ROUND)		" DIAMETER			Sq Ft =	0.00
DUCT SIZE (RECT.)	48	" WIDTH x	24	" DEPTH	Sq Ft =	8.00

AIR DENSITY DATA

STATIC PRESS @ CL:	1.17	InWg.	DESIGN CFM =	7709
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	7784
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**7811**

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	514	620	744	1071	1117	1505	
B	533	286	605	817	1215	1476	
C	384	640	733	624	1043	1686	
D	1019	1057	1290	1381	1278	1715	
E							
F							
G							
H							
I							

NO. OF READINGS = 24 AVERAGE FPM = 973

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Greg Miller

Project: Chelsea Trial Court
Address: Chelsea, MA
Date: 4/27/2021 **Project No.** 21-012

TRAVERSE DATA

SYSTEM: AHU-9 TRAVERSE NUMBER : T-1
TRAVERSE LOCATION: OSA

DUCT SIZE (ROUND)		" DIAMETER			Sq Ft =	0.00
DUCT SIZE (RECT.)	66	" WIDTH x	20	" DEPTH	Sq Ft =	9.17

AIR DENSITY DATA

STATIC PRESS @ CL:	-0.16	InWg.	DESIGN CFM =	4900
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	4760
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**4761**

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	421	676	711	456	523	611	699
B	440	533	636	502	488	478	466
C	501	522	588	477	377	367	432
D							
E							
F							
G							
H							
I							

NO. OF READINGS = 21 AVERAGE FPM = 519

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Greg Miller

Project: Chelsea Trial Court
Address: Chelsea, MA
Date: 4/27/2021 **Project No.** 21-012

TRAVERSE DATA

SYSTEM: AHU-10 TRAVERSE NUMBER : T-1
TRAVERSE LOCATION: SUPPLY

DUCT SIZE (ROUND)		" DIAMETER			Sq Ft =	0.00
DUCT SIZE (RECT.)	52	" WIDTH x	18	" DEPTH	Sq Ft =	6.50

AIR DENSITY DATA

STATIC PRESS @ CL:	0.95	InWg.	DESIGN CFM =	7709
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	8287
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**8311**

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	2473	2139	1328	1486	589	0	0
B	2851	2145	1681	1318	734	0	0
C	2987	2781	1790	823	517	219	0
D	3393	3217	2544	684	0	0	0
E							
F							
G							
H							
I							

NO. OF READINGS = 28 AVERAGE FPM = 1275

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Greg Miller

Project: Chelsea Trial Court
Address: Chelsea, MA
Date: 4/27/2021 **Project No.** 21-012

TRAVERSE DATA

SYSTEM: AHU-10 TRAVERSE NUMBER : T-1
TRAVERSE LOCATION: OSA

DUCT SIZE (ROUND)		" DIAMETER			Sq Ft =	0.00
DUCT SIZE (RECT.)	56	" WIDTH x	16	" DEPTH	Sq Ft =	6.22

AIR DENSITY DATA

STATIC PRESS @ CL:	-0.18	InWg.	DESIGN CFM =	4200
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	4059
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**4060**

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	766	811	701	765	833	822	765
B	802	745	789	655	711	823	656
C	354	333	523	477	411	502	456
D							
E							
F							
G							
H							
I							

NO. OF READINGS = 21 AVERAGE FPM = 652

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Greg Miller

Project: Chelsea Trial Court
Address: Chelsea, MA
Date: 4/27/2021 **Project No.** 21-012

FAN DATA SHEET

	FAN NO. RAF-9		FAN NO. RAF-10	
Serves / Location:	3rd Floor Return / Basement Mech		Basement West VAV's / Basement Mech	
Manufacturer:	York		York	
Model Number:	CA0061433		BA0061230	
Size:	NL		NL	
Serial Number:	DLGM-09026B		DLGM-09007B	
MOTOR	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Manufacturer:	NL	Marathon	NL	AO Smith
Frame Number:	NL	213T	NL	S184Y
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:	9.8	7.1/6.9/6.9	6.8	5.0/5.3/5.2
Motor RPM:	1760	1781	1760	1777
Speeds:	VFD	60 Hz	VFD	60 Hz
Heater Size:	NL	IA	NL	IA
Heater Amps.:	NL	IA	NL	IA
FAN	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Supply Air CFM:				
Return Air CFM:	8938	7095		
Exhaust Air CFM:				
Outside Air CFM:				
Suction Pressure:				
Discharge Pressure:				
Fan Static Pressure:				
External Pressure:				
RPM	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Fan RPM:	NL	NA	NL	NA
Motor Drive:	NL	1VP60"	NL	8400M
Motor Size/Bore:	NL	1 3/8"	NL	1 1/8"
Fan Drive:	NL	BK120	NL	BK95
Fan Size/Bore:	NL	1 3/16"	NL	QT 1 3/16"
Belt Size / Number:	NL	BP57 /1	NL	BX50 / 1
Shafts C-C:	NL	15 1/2"	NL	15 1/2"
Turns Open:	NL	2	NL	3

Comments:

Project: Chelsea Trial Court
Address: Chelsea, MA
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FAN DATA SHEET

	FAN NO. AHU-11		FAN NO.	
Serves / Location:	1st Floor East VAV's / Basement Mech			
Manufacturer:	York			
Model Number:	BA0061232			
Size:	NL			
Serial Number:	DLGM-09008B			
MOTOR	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Manufacturer:	NL	Marathon		
Frame Number:	NL	213T		
Horsepower:	NL	7.5		
Brake Horsepower:	NL	NA		
Safety Factor:	NL	1.15		
Volts/Phase:	460/3	460/3		
Motor Amperage:	9.8	10.1/9.9/9.7		
Motor RPM:	1760	1756		
Speeds:	VFD	60Hz		
Heater Size:	NL	IA		
Heater Amps.:	NL	IA		
FAN	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Supply Air CFM:	9500	9876		
Return Air CFM:				
Exhaust Air CFM:				
Outside Air CFM:	5200	5472 *1		
Suction Pressure:				
Discharge Pressure:				
Fan Static Pressure:				
External Pressure:				
RPM	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Fan RPM:	NL	NA		
Motor Drive:	NL	8600L		
Motor Size/Bore:	NL	1 3/8"		
Fan Drive:	NL	BK130		
Fan Size/Bore:	NL	SK 1 3/16"		
Belt Size / Number:	NL	BX59 / 2		
Shafts C-C:	NL	23"		
Turns Open:	NL	2		

Comments: ***1 Mininmum OSA Damper set for 50%**

Project: Chelsea Trial Court
Address: Chelsea, MA
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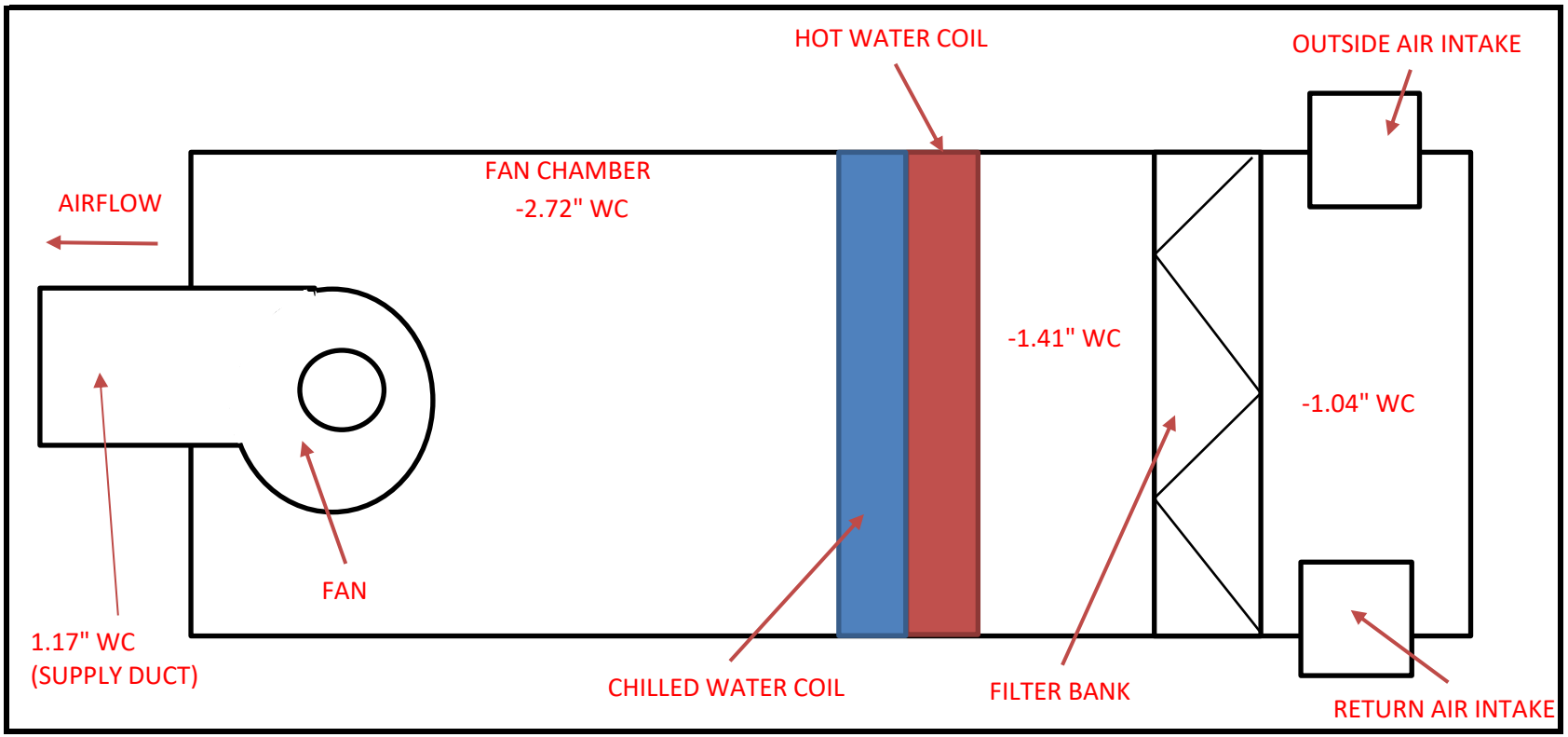
Project No. **21-012**

STATIC PRESSURE PROFILE

Device: AHU-11

Technician: *G. Miller*



Comments: *FILTERS ARE CONSIDERABLY DIRTY
**COILS ARE DIRTY

Project: Chelsea Trial Court
Address: Chelsea, MA
Date: 4/27/2021 **Project No.** 21-012

TRAVERSE DATA

SYSTEM: AHU-11 TRAVERSE NUMBER : T-1
TRAVERSE LOCATION: SUPPLY

DUCT SIZE (ROUND)		" DIAMETER			Sq Ft =	0.00
DUCT SIZE (RECT.)	20	" WIDTH x	74	" DEPTH	Sq Ft =	10.28

AIR DENSITY DATA

STATIC PRESS @ CL:	0.83	InWg.	DESIGN CFM =	9500
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	9850
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**9876**

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	988	1021	1211	1345	1178		
B	877	1120	1102	1278	1106		
C	656	976	1076	1190	1256		
D	754	956	988	1023	910		
E	845	788	877	977	989		
F	902	902	788	899	798		
G	921	865	863	907	876		
H	988	765	907	866	949		
I	966	811	899	801	967		

NO. OF READINGS = 45 AVERAGE FPM = 958

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Greg Miller

Project: Chelsea Trial Court
Address: Chelsea, MA
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TRAVERSE DATA

SYSTEM: AHU-11 TRAVERSE NUMBER : T-2
TRAVERSE LOCATION: OSA

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

AIR DENSITY DATA

STATIC PRESS @ CL:	-0.22	InWg.	DESIGN CFM =	5200
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	5472
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**5472**

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	692	619	823	658	851	819	739
B	636	841	725	505	540	381	555
C	426	114	181	254	256	151	435
D							
E							
F							
G							
H							
I							

NO. OF READINGS = 30 AVERAGE FPM = 563

J	734	723	733				
K	635	564	939				
L	330	331	694				
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Greg Miller

Project: Chelsea Trial Court
Address: Chelsea, MA
Date: 4/27/2021 **Project No.** 21-012

FAN DATA SHEET

	FAN NO. RAF-11		FAN NO.	
Serves / Location:	1st Floor East Return / Basement Mech			
Manufacturer:	York			
Model Number:	BA0061232			
Size:	NL			
Serial Number:	DLGM-09008B			
MOTOR	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Manufacturer:	NL	Marathon		
Frame Number:	NL	213T		
Horsepower:	NL	7.5		
Brake Horsepower:	NL	NA		
Safety Factor:	NL	1.15		
Volts/Phase:	460/3	460/3		
Motor Amperage:	9.8	7.1/6.8/7.7		
Motor RPM:	1760	1778		
Speeds:	VFD	60 Hz		
Heater Size:	NL	IA		
Heater Amps.:	NL	IA		
FAN	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Supply Air CFM:				
Return Air CFM:	9500	10247		
Exhaust Air CFM:				
Outside Air CFM:				
Suction Pressure:				
Discharge Pressure:				
Fan Static Pressure:				
External Pressure:				
RPM	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Fan RPM:	NL	NA		
Motor Drive:	NL	1VP60"		
Motor Size/Bore:	NL	1 3/8"		
Fan Drive:	NL	1B5V124		
Fan Size/Bore:	NL	1 3/16"		
Belt Size / Number:	NL	BX59 / 1		
Shafts C-C:	NL	15 1/2"		
Turns Open:	NL	2		

Comments:

Project: Chelsea Trial Court
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FAN DATA SHEET

	FAN NO. EF-6		FAN NO. EF-7	
Serves / Location:	Staff Lounge / Roof		Bathroom 305 / Roof	
Manufacturer:	Penn		Dayton	
Model Number:	NL		4YC67G	
Size:	NL		NL	
Serial Number:	NL		10904728 0706	
MOTOR	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Manufacturer:	NL	FASCO	NL	Dayton
Frame Number:	NL	NL	NL	NL
Horsepower:	NL	1/30	NL	1/8
Brake Horsepower:	NL	NA	NL	NA
Safety Factor:	NL	NL	NL	NL
Volts/Phase:	115/1	115	115/1	115
Motor Amperage:	0.6	0.4	2.6	2
Motor RPM:	750/1550	DIRECT DRIVE	1550/1300/1050	DIRECT DRIVE
Speeds:	2		3	
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:	400	103	200	202
Outside Air CFM:				
Suction Pressure:	NL	-0.11	NL	-0.19
Discharge Pressure:	NL	0.03	NL	0.03
Fan Static Pressure:	NL	0.14	NL	0.22
External Pressure:	NL	NA	NL	NA
RPM	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Fan RPM:	NL	DIRECT DRIVE	NL	DIRECT DRIVE
Motor Drive:	NL	DIRECT DRIVE	NL	DIRECT DRIVE
Motor Size/Bore:	NL	DIRECT DRIVE	NL	DIRECT DRIVE
Fan Drive:	NL	DIRECT DRIVE	NL	DIRECT DRIVE
Fan Size/Bore:	NL	DIRECT DRIVE	NL	DIRECT DRIVE
Belt Size / Number:	NL	DIRECT DRIVE	NL	DIRECT DRIVE
Shafts C-C:	NL	DIRECT DRIVE	NL	DIRECT DRIVE
Turns Open:	NL	DIRECT DRIVE	NL	DIRECT DRIVE

Comments:

Project: Chelsea Trial Court
Address: Chelsea, MA
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FAN DATA SHEET

	FAN NO. EF-8		FAN NO. EF-9	
Serves / Location:	Bathroom 313,324,325 / Roof		Bathroom 317,318 / Roof	
Manufacturer:	Dayton		Dayton	
Model Number:	4YC67G		4YC65G	
Size:	NL		NL	
Serial Number:	10904716 0706		15233028 17K	
MOTOR	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Manufacturer:	NL	Dayton	NL	Dayton
Frame Number:	NL	NL	NL	NL
Horsepower:	NL	1/8	NL	1/25
Brake Horsepower:	NL	NA	NL	NA
Safety Factor:	NL	NL	NL	NL
Volts/Phase:	115/1		115/1	115
Motor Amperage:	2.6	2	1.3	1
Motor RPM:	1550/1300/1050	DIRECT DRIVE	1550/1300/1050	DIRECT DRIVE
Speeds:	3		3	
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:	390	246	200	245
Outside Air CFM:				
Suction Pressure:	NL	-0.18	NL	0.15
Discharge Pressure:	NL	0.04	NL	0.03
Fan Static Pressure:	NL	0.22	NL	0.18
External Pressure:	NL	NA	NL	NA
RPM	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Fan RPM:	NL	DIRECT DRIVE	NL	DIRECT DRIVE
Motor Drive:	NL	DIRECT DRIVE	NL	DIRECT DRIVE
Motor Size/Bore:	NL	DIRECT DRIVE	NL	DIRECT DRIVE
Fan Drive:	NL	DIRECT DRIVE	NL	DIRECT DRIVE
Fan Size/Bore:	NL	DIRECT DRIVE	NL	DIRECT DRIVE
Belt Size / Number:	NL	DIRECT DRIVE	NL	DIRECT DRIVE
Shafts C-C:	NL	DIRECT DRIVE	NL	DIRECT DRIVE
Turns Open:	NL	DIRECT DRIVE	NL	DIRECT DRIVE

Comments:

Project: Chelsea Trial Court
Address: Chelsea, MA
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FAN DATA SHEET

	FAN NO. EF-12		EF-13	
Serves / Location:	Bathroom 331,332 / Roof		Holding Cells 2nd & 3rd fl / Roof	
Manufacturer:	Dayton		Dayton	
Model Number:	4YC65G		4YC65G	
Size:	NL		NL	
Serial Number:	15233029 17K		15241037 17K	
MOTOR	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Manufacturer:	NL	Dayton	NL	Dayton
Frame Number:	NL	NL	NL	NL
Horsepower:	NL	1/25	NL	1/25
Brake Horsepower:	NL	NA	NL	NA
Safety Factor:	NL	NL	NL	NL
Volts/Phase:	115/1	115	115/1	115
Motor Amperage:	1.3	0.9	1.3	0.9
Motor RPM:	1550/1300/1050	DIRECT DRIVE	1550/1300/1050	DIRECT DRIVE
Speeds:	3		3	
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:	500	189	600	279
Outside Air CFM:				
Suction Pressure:	NL	-0.22	NL	-0.18
Discharge Pressure:	NL	0.04	NL	0.03
Fan Static Pressure:	NL	0.26	NL	0.21
External Pressure:	NL	NA	NL	NA
RPM	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Fan RPM:	NL	DIRECT DRIVE	NL	DIRECT DRIVE
Motor Drive:	NL	DIRECT DRIVE	NL	DIRECT DRIVE
Motor Size/Bore:	NL	DIRECT DRIVE	NL	DIRECT DRIVE
Fan Drive:	NL	DIRECT DRIVE	NL	DIRECT DRIVE
Fan Size/Bore:	NL	DIRECT DRIVE	NL	DIRECT DRIVE
Belt Size / Number:	NL	DIRECT DRIVE	NL	DIRECT DRIVE
Shafts C-C:	NL	DIRECT DRIVE	NL	DIRECT DRIVE
Turns Open:	NL	DIRECT DRIVE	NL	DIRECT DRIVE

Comments:

Project: Chelsea Trial Court
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FAN DATA SHEET

	FAN NO. EF-15		EF-16	
Serves / Location:	Bathroom 331,332 / Roof		Holding Cells Basement / Roof	
Manufacturer:	Acme		Penn Ventilator	
Model Number:	PRN126		RFX-22B	
Size:	NL		NL	
Serial Number:	18G1318-8		NL	
MOTOR	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Manufacturer:	NL	US Motors	NL	Baldor
Frame Number:	NL	56	NL	56
Horsepower:	NL	1/4	NL	1/2
Brake Horsepower:	NL	NA	NL	NA
Safety Factor:	NL	NL	NL	1.25
Volts/Phase:	115/1	115	460/3	477
Motor Amperage:	2.7	2.1	0.8	.6/.6/.7
Motor RPM:	1625	DIRECT DRIVE	1750	1761
Speeds:	1	1	1	1
Heater Size:	NL	CB	NL	CB
Heater Amps.:	NL	CB	NL	CB
FAN	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Supply Air CFM:				
Return Air CFM:				
Exhaust Air CFM:	875	903	2420	2030
Outside Air CFM:				
Suction Pressure:	NL	-0.26	NL	-0.43
Discharge Pressure:	NL	0.04	NL	0.03
Fan Static Pressure:	NL	0.3	NL	0.46
External Pressure:	NL	NA	NL	NA
RPM	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Fan RPM:	NL	DIRECT DRIVE	NL	NA
Motor Drive:	NL	DIRECT DRIVE	NL	1VL34
Motor Size/Bore:	NL	DIRECT DRIVE	NL	5/8"
Fan Drive:	NL	DIRECT DRIVE	NL	INLINE
Fan Size/Bore:	NL	DIRECT DRIVE	NL	INLINE
Belt Size / Number:	NL	DIRECT DRIVE	NL	AX60 / 1
Shafts C-C:	NL	DIRECT DRIVE	NL	INLINE
Turns Open:	NL	DIRECT DRIVE	NL	1

Comments:

Project: Chelsea Trial Court
Address: Chelsea, MA
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TRAVERSE DATA

SYSTEM: EF-16 TRAVERSE NUMBER : T-1
TRAVERSE LOCATION: EXHAUST

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

AIR DENSITY DATA

STATIC PRESS @ CL:	-0.42	InWg.	DESIGN CFM =	2420
DUCT AIR TEMP :		Deg F	ACTUAL CFM =	2030
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**2338**

AIR DENSITY RATIO CORRECTION = 1.15
SCFM CORRECTION FACTOR 1.15
ACTUAL DENSITY 0.086

TEST HOLE	1	2	3	4	5	6	7
A	721	636	603				
B	795	785	835				
C	864	905	900				
D	897	918	876				
E	760	751	800				
F							
G							
H							
I							

NO. OF READINGS = 15 AVERAGE FPM = 803

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Greg Miller