SUFFOLK COUNTY SUPERIOR COURTHOUSE
HVAC SYSTEM EVALUATION SUMMARY

Tighe & Bond visited the Suffolk County Superior Courthouse on February 8th, 2021. While on site we inspected the air handling equipment located in the mechanical rooms and toured the facility to determine if the spaces generally matched usages noted on the architectural plans. Tighe and Bond was provided with mechanical design plans from 1937 and 2005. Our analysis is based on these drawings and our one day on site.

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	56	4000	71	1200	21
Civil Courtroom 304	24	4400	183	1600	67
Civil Courtroom 306	24	4400	183	1600	67
Civil Courtroom 313	22	4400	200	1600	73
Civil Courtroom 314	22	4400	200	1600	73
First Session 704	24	4400	184	1600	67
Magistrate 705	15	2250	150	818	55
Criminal Courtroom 805	24	4400	183	1600	67
Criminal Courtroom 806	24	4400	183	1600	67
Criminal Courtroom 815	24	4400	183	1600	67
Criminal Courtroom 817	24	4400	183	1600	67
Criminal Courtroom 906	49	4400	90	1600	33
Criminal Courtroom 907	24	4400	183	1600	67
Criminal Courtroom 914	24	4400	183	1600	67
Criminal Courtroom 916	24	4400	183	1600	67
Civil Court 1006	24	4400	183	1600	67
Civil Court 1008	24	4400	183	1600	67
Civil court 1015	24	4400	183	1600	67
Civil Court 1017	24	4400	183	1600	67

2.0 Recommendations

Section	Recommendation/Finding	Action
2.1	**Filter Efficiency**	
RF-3	Install a differential pressure sensor with a display across the filter bank.	In-progress
RF-3a	Connect the pressure sensor to the BMS system and/or a local alarm.	In-progress
2.2	**Testing and Balancing**	
RTB-1	Test and rebalance air handling unit supply air and minimum outside air flow rate.	Complete

RTB-2	Rebalance system return air flow rate.	Complete
RTB-6	Test air handler refrigerant coils.	In-progress
2.3	**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.	In-progress
RE-2	Clean air handler coils and drain pans.	Complete
2.4	**Control System**	
RC-1	Implement a pre and post-occupancy flush sequence.	In-progress
RC-4	Confirm the economizer control sequence is operational.	In-progess
RC-5	Disable demand control ventilation sequences. We recommend temporarily disabling demand control ventilation systems.	In-progress
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.*	Complete
2.6	**Humidity Control**	
	No actionable items listed – continuous monitoring for seasonal changes	In-progress
2.7	**Other Recommendations**	
2.7.1	Air handling Units and add heating coils	Deferred – included in 5 year capital plan
2.7.2	Unit Ventilators – Restore outdoor air	Deferred – included in 5 year capital plan
2.7.3	Add Return Fan for AC-7	Deferred – included in 5 year capital plan
2.7.4	Replace Supply Fan Serving Courtroom 1309 with an Air Handler	Deferred – included in 5 year capital plan
2.7.5	Mechanical Ventilation and Air Conditioning Feasibility Study	Deferred – included in 5 year capital plan
2.7.6	Investigate Insulating Holding Cell Wall	Deferred – included in 5 year capital plan

Suffolk County Courthouse Boston, MA

HVAC SYSTEM EVALUATIONS COVID-19

Office of Court Management

July 13, 2021

Tighe&Bond

100% Recyclable

Section 1
Existing Conditions & Site Observations

Tighe & Bond visited the Suffolk County Courthouse on February 8th, 2021. While on site we inspected the air handling equipment located in the mechanical rooms and toured the facility to determine if the spaces generally matched usages noted on the architectural plans. Tighe and Bond was provided with mechanical design plans from 1937 and 2005. Our analysis is based on these drawings and our one day on site.

Site Visit Attendees:

- *Office of Court Management:*
  - Jose Ramos, Courthouse Facilities Staff
- *Tighe & Bond*
  - Jason Urso, PE, Senior Mechanical Engineer
  - Tim Bill, Staff Mechanical Engineer

1.1 Existing Ventilation System

The Suffolk County Courthouse was constructed in 1937 and is approximately 395,000 square feet in size. A renovation in 2005 installed nineteen new air conditioning (AC) air handlers to serve Courtrooms and the Lockup area. Each unit contains a supply fan, refrigerant (DX) cooling coil, and 2" MERV 13 filters. Each unit also contains a condenser coil. A remote condenser fan draws air from the outside, blows air over the condenser coil, and discharges waste heat from the refrigerant circuit to the outdoors. There are no filters protecting the condenser coils and the coils are very dirty. Dirty condenser coils can reduce heat transfer efficiency and the effectiveness of the cooling coils in the AC units. The 2005 as-built drawings do not indicate that any of the AC units contain heating. A dedicated return fan serves each unit except AC-7. The AC units are approximately 16 years old (assuming they have not been replaced since 2005) and are in good to fair condition and the return fans are in fair condition. The dampers and actuators in the units are in good condition. The cooling coils are dirty and should be cleaned. The mixed air temperature sensors inside the AC units are not installed correctly and are laying on the ductwork in several units. According to facility staff, all AC units except AC-7 do not run during the winter, meaning the Courtrooms are not ventilated during the heating season.

AC-7 serves the lockup area and to our knowledge is the only unit that runs during the winter. There is a steam heating coil located in the supply ductwork, downstream from AC-7. The unit does not have a return fan, so AC-7 appears to have been designed to return air back to itself. According to facility staff, the fan in AC-7 is not able to return air from the lockup corridor or support areas. While on site we observed a section of the return duct in the mechanical room was removed and a filter was installed. AC-7 is returning air from the mechanical room instead of the lockup corridor. Exhaust fan EF-4 provides exhaust for the cells.

The 2005 as-built drawings indicate that a fan and a duct mounted steam heating coil located in the 16th floor mezzanine level provide 100% outdoor air to Supreme Courtroom

1309. It is not clear from the drawings if a filter is installed in the ductwork. Exhaust fan EF-32 exhausts air from this Courtroom.

The elevator lobby is centrally located within the building and does not appear to be ventilated. Facility staff indicated the lobbies get very warm during the summer.

According to the existing drawings, unit ventilators (UV) are installed in some perimeter spaces throughout the Courthouse, but not all. Some Courtrooms and the Jury Pool room contain UVs. They were designed to provide outdoor ventilation air via a connection to outdoor air louvers, however according to Courthouse staff, all outdoor air connections from unit ventilators have been blocked off. It appears any space served by UVs are not receiving ventilation air. The age of the unit ventilators is unknown. During our site visit, we removed the front cover of the UV in Courtroom 1006. We noticed that there was no filter inside of this unit and confirmed that the connection to the outdoor air louver was blocked.

Many perimeter spaces, such as offices, Jury rooms, etc. not mechanically ventilated and only contain steam radiators and window air conditioners.

Cell 1 is located next to the intake air louver for the AC units and according to the officers is unusable because the cell is either too hot or too cold due to the hot or cold outside air passing along the wall of the cell. The cells have a ceiling supply and floor exhaust that are near one another, possibly causing the air to short circuit. Short circuiting occurs when air is exhausted shortly after being supplied into the room, causing poor air distribution and ventilation effectiveness within the space. One way to check to see if the air is short circuiting is with a duct smoke test. The lockup area corridor has supply grilles, return grilles, and unit ventilators. According to staff, the unit ventilator OA intake is blocked off, however we could not confirm this during out site visit. The lockup area is also exhausted with a dedicated exhaust fan.

Window air conditioners were also specified in the 2005 design drawings. Window air conditioners do not provide ventilation air. In speaking with facility staff, they have to block every air conditioner up with plastic in the winter and remove the plastic in the summer, as well as repair or replace units, which can be extremely time consuming.

While on site we noticed that the toilet room in Jury Room M1008 did not contain an exhaust grille. We presume other Jury toilet rooms may not be exhausted, however we did not confirm this while on site. Toilet exhaust is required per the International Mechanical Code.

A 42 million BTU/hr steam boiler plant provides steam to unit ventilators, radiators, and unit heaters throughout the building.

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

TABLE 1
Existing Air Handling Units

Unit	Original Design Airflow (CFM)	Original Design Min. O.A. (CFM)	Pre/Final Filters	Condition
AC-1 thru AC-19	4,400	1,600	2" MERV 13	Fair

Photo 1 - AC-7 (right) with Return Air Filter in Mechanical Room

Photo 2 – Typical Clogged Condenser Coil

Photo 3 – Courtroom 1006 Unit Ventilator

1.2 Existing Control System

A Trane Building Management System (BMS) was installed in 2005 and controls the 19 AC units, AC unit return fans, unit ventilators, exhaust fans, steam boiler plant, unit heaters, and cabinet unit heaters.

According to the 2005 Automatic Temperature Controls (ATC) record documents, the BMS starts and stops the AC units and unit ventilators based on season and occupancy schedules. An economizer sequence allows each AC unit to provide 100% outdoor air when outdoor air temperatures allow, initially set a 60°F. All 19 AC units contain CO2 sensors in the return air ductwork and operate under a demand control ventilation (DCV) sequence of operation, where outdoor ventilation air is reduced when lower occupancy results in space CO2 levels being within an acceptable range.

The ATC documents also state unit ventilators contain outdoor air dampers that provide outdoor air to the spaces they serve. As previously mentioned, it is believed that all unit ventilator outdoor air connections have been sealed shut.

Section 2
Recommendations

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

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

2.1 Filtration Efficiency Recommendations

The filters in the nineteen AC unit air handlers were already upgraded with 2" MERV 13 filters. The use of 2" MERV 13 meets the minimum ASHRAE recommendations for filtration during the pandemic. We recommend that a testing and balancing contractor test and document the airflow and static pressure profile of all air handlers, as outlined in recommendation RF-1 in the "Overview of Recommendations" document. This will help determine if the equipment can accommodate the increase in system static pressure associated with the addition of the MERV 13 filters, without excessively reducing supply air capacity. It is unclear from the design documents provided what MERV rating the AC units were designed to operate with.

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

RF-3: *Install a differential pressure sensor with a display across the filter bank.*

RF-3a: *Connect the pressure sensor to the BMS system and/or a local alarm.*

> Maximum differential pressure should be set per manufacturer's recommendation based on air velocity to ensure filters are within their service lives. Typically, this is not more than 1.0" w.g.

2.2 Testing & Balancing Recommendations

The air handling units are approximately 16 years old and it is unknown to Tighe & Bond when the last time the units were tested and balanced. Also, the code requirements to determine the outdoor air flow rates that were used to design the original system may be different than the 2015 International Mechanical Code (IMC) and current ASHRAE Standard 62.1 requirements.

We recommend the following testing and balancing measures be implemented:

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

> We recommend testing and balancing the outdoor air flow rates for all air handling units to the recommended minimum O.A. rates listed in Table 2.

TABLE 2
Recommended Air Handler O.A. Flow Rates

Unit	Original Supply Airflow (CFM)	Original Design Min. O.A. (CFM)	Current Code Min. O.A. Requirements (CFM)	Recommended Minimum O.A. (CFM)
AC-1 (Courtroom 314)	4,400	1,600	655	**1,600**
AC-2 (Courtroom 313)	4,400	1,600	660	**1,600**
AC-3 (Courtroom 304)	4,400	1,600	580	**1,600**
AC-4 (Courtroom 306)	4,400	1,600	580	**1,600**
AC-5 (Courtroom 704)	4,400	1,600	775	**1,600**
AC-6 (Courtroom 705)	4,400[4]	1,600	525	**1,600**
AC-7 (Detention/Holding Area)	4,400	1,600	500	**1,600**
AC-8 (Courtroom 806)	4,400	1,600	575	**1,600**
AC-9 (Courtroom 808)	4,400	1,600	575	**1,600**
AC-10 (Courtroom 817)	4,400	1,600	575	**1,600**
AC-11 (Courtroom 815)	4,400	1,600	575	**1,600**
AC-12 (Courtroom 906)	4,400	1,600	725	**1,600**
AC-13 (Courtroom 907)	4,400	1,600	575	**1,600**
AC-14 (Courtroom 916)	4,400	1,600	575	**1,600**
AC-15 (Courtroom 914)	4,400	1,600	575	**1,600**
AC-16 (Courtroom 1006)	4,400	1,600	575	**1,600**
AC-17 (Courtroom 1008)	4,400	1,600	575	**1,600**

Unit	Original Supply Airflow (CFM)	Original Design Min. O.A. (CFM)	Current Code Min. O.A. Requirements (CFM)	Recommended Minimum O.A. (CFM)
AC-18 (Courtroom 1017)	4,400	1,600	575	**1,600**
AC-19 (Courtroom 1015)	4,400	1,600	450	**1,600**
Courtroom 401[1]	0	0	375	**N/A[2]**
Courtroom 402[1]	0	0	225	**N/A[2]**
Courtroom 403 Unit Ventilators[3] (Qty. of 3)	Unknown	Unknown	225	**225 ea.**
Courtroom 404 Unit Ventilators[3] (Qty. of 3)	Unknown	Unknown	225	**225 ea.**
Courtroom 1101 Unit Ventilators[3] (Qty. of 2)	Unknown	Unknown	300	**300 ea.**
Courtroom 1102 Unit Ventilators[3] (Qty. of 1)	Unknown	Unknown	500	**500**
Fan 30 (Courtroom 1309)	2,000	2,000	1,000	**2,000**
Jury Pool Room Unit Ventilators[3] (qty. of 4)	1,000 (ea.)	Unknown	300	**300 ea.**

Notes: Although the ASHRAE Position Document on Infectious Aerosols recommends using the latest published standards and codes as a baseline for minimum ventilation, the mechanical code in effect at the time the HVAC systems were designed and constructed is what governs the required outdoor air flowrate for the HVAC equipment, if there have been no additions, renovations, alterations or changes in occupancy to the building. The 2015 International Mechanical Code does not prevent the continued use of existing systems.

Airflow rates noted in this table are based upon floor plans that were provided to Tighe & Bond.

Note 1: According to the plans provided to Tighe & Bond, no ventilation equipment serves this space. This was not verified while on site.

Note 2: Recommended airflow is not applicable because there is no mechanical ventilation equipment serving this space.

Note 3: According to facility staff, the outdoor air louvers were blocked off, therefore no ventilation air is being provided to these spaces.

Note 4: The designed airflow rate noted on the floor plan (2,250 CFM) does not match the airflow noted in the air handling unit schedule (4,400 CFM).

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

The average airflow rate per person is shown below in Table 3. These values only reflect the spaces identified in Table 2 served by AC-1 through AC-19, Courtroom Room 1309, and the Jury Pool Room. The values are based on the original full design supply airflow rate and the recommended outdoor airflow rates shown. This assumes the outdoor air louver serving the Jury Pool room unit ventilators are unblocked and made functional. The airflow rate per person assumes a diversity factor of 70%, meaning the maximum number of occupants assumed to be in all zones at all times equates to 70% of the code required occupancy.

TABLE 3
Average Airflow Rate per Person*

	All spaces served by AC-1 thru AC-19	***Courtrooms (All AC units, excluding AC-7)***	***Non-Courtroom Spaces, Lockup Only (AC-7)***
Total Occupancy (People)	1,442	1,280	162
Total Supply Air (CFM/Person)	61	60	65
Outdoor Air (CFM/Person)	22	22	17

*This table does not reflect other spaces served by unit ventilators, since all outdoor louvers have been blocked off.

The airflow rate per person for each Courtroom and the Jury Pool Room is shown below in Table 4. These values are based on full occupancy without taking diversity into account, the original full design supply airflow rate, and the recommended outdoor airflow rate. The airflow rate per person assumes the full supply airflow is being delivered to the room.

TABLE 4
Airflow Rate per Person (Full Occupancy)

		Total Air		Outdoor Air	
Courtroom	***Total People***	***Supply Airflow (CFM)***	***Airflow Rate (CFM/Person)***	***Outdoor Airflow (CFM)***	***Airflow Rate (CFM/Person)***
Jury Pool Room	187	4,000	21	1,200	6
Civil Courtroom 304	99	4,400	44	1,600	16
Civil Courtroom 306	99	4,400	44	1,600	16
Civil Courtroom 314	112	4,400	39	1,600	14
Civil Courtroom 313	113	4,400	39	1,600	14
First Session 704	132	4,400	33	1,600	12
Magistrate 705	87	2,250	26	818	9
Criminal Courtroom 806	99	4,400	44	1,600	16
Criminal Courtroom 805	98	4,400	45	1,600	16
Criminal Courtroom 817	99	4,400	44	1,600	16
Criminal Courtroom 815	98	4,400	45	1,600	16
Criminal Courtroom 906	124	4,400	35	1,600	13
Criminal Courtroom 907	99	4,400	44	1,600	16
Criminal Courtroom 916	99	4,400	44	1,600	16
Criminal Courtroom 914	98	4,400	45	1,600	16
Civil Court 1006	99	4,400	44	1,600	16
Civil Court 1008	98	4,400	45	1,600	16
Civil Court 1017	99	4,400	44	1,600	16
Civil Court 1015	77	4,400	57	1,600	21

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

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

TABLE 4a
Airflow Rate per Person (Reduced Occupancy)

		Total Air		Outdoor Air	
Courtroom	Total People	Supply Airflow (CFM)	Airflow Rate (CFM/Person)	Outdoor Airflow (CFM)	Airflow Rate (CFM/Person)
Jury Pool Room	56	4,000	71	1,200	21
Civil Courtroom 304	24	4,400	183	1,600	67
Civil Courtroom 306	24	4,400	183	1,600	67
Civil Courtroom 314	22	4,400	200	1,600	73
Civil Courtroom 313	22	4,400	200	1,600	73
First Session 704	24	4,400	184	1,600	67
Magistrate 705	15	2,250	150	818	55
Criminal Courtroom 806	24	4,400	183	1,600	67
Criminal Courtroom 805	24	4,400	183	1,600	67
Criminal Courtroom 817	24	4,400	183	1,600	67
Criminal Courtroom 815	24	4,400	183	1,600	67
Criminal Courtroom 906	49	4,400	90	1,600	33
Criminal Courtroom 907	24	4,400	183	1,600	67
Criminal Courtroom 916	24	4,400	183	1,600	67
Criminal Courtroom 914	24	4,400	183	1,600	67
Civil Court 1006	24	4,400	183	1,600	67
Civil Court 1008	24	4,400	183	1,600	67
Civil Court 1017	24	4,400	183	1,600	67
Civil Court 1015	24	4,400	183	1,600	67

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

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

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

We also recommend testing the airflow of the heat rejection fans serving the condenser coils.

RTB-6: *Test air handler refrigerant coils.*

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

2.3 Equipment Maintenance & Upgrades

We recommend the following equipment maintenance and upgrades:

RE-1: *Test existing air handling system dampers and actuators for proper operation*.

Replace dampers and actuators that are not functioning properly.

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

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.*

We recommend temporarily disabling demand control ventilation systems.

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 main public lobbies and hallways, public waiting areas, the public side of office counters, and Jury Deliberation Rooms. 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.

Regardless of occupancy levels, we recommend installing HEPA filters in elevator lobbies. According to the drawings, the elevator lobbies are not ventilated.

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 Air Handling Units

The air handling units serving Courtrooms do not have the ability to heat supply air. We assume this is the reason they are not operated during the winter, rendering the Courtrooms unventilated during the heating season. To operate these units during the winter, a means to heat the supply air must be provided. Several options are available to temper the supply air during the heating season. One option is to provide duct mounted heating coils in the supply duct of each air handler. We recommend hot water heating coils vs. steam. Steam coils require steam traps, which are difficult to maintain over time. A steam to hot water heat exchanger, hot water pumps, and distribution piping to each air handler will be required, which will be costly and potentially disruptive to occupied spaces and architectural finishes.

Another potential option is to retrofit the existing air handlers with heat pump components, which allows the refrigerant circuit to reverse its operation and reject heat to the supply air. This option must be explored with the air handler manufacturer. Considering the units are 16 years old, it may be more cost effective to replace the air handlers with new heat pump units.

We recommend further investigation to determine which option may be best suited to heat the supply air from the air handling units and allow the ventilation systems to be operated during the winter months.

We also recommend investigating if MERV 6 or 8 filters can be installed upstream of the condenser coils to help keep them clean. These coils reject heat from the refrigerant cooling coil and should have no interaction with the supply air to the building. Maintaining clean condenser coils will help maintain good performance of the refrigerant cooling system. Filters will impose a pressure drop on the fan serving each condenser coil and may have to be rebalanced or in some cases replaced.

2.7.2 Unit Ventilators – Restore outdoor air

The outdoor air louvers serving the unit ventilators (UV) were obstructed, therefore spaces containing UVs are not receiving ventilation air. Outdoor air connections to unit ventilators are typically sealed because of freezing concerns with the heating coils. We recommend further discussions with facility staff to determine why the outdoor air louvers were sealed. Once the root cause is determined, a solution to restore the outdoor air connections to the unit ventilators should be developed.

2.7.3 Add Return Fan for AC-7

It appears AC-7 does not have enough capacity to return air from the lockup support areas and is currently returning air from the mechanical room. We recommend installing a return fan and sealing the return opening in the mechanical room.

2.7.4 Replace Supply Fan Serving Courtroom 1309 with an Air Handler

According the 2005 design drawings, a supply fan (Fan 30) and a duct mounted steam heating coil located in the 16th floor mezzanine level provides ventilation air (100% outdoor air) to Courtroom 1309. To our knowledge, this supply air is not mechanically cooled. If this fan were to run during the cooling season, warm, humid air would be supplied to the Courtroom creating an uncomfortable environment. The window air conditioners will help dehumidify the air; however, they may not have the capacity to handle the cooling load requirement of the outdoor air. Also, best practice is to cool and dehumidify the air before suppling it to a space. Most likely, this fan is not operated during the cooling season, however this has not been confirmed.

Exhaust fan EF-32 located on the 16th floor exhausts air from Courtroom 1309. Should an air handler be provided for this Courtroom, we recommend investigating if the exhaust ductwork can be converted to return ductwork and ducted to the new air handler. This will allow the new air handler to return air from the space instead of supplying 100% outdoor air, and may also provide energy cost savings in tempering the supply air.

2.7.5 Mechanical Ventilation and Air Conditioning Feasibility Study

Many spaces in the Courthouse are not mechanically ventilated or cooled with fixed mechanical equipment. Most spaces are cooled with window air conditioners. We recommend a study of the Courthouse to determine how feasible it is to install mechanical ventilation and cooling, such as a chiller plant, in all occupied spaces.

2.7.6 Investigate Insulating Holding Cell Wall

The Courthouse Officers noted Cell 1 is not usable due to the cell becoming excessively hot or cold. We recommend consulting with an Architect to determine if it's possible to insulate the wall.

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.

Section 3
Testing & Balancing Results

Milharmer Associates, Inc. visited the Suffolk County Courthouse on May 28, 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 Table 5. The 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 Airflow (CFM)**	**Supply Fan Airflow (CFM)**	**Outdoor Airflow (CFM)**	**Return Airflow (CFM)**
AC-1	4,400	1,600	2,800	4,896	0	4,896
AC-2	4,400	1,600	2,800	4,187	1,712	3,105
AC-3	4,400	1,600	2,800	4,842	1,750	3,092
AC-4	4,400	1,600	2,800	2,208	1,976	232
AC-5	4,400	1,600	2,800	4,141	1,467	2,674
AC-6	4,400	1,600	2,800	2,280	734	1,546
AC-7	4,400	1,600	2,800	1,822	1,601	221
AC-8	4,400	1,600	2,800	4,167	2,052	2,115
AC-9	4,400	1,600	2,800	4,127	1,478	2,699
AC-10	4,400	1,600	2,800	4,092	1,743	2,349
AC-11	4,400	1,600	2,800	-	-	-
AC-12	4,400	1,600	2,800	4,219	1,935	2,284
AC-13	4,400	1,600	2,800	4,035	1,636	3,105
AC-14	4,400	1,600	2,800	4,163	1,493	2,670
AC-15	4,400	1,600	2,800	4,369	1,488	2,881
AC-16	4,400	1,600	2,800	4,472	1,547	2,925
AC-17	4,400	1,600	2,800	4,211	1,712	2,499
AC-18	4,400	1,600	2,800	4,269	1,650	2,619
AC-19	4,400	1,600	2,800	4,309	1,792	2,517

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

1. The balancer noted the AC air handlers are in good to fair condition, however the condenser coils are dirty and need to be cleaned before airflow rates across the condenser coils can be documented.
    a. The condenser coils dissipate heat from the refrigerant cooling circuit to help the refrigerant circuit provide adequate cooling capacity. Measuring the airflow across the condenser coil will not give any insight into the quantity of supply air or ventilation air provided to the building. It may help give an indication to how the refrigerant cooling circuit may be performing.
2. AC-2, 3, 5, 8 thru 10 and 12 thru 19 are all performing within the acceptable airflow range.
3. The supply fan for AC-1 is performing within the acceptable airflow range, however the outdoor air damper is stuck closed so there is no ventilation air supplied to the space from this unit. The actuator should be replaced, the outdoor airflow rate should be retested, and the outdoor air damper set to the proper position.
4. AC-4 is only supplying 50% of design airflow, but the OA flow rate is with acceptable design range. The return fan is operating well below design.
    a. The outdoor air accounts for approximately 89% of the total supply airflow, which changes the entering mixed air conditions. AC-4 was not designed the provide this percentage of outdoor air and may lead to colder (in the winter) and hotter and more humid (in the summer) supply air than desired, causing uncomfortable space conditions.
5. AC-6 is operating at 50% of design supply, return, and OA airflow.
6. AC-7 is supplying 41% of the design supply flow, but the OA flow rate is with acceptable design range. As suspected, AC-7 isn't returning the proper quantity of air, which is most likely due to not having a dedicated return fan. We recommend installing a return fan to serve AC-7.
7. AC-11 return air damper actuator is disconnected and causing low airflow. Airflow readings could not be taken. We recommend replacing the actuator and retesting the unit.
8. The exhaust fans were not tested.
9. The balancer noted the perimeter unit ventilators in the Courtrooms and Jury Pool Room have been boarded up and are not running.

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: **Suffolk Superior Court**
Boston, MA

Project No.: **21-210** **Project Date:** **5/28/2021**

MECHANICAL CONTRACTOR
Tighe & Bond

3384

A N.E.B.B. Certified Company

Project:	Suffolk Superior Court		
Address:	Boston, MA		
Date:	5/28/2021	**Project No.**	21-210

CERTIFICATION

Submitted & Certified by:

Milharmer Associates, Inc.

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

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

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

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

Certification

SCOTT F. MILLER

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

Testing, Adjusting and Balancing of Environmental Systems

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

CP-23541

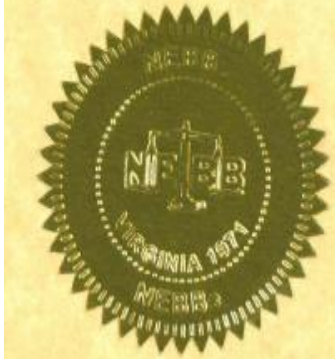
NEBB Certification Number

March 31, 2023

Expiration Date

NEBB President

NEBB President-Elect



Firm Certification

MILHARMER ASSOCIATES, INC.

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

Testing, Adjusting and Balancing of Environmental Systems

3384

NEBB Certification Number

March 31, 2023

Expiration Date

NEBB President

NEBB President-Elect

Project:	Suffolk Superior Court		
Address:	Boston, MA		
Date:	5/28/2021	**Project No.**	21-210

TABLE OF CONTENTS

Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

INSTRUMENT SHEET

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

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

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

Technician:

SYMBOL SHEET

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

SYMBOL SHEET CONTINUED

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

Project:	Suffolk Superior Court		
Address:	Boston, MA		
Date:	5/28/2021	**Project No.**	21-210

REPORT SUMMARY

Test and balance of AC-1 -19 serving Courtrooms.

All equipment is existing and is in good to fair condition. Regular maintenance has been performed.

All O.A. damper positions had to be adjusted as AC's were tested to meet required values. Every AC had a 15% open position when first tested. And were adjusted (see new positions).

The following items need to be addressed:

AC-1:	OA damper is stuck closed. Could not set O.A. damper position.
	Actuator needs to be replaced.
AC-6:	Return registers are partially blocked off.
AC-11:	Return air damper actuator is disconnected resulting in low airflow.

New O.A. damper positions to meet required value:

AC-1	Damper stuck closed.
AC-2	50% position
AC-3	40% position
AC-4	65% position
AC-5	50% position
AC-6	20% position
AC-7	100% position
AC-8	60% position
AC-9	40% position
AC-10	60% position
AC-11	Return actuator needs replacement
AC-12	45% position
AC-13	55% position
AC-14	45% position
AC-15	60% position
AC-16	50% position
AC-17	50% position
AC-18	50% position
AC-19	50% position

Project:	Suffolk Superior Court		
Address:	Boston, MA		
Date:	5/28/2021	**Project No.**	21-210

REPORT SUMMARY

The perimeter UV's observed in the Courtrooms and Jury Pool Room have been boarded up and are not runnig.

The condenser coils for the AC Units are all plugged with dirt which needs to be cleaned before airflow across the coil and be measured.

Project:	Suffolk Superior Court		
Address:	Boston, MA		
Date:	5/28/2021	**Project No.**	21-210

REPORT SUMMARY

AC UNITS

UNIT	SUPPLY	RETURN	OUTSIDE AIR
AC-1	4,896 CFM	4,896 CFM	*1
AC-2	4,187 CFM	3,105 CFM	1,712 CFM
AC-3	4,842 CFM	3,092 CFM	1,750 CFM
AC-4	2,208 CFM	232 CFM	1,976 CFM
AC-5	4,141 CFM	2,674 CFM	1,467 CFM
AC-6	2,280 CFM	1,546 CFM	734 CFM
AC-7	1,822 CFM	221 CFM	1,601 CFM
AC-8	4,167 CFM	2,115 CFM	2,052 CFM
AC-9	4,127 CFM	2,699 CFM	1,478 CFM
AC-10	4,092 CFM	2,349 CFM	1,743 CFM
AC-11	*2		
AC-12	4,219 CFM	2,284 CFM	1,935 CFM
AC-13	4,035 CFM	3,105 CFM	1,636 CFM
AC-14	4,163 CFM	2,670 CFM	1,493 CFM
AC-15	4,369 CFM	2,881 CFM	1,488 CFM
AC-16	4,472 CFM	2,925 CFM	1,547 CFM
AC-17	4,211 CFM	2,499 CFM	1,712 CFM
AC-18	4,269 CFM	2,619 CFM	1,650 CFM
AC-19	4,309 CFM	2,517 CFM	1,792 CFM

*1 Outside Air Damper is stuck closed.

*2 Return air damper actuator is disconnected causing low flow..

Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

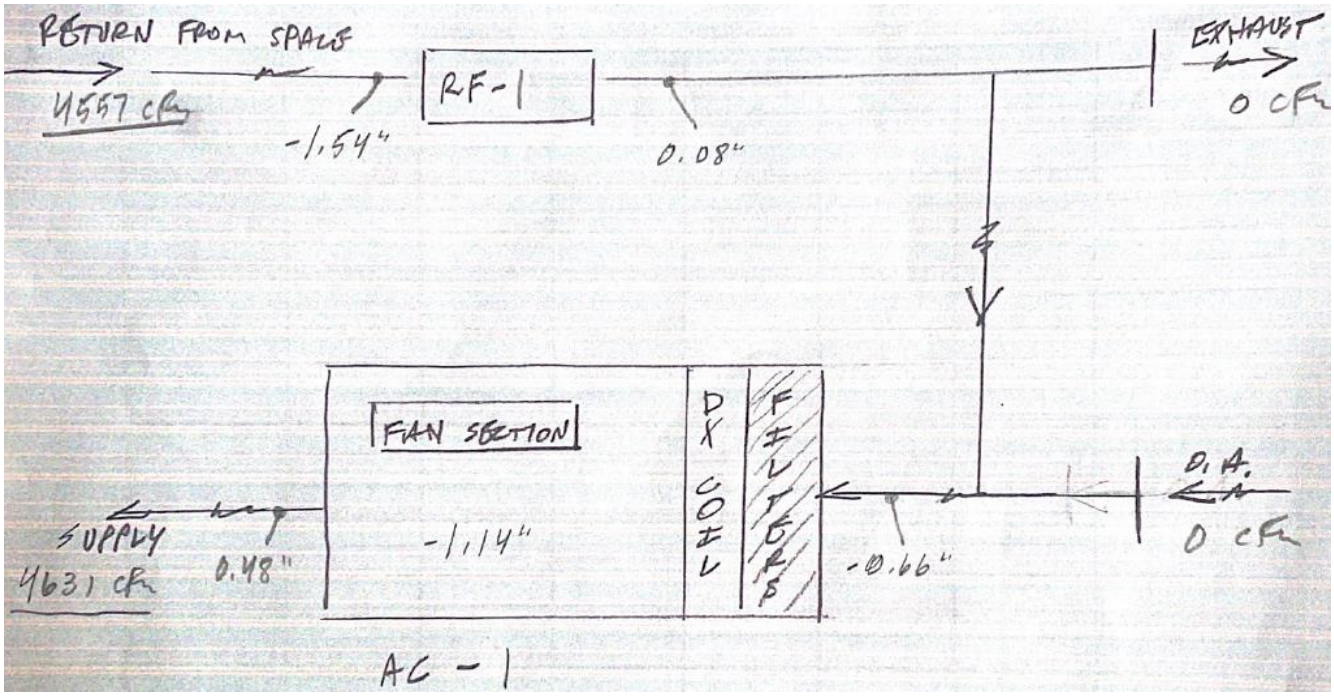
FAN DATA SHEET

	FAN NO. AC-1		FAN NO. RF-1	
Serves / Location:	COURT 314	M375	COURT 314	M375
Manufacturer:	TRANE		GREENHECK	
Model Number:	SC1H10043		SWB-216-20	
Size:	NL		NL	
Serial Number:	NL		NL	
MOTOR	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Manufacturer:	NL	WEG	NL	MARATHON
Frame Number:	NL	182T	NL	145T
Horsepower:	NL	3	NL	2
Brake Horsepower:	NL	NA	NL	NA
Safety Factor:	NL	1.25	NL	1.15
Volts/Phase:	460/3	460	460/3	460
Motor Amperage:	3.9	2.6/2.7/2.7	2.9	2.3/2.2/2.2
Motor RPM:	1765	1765	1735	1735
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:	4400	4896		
Return Air CFM:			4400	4544
Exhaust Air CFM:				
Outside Air CFM:	1600	*1		
Suction Pressure:	NL	-1.14	NL	-1.54
Discharge Pressure:	NL	0.48	NL	0.08
Fan Static Pressure:	1.75	1.62	NL	NA
External Pressure:	1.2	1.14	0.95	1.62
RPM	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Fan RPM:	NL	882	1820	1922
Motor Drive:	NL	BK40H	NL	2VP34
Motor Size/Bore:	NL	H1 1/8	NL	7/8"
Fan Drive:	NL	BK80	NL	AK30
Fan Size/Bore:	NL	1"	NL	H1 1/4
Belt Size / Number:	NL	B32/1	NL	A33/2
Shafts C-C:	NL	7"	NL	12 1/2
Turns Open:	NL	FIXED	NL	2

Comments: ***1 O.A. damper stuck closed.**

Project:	Suffolk Superior Court		
Address:	Boston, MA		
Date:	5/28/2021	**Project No.**	21-210

ROOM PRESSURIZATION
AC-1 / RF-1 COURTROOM SYSTEM



Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

TRAVERSE DATA

SYSTEM: AC-1 TRAVERSE NUMBER : T1
Supply TRAVERSE LOCATION: M305A

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:	0.48	InWg.	DESIGN CFM =	4400
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	4896
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**4904**

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	1433	1205	758	690	801		
B	1419	1026	887	742	890		
C	1496	1272	1081	926	985		
D	1535	1271	1203	1048	1090		
E							
F							
G							
H							
I							

NO. OF READINGS = 20 AVERAGE FPM = 1088

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Brian Murphy

Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

TRAVERSE DATA

SYSTEM: RF-1 TRAVERSE NUMBER : T1
TRAVERSE LOCATION: M305A

DUCT SIZE (ROUND)	18	" DIAMETER	Sq Ft =	1.77
DUCT SIZE (RECT.)		" WIDTH x	" DEPTH Sq Ft =	0.00

AIR DENSITY DATA

STATIC PRESS @ CL:	1.54	InWg.	DESIGN CFM =	4400
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	4544
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**4563**

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	2479	2877	2989	2852			
B	2818	2792	1859	2712			
C	3011	2668	2120	2151			
D	2915	2712	2402	1783			
E	2916	2996	2744	1653			
F							
G							
H							
I							

NO. OF READINGS = 20 AVERAGE FPM = 2572

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Brian Murphy

Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

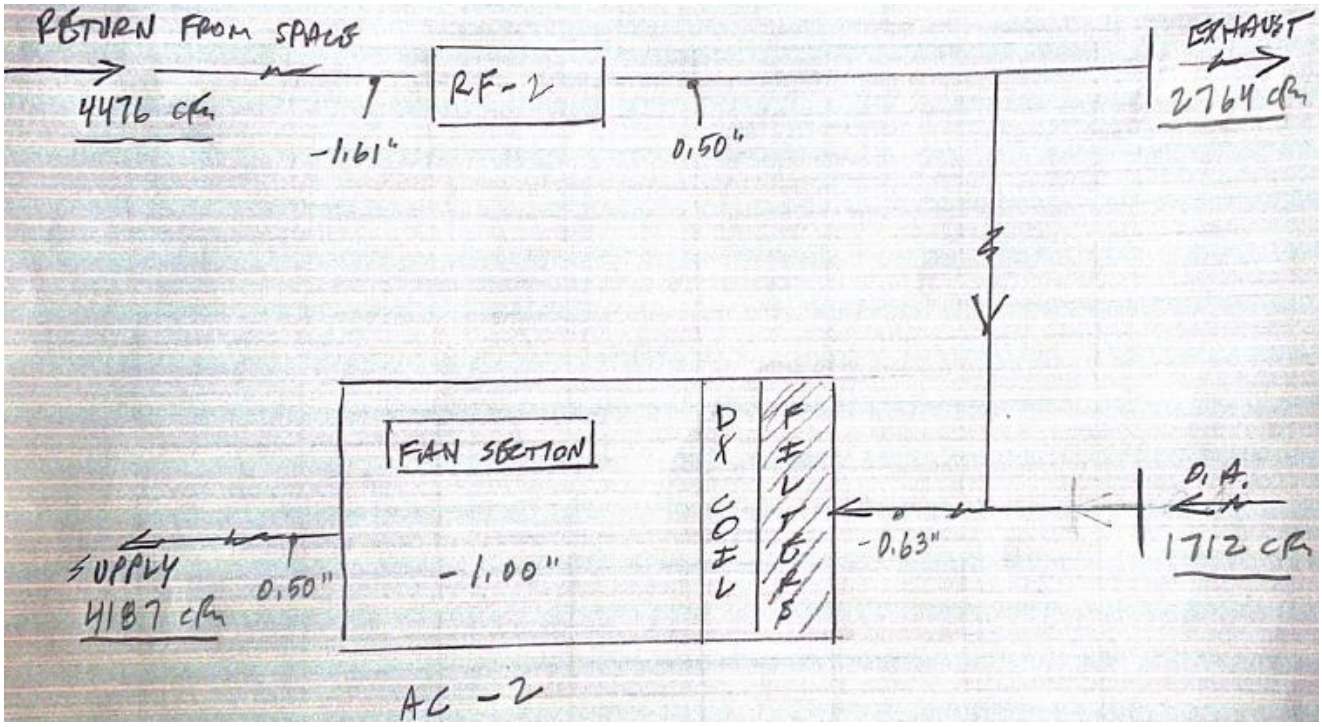
FAN DATA SHEET

	FAN NO. AC-2		FAN NO. RF-2	
Serves / Location:	COURT 313	M360	COURT 313	M360
Manufacturer:	TRANE		GREENHECK	
Model Number:	SC1H10043		SWB-216-20	
Size:	NL		NL	
Serial Number:	NL		NL	
MOTOR	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Manufacturer:	NL	WEG	NL	MARATHON
Frame Number:	NL	182T	NL	145T
Horsepower:	NL	3	NL	2
Brake Horsepower:	NL	NA	NL	NA
Safety Factor:	NL	1.25	NL	1.15
Volts/Phase:	460/3	460	460/3	460
Motor Amperage:	3.9	2.6/2.4/2.4	2.9	2.1/2.0/2.0
Motor RPM:	1765	1765	1735	1735
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:	4400	4187		
Return Air CFM:			4400	4467
Exhaust Air CFM:				
Outside Air CFM:	1600	1712 *1		
Suction Pressure:	NL	-1	NL	-1.61
Discharge Pressure:	NL	0.5	NL	0.51
Fan Static Pressure:	1.75	1.5	NL	NA
External Pressure:	1.2	1.13	0.95	2.11
RPM	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Fan RPM:	NL	882	1820	1922
Motor Drive:	NL	BK40H	NL	2VP34
Motor Size/Bore:	NL	H1 1/8	NL	7/8"
Fan Drive:	NL	BK80	NL	AK30
Fan Size/Bore:	NL	1"	NL	H1 1/4
Belt Size / Number:	NL	B32/1	NL	A33/2
Shafts C-C:	NL	7"	NL	12 1/2
Turns Open:	NL	FIXED	NL	2

Comments: ***1 O.A. damper at 50%.**

Project:	Suffolk Superior Court		
Address:	Boston, MA		
Date:	5/28/2021	**Project No.**	21-210

ROOM PRESSURIZATION
AC-1 / RF-2 COURTROOM SYSTEM



Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

AIR DISTRIBUTION

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

ROOM OR LOCATION	UNIT NUMBER	UNIT SIZE	AREAxK FACTOR	DESIGN FT/MIN	TEST FT/MIN	DESIGN CFM	TESTED CFM
Court 313	1	24X24	FH	NA	NA	730	442
Court 313	2	24X24	FH	NA	NA	730	500
Court 313	3	24X24	FH	NA	NA	730	555
Court 313	4	24X24	FH	NA	NA	730	404
Court 313	5	24X24	FH	NA	NA	730	482
Court 313	6	24X24	FH	NA	NA	730	496
Court 313	7	24X24	FH	NA	NA	730	608
Court 313	8	24X24	FH	NA	NA	730	700
Comments:					TOTALS:	5840	4187

Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

TRAVERSE DATA

SYSTEM: RF-2 TRAVERSE NUMBER : T1
TRAVERSE LOCATION: M312

DUCT SIZE (ROUND)	18	" DIAMETER	Sq Ft =	1.77
DUCT SIZE (RECT.)		" WIDTH x	" DEPTH Sq Ft =	0.00

AIR DENSITY DATA

STATIC PRESS @ CL:	-1.61	InWg.	DESIGN CFM =	4400
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	4467
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**4452**

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	2918	1631	638	3280			
B	3226	2436	356	3152			
C	3360	2633	683	3004			
D	3155	2230	3842	2997			
E	3197	1363	3532	2952			
F							
G							
H							
I							

NO. OF READINGS = 20 AVERAGE FPM = 2529

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Brian Murphy

Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

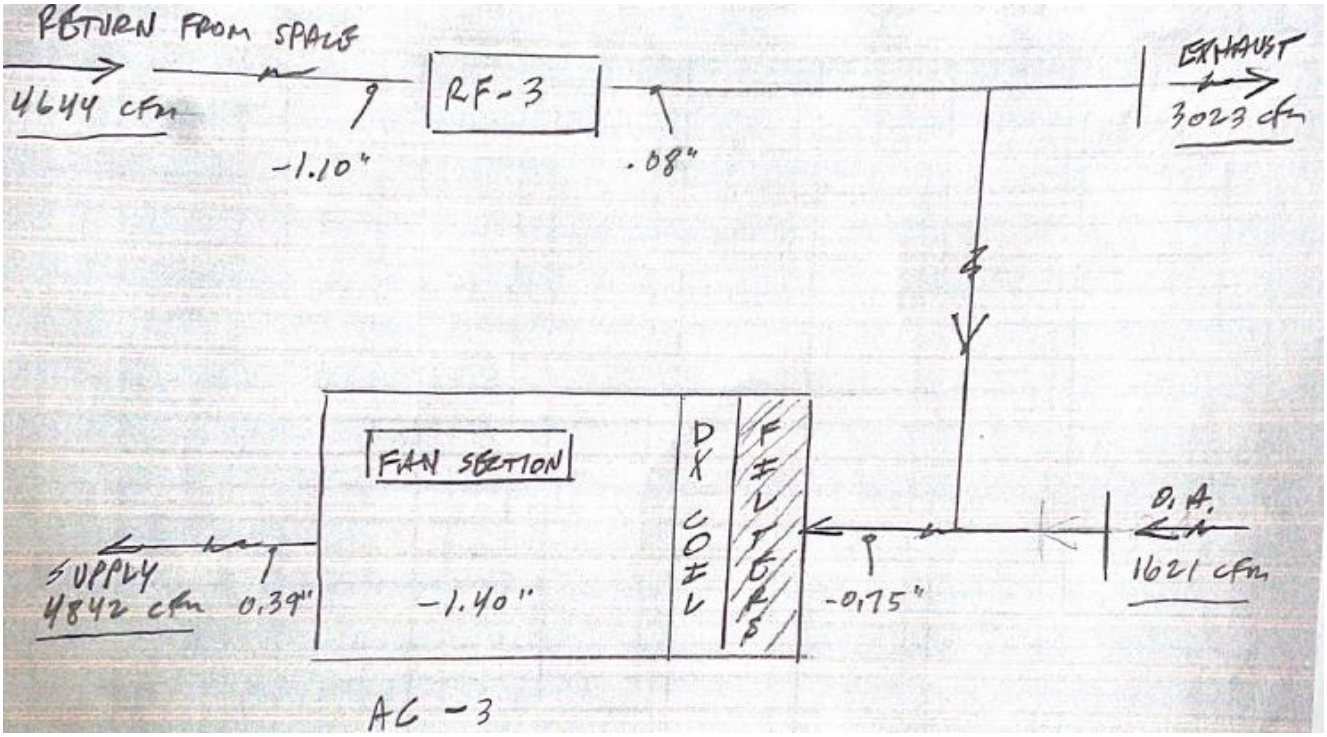
FAN DATA SHEET

	FAN NO. AC-3		FAN NO. RF-3	
Serves / Location:	COURT 306	M355	COURT 306	M355
Manufacturer:	TRANE		GREENHECK	
Model Number:	SC1H10043		SWB-216-20	
Size:	NL		NL	
Serial Number:	NL		NL	
MOTOR	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Manufacturer:	NL	WEG	NL	MARATHON
Frame Number:	NL	182T	NL	145T
Horsepower:	NL	3	NL	2
Brake Horsepower:	NL	NA	NL	NA
Safety Factor:	NL	1.25	NL	1.15
Volts/Phase:	460/3	460	460/3	460
Motor Amperage:	3.9	2.2/2.1/2.1	2.9	2.1/2/1.9
Motor RPM:	1765	1765	1735	1735
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:	4400	4842		
Return Air CFM:			4400	4634
Exhaust Air CFM:				
Outside Air CFM:	1600	1750 *1		
Suction Pressure:	NL	-1.4	NL	-1.1
Discharge Pressure:	NL	0.39	NL	0.08
Fan Static Pressure:	1.75	1.79	NL	NA
External Pressure:	1.2	1.14	0.95	1.18
RPM	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Fan RPM:	NL	882	1820	1922
Motor Drive:	NL	VP60	NL	2VP34
Motor Size/Bore:	NL	H1 1/8	NL	7/8"
Fan Drive:	NL	BK80	NL	AK30
Fan Size/Bore:	NL	1"	NL	H1 1/4
Belt Size / Number:	NL	B32/1	NL	A33/2
Shafts C-C:	NL	7"	NL	12 1/2
Turns Open:	NL	3	NL	2

Comments: ***1 O.A. damper at 40%.**

Project:	Suffolk Superior Court		
Address:	Boston, MA		
Date:	5/28/2021	**Project No.**	21-210

ROOM PRESSURIZATION
AC-3 / RF-3 COURTROOM SYSTEM



Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

AIR DISTRIBUTION

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

ROOM OR LOCATION	UNIT NUMBER	UNIT SIZE	AREAxK FACTOR	DESIGN FT/MIN	TEST FT/MIN	DESIGN CFM	TESTED CFM
Court 306	1	24X24	FH	NA	NA	730	559
Court 306	2	24X24	FH	NA	NA	730	993
Court 306	3	24X24	FH	NA	NA	730	979
Court 306	4	24X24	FH	NA	NA	730	789
Court 306	5	24X24	FH	NA	NA	730	762
Court 306	6	24X24	FH	NA	NA	730	760
					TOTALS:	4380	4842

Comments:

Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

TRAVERSE DATA

SYSTEM: AC-3 TRAVERSE NUMBER : T1
O.A. TRAVERSE LOCATION: M308A

DUCT SIZE (ROUND)		" DIAMETER			Sq Ft =	0.00
DUCT SIZE (RECT.)	26	" WIDTH x	26	" DEPTH	Sq Ft =	4.69

AIR DENSITY DATA

STATIC PRESS @ CL:	-0.48	InWg.	DESIGN CFM =	1600
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	1750
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**1749**

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	337	233	283	277			
B	263	266	257	281			
C	441	334	363	381			
D	521	463	381	421			
E	555	521	516	363			
F							
G							
H							
I							

NO. OF READINGS = 20 AVERAGE FPM = 373

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Brian Murphy

Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

TRAVERSE DATA

SYSTEM: RF-3 TRAVERSE NUMBER : T1
TRAVERSE LOCATION: M308A

DUCT SIZE (ROUND)	18	" DIAMETER	Sq Ft =	1.77
DUCT SIZE (RECT.)		" WIDTH x	" DEPTH Sq Ft =	0.00

AIR DENSITY DATA

STATIC PRESS @ CL:	NA	InWg.	DESIGN CFM =	4400
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	4634
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**4637**

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	1092	2843	2649	2378			
B	2776	2943	2361	2307			
C	3409	2900	2551	2487			
D	3493	3024	2481	2128			
E	2977	3084	2269	2326			
F							
G							
H							
I							

NO. OF READINGS = 20 AVERAGE FPM = 2624

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Brian Murphy

Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

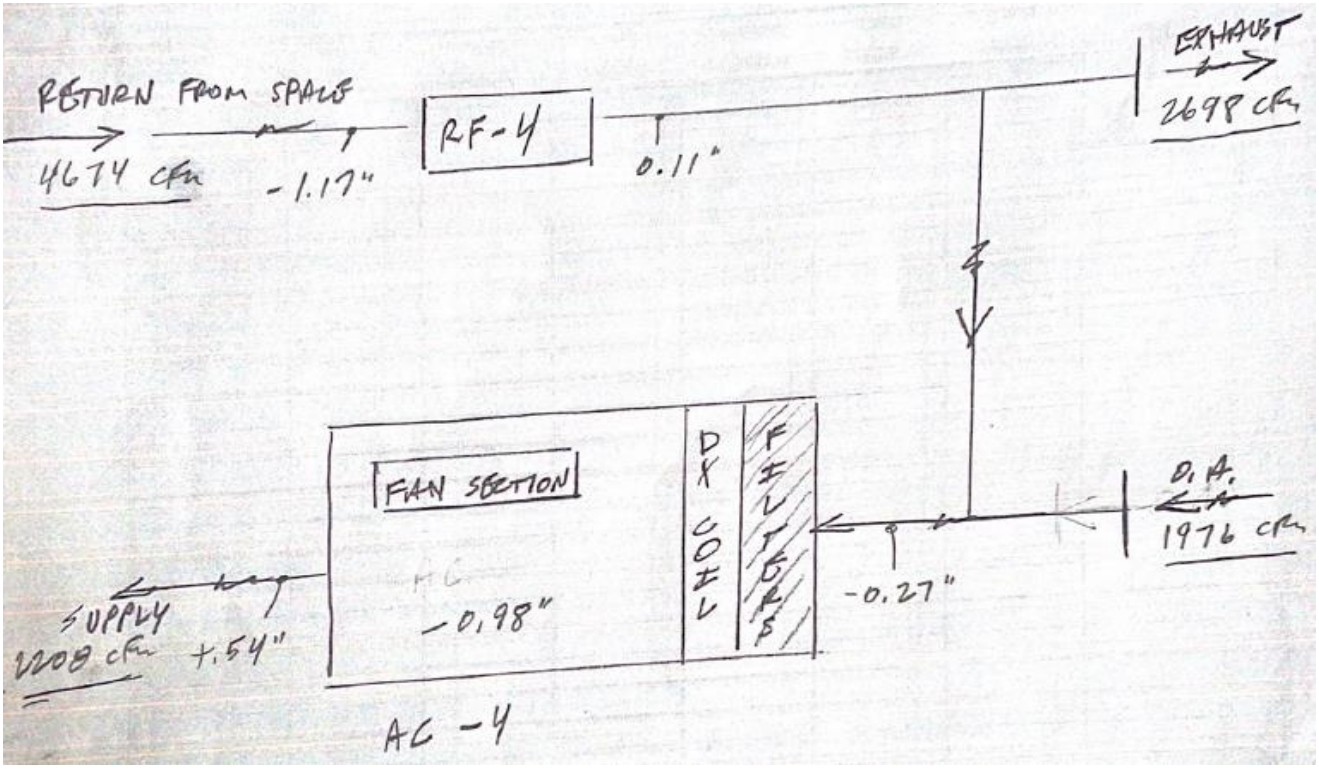
FAN DATA SHEET

	FAN NO. AC-4		FAN NO. RF-4	
Serves / Location:	COURT 304	M355	COURT 304	M355
Manufacturer:	TRANE		GREENHECK	
Model Number:	SC1H10043		SWB-216-20	
Size:	NL		NL	
Serial Number:	NL		NL	
MOTOR	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Manufacturer:	NL	WEG	NL	MARATHON
Frame Number:	NL	182T	NL	145T
Horsepower:	NL	3	NL	2
Brake Horsepower:	NL	NA	NL	NA
Safety Factor:	NL	1.25	NL	1.15
Volts/Phase:	460/3	460	460/3	460
Motor Amperage:	3.9	3.2/3.3/3.3	2.9	2.1/2.1/2.0
Motor RPM:	1765	1765	1735	1735
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:	4400	2208 *1		
Return Air CFM:			4400	4665
Exhaust Air CFM:				
Outside Air CFM:	1600	1976		
Suction Pressure:	NL	-0.98	NL	-1.17
Discharge Pressure:	NL	0.54	NL	0.11
Fan Static Pressure:	1.75	1.52	NL	NA
External Pressure:	1.2	0.81	0.95	1.28
RPM	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Fan RPM:	NL	1324	1820	1922
Motor Drive:	NL	VP60	NL	2VP34
Motor Size/Bore:	NL	1 1/8	NL	7/8"
Fan Drive:	NL	BK80	NL	AK30
Fan Size/Bore:	NL	1"	NL	H1 1/4
Belt Size / Number:	NL	B32/1	NL	A33/2
Shafts C-C:	NL	7"	NL	12 1/2
Turns Open:	NL	3	NL	2

Comments: ***1 Air was previously dampered down due to comfort. O.A. damper at 65% open..**

Project:	Suffolk Superior Court		
Address:	Boston, MA		
Date:	5/28/2021	**Project No.**	21-210

ROOM PRESSURIZATION
AC-4 / RF-4 COURTROOM SYSTEM



Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

AIR DISTRIBUTION

SYSTEM: AC-4
SUPPLY [X] RETURN [ ] EXHAUST [ ]

ROOM OR LOCATION	UNIT NUMBER	UNIT SIZE	AREAxK FACTOR	DESIGN FT/MIN	TEST FT/MIN	DESIGN CFM	TESTED CFM
Court 304	1	24X24	FH	NA	NA	730	339
Court 304	2	24X24	FH	NA	NA	730	419
Court 304	3	24X24	FH	NA	NA	730	422
Court 304	4	24X24	FH	NA	NA	730	101
Court 304	5	24X24	FH	NA	NA	730	467
Court 304	6	24X24	FH	NA	NA	730	460
					TOTALS:	4380	2208 *1

Comments: ***1 Air was previously dampered down due to comfort.**

Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

TRAVERSE DATA

SYSTEM: RF-4 TRAVERSE NUMBER : T1
TRAVERSE LOCATION: M355

DUCT SIZE (ROUND)	18	" DIAMETER	Sq Ft =	1.77
DUCT SIZE (RECT.)		" WIDTH x " DEPTH	Sq Ft =	0.00

AIR DENSITY DATA

STATIC PRESS @ CL:	1.17	InWg.	DESIGN CFM =	4400
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	4665
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**4681**

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	2287	2793	1084	2647			
B	2371	2905	1932	2618			
C	2714	2777	2880	2825			
D	2872	2873	3007	2832			
E	2877	2832	2923	2775			
F							
G							
H							
I							

NO. OF READINGS = 20 AVERAGE FPM = 2641

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Brian Murphy

Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

TRAVERSE DATA

SYSTEM: AC-4 TRAVERSE NUMBER : T1
Relief TRAVERSE LOCATION: M355

DUCT SIZE (ROUND)		" DIAMETER			Sq Ft =	0.00
DUCT SIZE (RECT.)	26	" WIDTH x	26	" DEPTH	Sq Ft =	4.69

AIR DENSITY DATA

STATIC PRESS @ CL:	NA	InWg.	DESIGN CFM =	NA
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	2693
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**2695**

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	622	559	590	625			
B	628	600	594	544			
C	594	470	584	530			
D	552	570	508	609			
E							
F							
G							
H							
I							

NO. OF READINGS = 16 AVERAGE FPM = 574

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Brian Murphy

Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

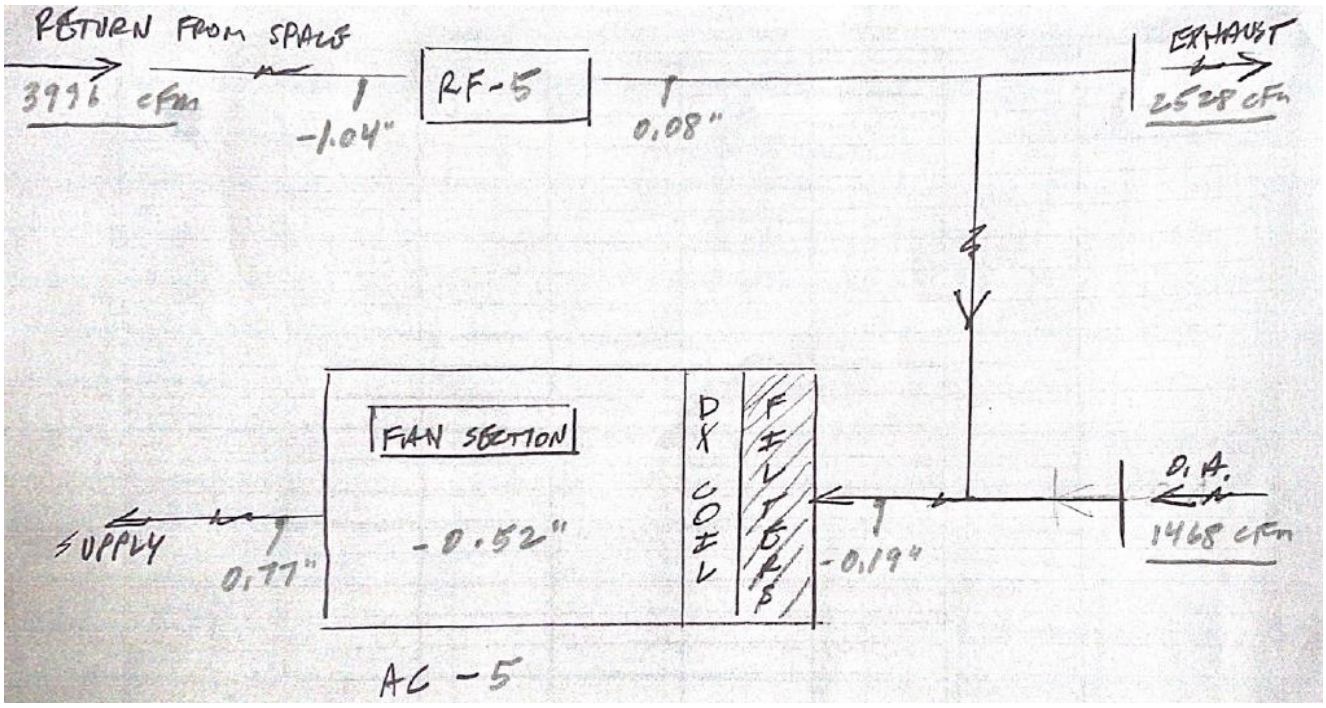
FAN DATA SHEET

	FAN NO. AC-5		FAN NO. RF-5	
Serves / Location:	COURT 704	M755	COURT 704	M755
Manufacturer:	TRANE		GREENHECK	
Model Number:	SC1H10043		QEI-16-1-20	
Size:	NL		NL	
Serial Number:	NL		04B000629	
MOTOR	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Manufacturer:	NL	WEG	NL	MARATHON
Frame Number:	NL	182T	NL	145T
Horsepower:	NL	3	NL	2
Brake Horsepower:	NL	NA	NL	NA
Safety Factor:	NL	1.25	NL	1.15
Volts/Phase:	460/3	460	460/3	460
Motor Amperage:	3.9	2.7/2.8/2.8	2.9	1.8/1.8/2.0
Motor RPM:	1765	1765	1735	1735
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:	4400	4141		
Return Air CFM:			4400	3996
Exhaust Air CFM:				
Outside Air CFM:	1600	1467 *1		
Suction Pressure:	NL	-0.52	NL	-1.04
Discharge Pressure:	NL	0.77	NL	0.08
Fan Static Pressure:	1.75	1.29	NL	NA
External Pressure:	1.2	0.96	0.95	1.12
RPM	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Fan RPM:	NL	882	1573	INLINE
Motor Drive:	NL	BK40H	NL	AK40
Motor Size/Bore:	NL	H 1 1/8"	NL	7/8"
Fan Drive:	NL	BK80	NL	INLINE
Fan Size/Bore:	NL	1"	NL	INLINE
Belt Size / Number:	NL	B32/1	NL	AX49/1
Shafts C-C:	NL	7"	NL	18 1/2"
Turns Open:	NL	FIXED	NL	FIXED

Comments: ***1 O.A. damper @ 50%.**

Project:	Suffolk Superior Court		
Address:	Boston, MA		
Date:	5/28/2021	**Project No.**	21-210

ROOM PRESSURIZATION
AC-5 / RF-5 COURTROOM SYSTEM



Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

AIR DISTRIBUTION

SYSTEM: AC-5
SUPPLY [X] RETURN [ ] EXHAUST [ ]

ROOM OR LOCATION	UNIT NUMBER	UNIT SIZE	AREAxK FACTOR	DESIGN FT/MIN	TEST FT/MIN	DESIGN CFM	TESTED CFM
Court 704	1	24X24	FH	NA	NA	730	679
Court 704	2	24X24	FH	NA	NA	730	692
Court 704	3	24X24	FH	NA	NA	730	708
Court 704	4	24X24	FH	NA	NA	730	712
Court 704	5	24X24	FH	NA	NA	730	662
Court 704	6	24X24	FH	NA	NA	730	688
Comments:					TOTALS:	4380	4141

Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

TRAVERSE DATA

SYSTEM: AC-5 TRAVERSE NUMBER : T1
O.A. TRAVERSE LOCATION: M755

DUCT SIZE (ROUND)		" DIAMETER			Sq Ft =	0.00
DUCT SIZE (RECT.)	24	" WIDTH x	24	" DEPTH	Sq Ft =	4.00

AIR DENSITY DATA

STATIC PRESS @ CL:	0.1	InWg.	DESIGN CFM =	1600
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	1467
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**1468**

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	321	364	363	438			
B	392	392	377	373			
C	397	363	302	333			
D	402	339	331	379			
E							
F							
G							
H							
I							

NO. OF READINGS = 16 AVERAGE FPM = 367

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Brian Murphy

Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

TRAVERSE DATA

SYSTEM: RF-5 TRAVERSE NUMBER : T1
TRAVERSE LOCATION: M755

DUCT SIZE (ROUND)		" DIAMETER			Sq Ft =	0.00
DUCT SIZE (RECT.)	24	" WIDTH x	24	" DEPTH	Sq Ft =	4.00

AIR DENSITY DATA

STATIC PRESS @ CL:	NA	InWg.	DESIGN CFM =	4400
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	3996
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**3998**

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	1382	1062	982	904			
B	1311	832	998	812			
C	1230	1009	902	979			
D	1027	911	834	808			
E							
F							
G							
H							
I							

NO. OF READINGS = 16 AVERAGE FPM = 999

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Brian Murphy

Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

FAN DATA SHEET

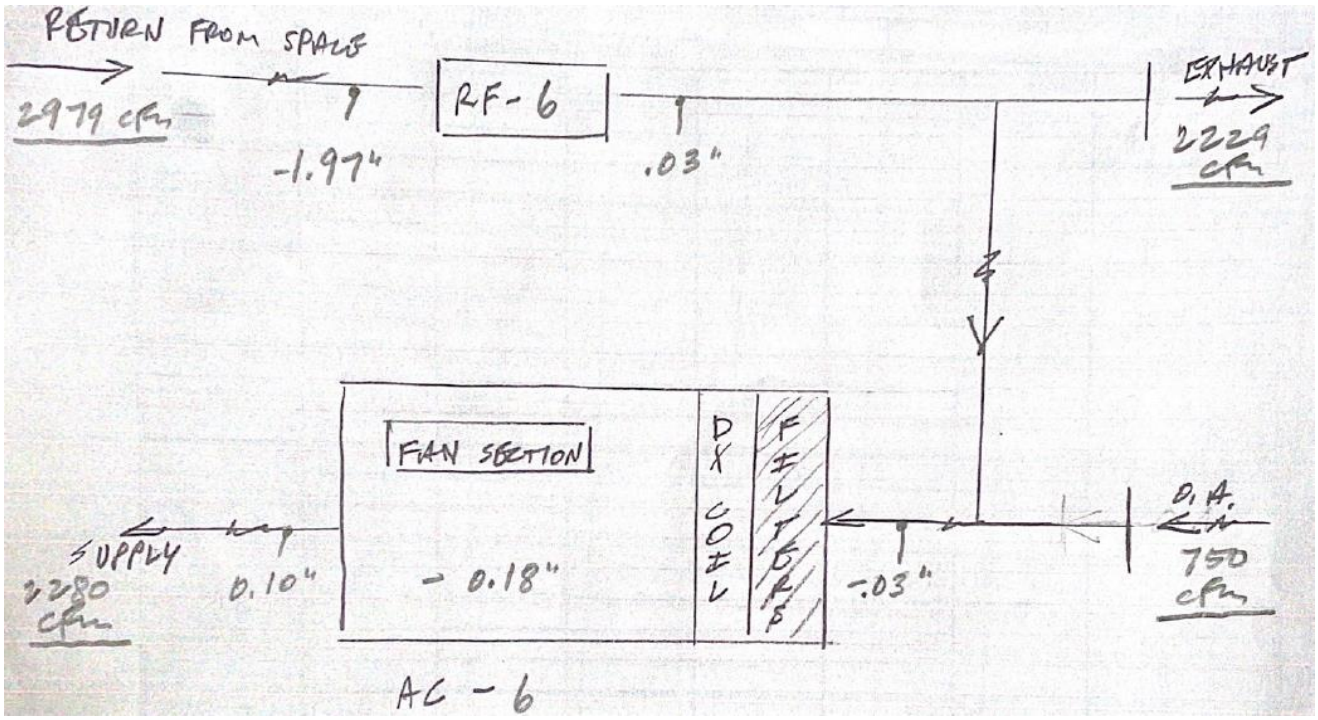
	FAN NO. AC-6		FAN NO. RF-6	
Serves / Location:	COURT 705	M755	COURT 705	M755
Manufacturer:	TRANE		GREENHECK	
Model Number:	SC1H10043		SWB-216-20	
Size:	NL		NL	
Serial Number:	NL		NL	
MOTOR	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Manufacturer:	NL	WEG	NL	MARATHON
Frame Number:	NL	182T	NL	145T
Horsepower:	NL	3	NL	2
Brake Horsepower:	NL	NA	NL	NA
Safety Factor:	NL	1.25	NL	1.15
Volts/Phase:	460/3	460	460/3	460
Motor Amperage:	3.9	1.5/1.5/1.7	2.9	2.3/2.2/2.2
Motor RPM:	1765	1765	1735	1735
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:	2250	2280		
Return Air CFM:			2250	2962 *1
Exhaust Air CFM:				
Outside Air CFM:	850	734 *2		
Suction Pressure:	NL	-0.18	NL	-1.97
Discharge Pressure:	NL	0.1	NL	0.03
Fan Static Pressure:	1.75	0.28	NL	NA
External Pressure:	1.2	0.13	0.95	2
RPM	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Fan RPM:	NL	NA	1820	NA
Motor Drive:	NL	BK40H	NL	1VP34
Motor Size/Bore:	NL	H 1 1/8"	NL	7/8"
Fan Drive:	NL	BK110	NL	AK30
Fan Size/Bore:	NL	H 1"	NL	H 1 1/4
Belt Size / Number:	NL	BX45/1	NL	A33/2
Shafts C-C:	NL	11"	NL	12 1/2
Turns Open:	NL	FIXED	NL	2

Comments: ***1 Return registers are partially blocked off.**

***2 O.A. damper @20% open.**

Project:	Suffolk Superior Court		
Address:	Boston, MA		
Date:	5/28/2021	**Project No.**	21-210

ROOM PRESSURIZATION
AC-6 / RF-6 COURTROOM SYSTEM



Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

AIR DISTRIBUTION

SYSTEM: AC-6
SUPPLY [X] RETURN [ ] EXHAUST [ ]

ROOM OR LOCATION	UNIT NUMBER	UNIT SIZE	AREAxK FACTOR	DESIGN FT/MIN	TEST FT/MIN	DESIGN CFM	TESTED CFM
Court 705	1	24X24	FH	NA	NA	NL	419
Court 705	2	24X24	FH	NA	NA	NL	432
Court 705	3	24X24	FH	NA	NA	NL	341
Court 705	4	24X24	FH	NA	NA	NL	342
Court 705	5	24X24	FH	NA	NA	NL	379
Court 705	6	24X24	FH	NA	NA	NL	367
					TOTALS:	2250	2280

Comments:

Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

TRAVERSE DATA

SYSTEM: AC-6 TRAVERSE NUMBER : T1
O.A. TRAVERSE LOCATION: M755

DUCT SIZE (ROUND)		" DIAMETER			Sq Ft =	0.00
DUCT SIZE (RECT.)	38	" WIDTH x	16	" DEPTH	Sq Ft =	4.22

AIR DENSITY DATA

STATIC PRESS @ CL:	NA	InWg.	DESIGN CFM =	850
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	734
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**735**

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	219	229	242	200			
B	222	182	209	219			
C	187	195	179	197			
D	92	67	45	98			
E							
F							
G							
H							
I							

NO. OF READINGS = 16 AVERAGE FPM = 174

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Brian Murphy

Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

TRAVERSE DATA

SYSTEM: RF-6 TRAVERSE NUMBER : T1
TRAVERSE LOCATION: M755

DUCT SIZE (ROUND)		" DIAMETER			Sq Ft =	0.00
DUCT SIZE (RECT.)	34	" WIDTH x	16	" DEPTH	Sq Ft =	3.78

AIR DENSITY DATA

STATIC PRESS @ CL:	NA	InWg.	DESIGN CFM =	2250
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	2962
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**2964**

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	300	419	1032			
B	705	642	614	1082			
C	786	957	836	1014			
D	717	1108	1025	1035			
E							
F							
G							
H							
I							

NO. OF READINGS = 16 AVERAGE FPM = 784

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Brian Murphy

Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

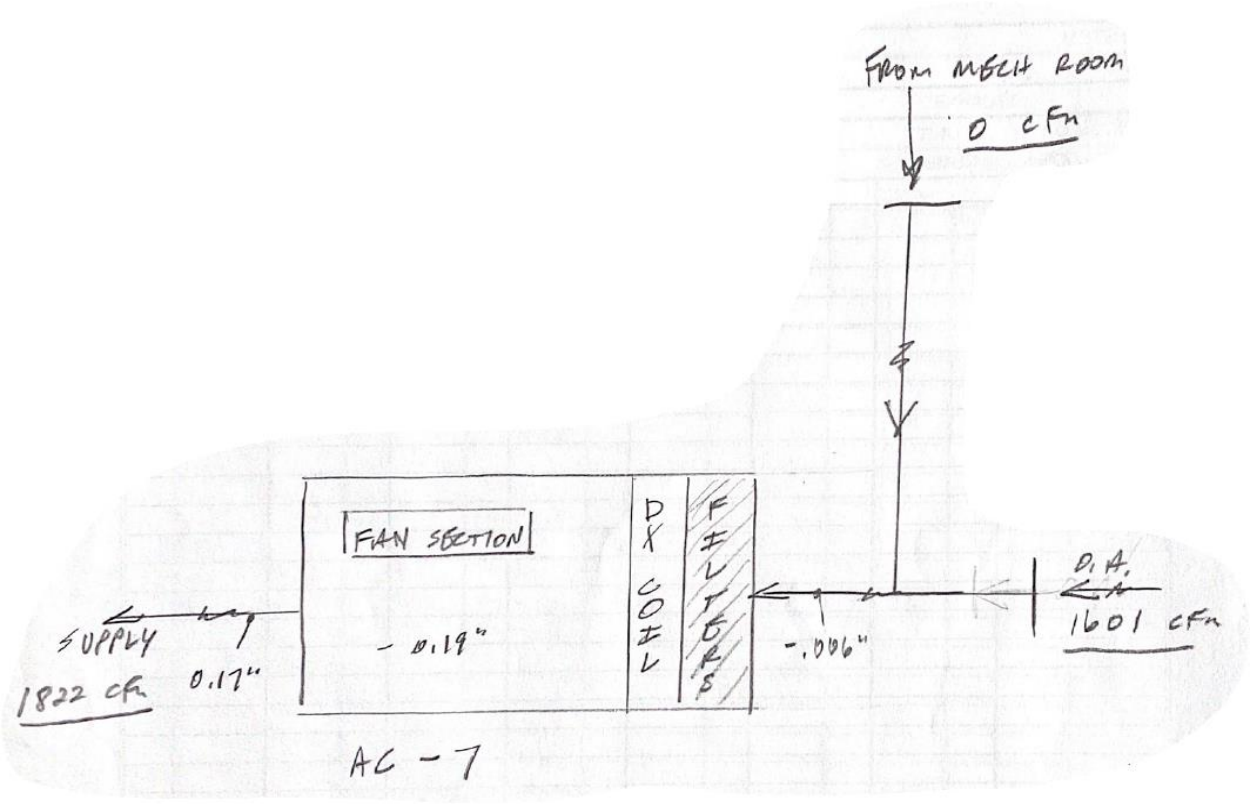
FAN DATA SHEET

	FAN NO. AC-7		FAN NO. RF-7	
Serves / Location:	DETENTION	M755	DETENTION	M755
Manufacturer:	TRANE		GREENHECK	
Model Number:	SC1H10043		CSP-A1410	
Size:	NL		NL	
Serial Number:	NL		04A16691	
MOTOR	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Manufacturer:	NL	WEG	NL	NO ACCESS
Frame Number:	NL	182T	NL	NO ACCESS
Horsepower:	NL	3	NL	NO ACCESS
Brake Horsepower:	NL	NA	NL	NO ACCESS
Safety Factor:	NL	1.25	NL	NO ACCESS
Volts/Phase:	460/3	460	115/1	NA
Motor Amperage:	3.9	2.1/2.2/2.2	NO ACCESS	NA
Motor RPM:	1765	1765	NO ACCESS	DIRECT DRIVE
Speeds:	NL	1	NL	DIRECT DRIVE
Heater Size:	NL	NA	NL	NA
Heater Amps.:	NL	NA	NL	NA
FAN	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Supply Air CFM:	4400	1822		
Return Air CFM:			920	561
Exhaust Air CFM:				
Outside Air CFM:	1600	1603 *1		
Suction Pressure:	NL	0.19	NL	-0.84
Discharge Pressure:	NL	0.17	NL	0.14
Fan Static Pressure:	1.75	0.36	NL	NA
External Pressure:	1.2	0.176	0.5	0.98
RPM	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Fan RPM:	NL	548	1084	DIRECT DRIVE
Motor Drive:	NL	BK40H	NL	DIRECT DRIVE
Motor Size/Bore:	NL	H 1 1/8"	NL	DIRECT DRIVE
Fan Drive:	NL	BK130	NL	DIRECT DRIVE
Fan Size/Bore:	NL	H 1"	NL	DIRECT DRIVE
Belt Size / Number:	NL	BX48/1	NL	DIRECT DRIVE
Shafts C-C:	NL	12"	NL	DIRECT DRIVE
Turns Open:	NL	FIXED	NL	DIRECT DRIVE

Comments: ***1 O.A. damper @ 100% open.**

Project:	Suffolk Superior Court		
Address:	Boston, MA		
Date:	5/28/2021	**Project No.**	21-210

ROOM PRESSURIZATION
AC-7 / RF-7 COURTROOM SYSTEM



Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

AIR DISTRIBUTION

SYSTEM: AC-7
SUPPLY [X] RETURN [ ] EXHAUST [ ]

ROOM OR LOCATION	UNIT NUMBER	UNIT SIZE	AREAxK FACTOR	DESIGN FT/MIN	TEST FT/MIN	DESIGN CFM	TESTED CFM
HC-4 CELL	1	14X8	FH	NA	NA	NL	102
HC-5 CELL	2	14X8	FH	NA	NA	NL	91
HC-6 CELL	3	14X8	FH	NA	NA	NL	101
HC-7 CELL	4	14X8	FH	NA	NA	NL	121
HC-8 CELL	5	14X8	FH	NA	NA	NL	128
HC-9 CELL	6	14X8	FH	NA	NA	NL	130
HC-10 CELL	7	14X8	FH	NA	NA	NL	109
CORRIDOR	8	10X10	FH	NA	NA	NL	113
CORRIDOR	9	10X10	FH	NA	NA	NL	108
CORRIDOR	10	10X10	FH	NA	NA	NL	146
HC-1 CELL	11	14X8	FH	NA	NA	NL	185
HC-2 CELL	12	14X8	FH	NA	NA	NL	124
HC-3 CELL	13	14X8	FH	NA	NA	NL	89
SECURITY	14	12X12	FH	NA	NA	NL	183
M712A	15	14X8	FH	NA	NA	NL	92
Comments:					TOTALS:	2250	1822

Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

TRAVERSE DATA

SYSTEM: AC-7 TRAVERSE NUMBER : T1
O.A. TRAVERSE LOCATION: M755

DUCT SIZE (ROUND)		" DIAMETER		Sq Ft =	0.00
DUCT SIZE (RECT.)	22	" WIDTH x	20 " DEPTH	Sq Ft =	3.06

AIR DENSITY DATA

STATIC PRESS @ CL:	NA	InWg.	DESIGN CFM =	1600
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	1603
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**1604**

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	481	549	574	504			
B	501	793	736	415			
C	364	561	587	230			
D							
E							
F							
G							
H							
I							

NO. OF READINGS = 12 AVERAGE FPM = 525

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Brian Murphy

Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

TRAVERSE DATA

SYSTEM: RF-7 TRAVERSE NUMBER : T1
TRAVERSE LOCATION: M755

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

AIR DENSITY DATA

STATIC PRESS @ CL:	0.84	InWg.	DESIGN CFM =	920
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	561
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**562**

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	122	226	335				
B	52	170	359				
C	276	265	476				
D	383	488	517				
E							
F							
G							
H							
I							

NO. OF READINGS = 12 AVERAGE FPM = 306

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Brian Murphy

Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

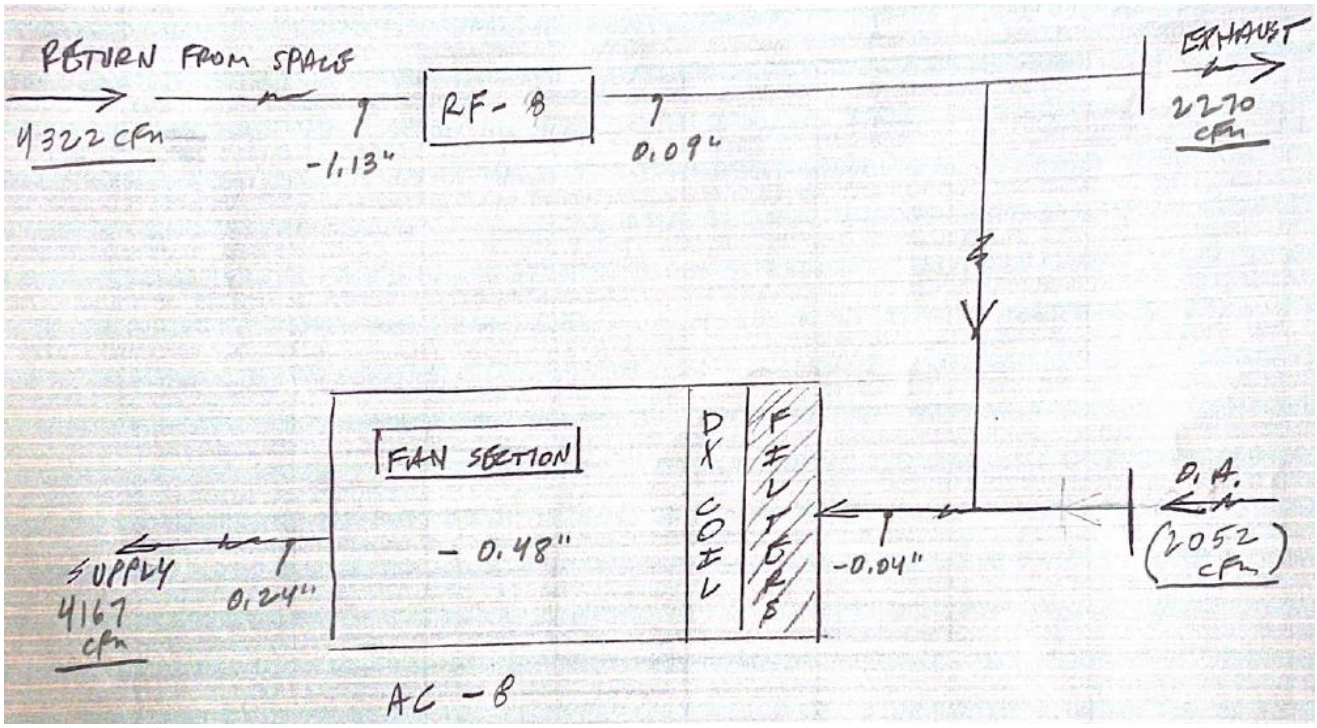
FAN DATA SHEET

	FAN NO. AC-8		FAN NO. RF-8	
Serves / Location:	COURT 806	M855	COURT 806	M855
Manufacturer:	TRANE		GREENHECK	
Model Number:	SC1H10043		SWB-216-20	
Size:	NL		NL	
Serial Number:	NL		NL	
MOTOR	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Manufacturer:	NL	WEG	NL	MARATHON
Frame Number:	NL	182T	NL	145T
Horsepower:	NL	3	NL	2
Brake Horsepower:	NL	NA	NL	NA
Safety Factor:	NL	1.25	NL	1.15
Volts/Phase:	460/3	460	460/3	460
Motor Amperage:	3.9	2.2/2.3/2.3	2.9	2.0/2.0/1.9
Motor RPM:	1765	1765	1735	1735
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:	4400	4167		
Return Air CFM:			4400	4313
Exhaust Air CFM:				
Outside Air CFM:	1600	2052 *1		
Suction Pressure:	NL	0.48	NL	1.13
Discharge Pressure:	NL	0.24	NL	0.09
Fan Static Pressure:	1.75	0.72	NL	NA
External Pressure:	1.2	0.28	0.95	1.22
RPM	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Fan RPM:	NL	882	1820	1920
Motor Drive:	NL	BK40H	NL	2VP34
Motor Size/Bore:	NL	H 1 1/8"	NL	7/8"
Fan Drive:	NL	BK80	NL	AK30
Fan Size/Bore:	NL	1"	NL	H 1 1/4"
Belt Size / Number:	NL	B32/1	NL	A32/2
Shafts C-C:	NL	7"	NL	12 1/2
Turns Open:	NL	FIXED	NL	2

Comments: ***1 O.A. damper @ 60%.**

Project:	Suffolk Superior Court		
Address:	Boston, MA		
Date:	5/28/2021	**Project No.**	21-210

ROOM PRESSURIZATION
AC-8 / RF-8 COURTROOM SYSTEM



Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

AIR DISTRIBUTION

SYSTEM: AC-8
SUPPLY [X] RETURN [ ] EXHAUST [ ]

ROOM OR LOCATION	UNIT NUMBER	UNIT SIZE	AREAxK FACTOR	DESIGN FT/MIN	TEST FT/MIN	DESIGN CFM	TESTED CFM
COURT 806	1	24X24	FH	NA	NA	730	687
COURT 806	2	24X24	FH	NA	NA	730	708
COURT 806	3	24X24	FH	NA	NA	730	713
COURT 806	4	24X24	FH	NA	NA	730	698
COURT 806	5	24X24	FH	NA	NA	730	662
COURT 806	6	24X24	FH	NA	NA	730	699
					TOTALS:	4380	4167

Comments:

Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

TRAVERSE DATA

SYSTEM: RF-8 TRAVERSE NUMBER : T1
TRAVERSE LOCATION: M810

DUCT SIZE (ROUND)	18	" DIAMETER	Sq Ft =	1.77
DUCT SIZE (RECT.)		" WIDTH x	" DEPTH Sq Ft =	0.00

AIR DENSITY DATA

STATIC PRESS @ CL:	1.13	InWg.	DESIGN CFM =	4400
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	4313
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**4327**

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	1055	3029	378	2859			
B	2045	2881	381	2965			
C	2286	3060	2227	2983			
D	2715	2958	2153	2944			
E	2742	2972	2878	3322			
F							
G							
H							
I							

NO. OF READINGS = 20 AVERAGE FPM = 2442

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Brian Murphy

Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

TRAVERSE DATA

SYSTEM: AC-8 TRAVERSE NUMBER : T1
Relief TRAVERSE LOCATION: M810

DUCT SIZE (ROUND)		" DIAMETER			Sq Ft =	0.00
DUCT SIZE (RECT.)	26	" WIDTH x	26	" DEPTH	Sq Ft =	4.69

AIR DENSITY DATA

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

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	637	594	588	564	485		
B	540	598	543	548	465		
C	608	568	506	434	486		
D	365	469	493	327	385		
E	402	390	360	343	387		
F							
G							
H							
I							

NO. OF READINGS = 25 AVERAGE FPM = 483

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Brian Murphy

Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

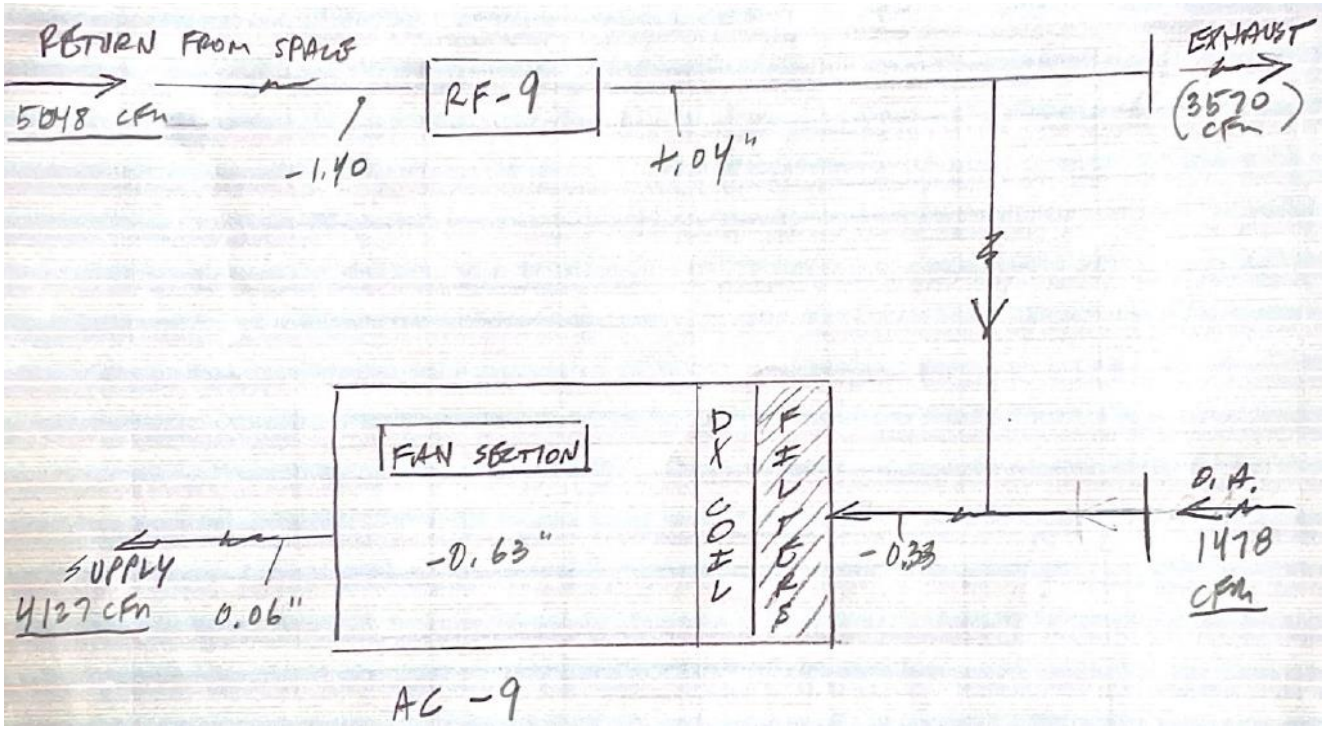
FAN DATA SHEET

	FAN NO. AC-9		FAN NO. RF-9	
Serves / Location:	COURT 808	M855	COURT 808	M855
Manufacturer:	TRANE		GREENHECK	
Model Number:	SC1H10043		SWB-216-20	
Size:	NL		NL	
Serial Number:	NL		NL	
MOTOR	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Manufacturer:	NL	WEG	NL	MARATHON
Frame Number:	NL	182T	NL	145T
Horsepower:	NL	3	NL	2
Brake Horsepower:	NL	NA	NL	NA
Safety Factor:	NL	1.25	NL	1.15
Volts/Phase:	460/3	460	460/3	460
Motor Amperage:	3.9	2.1/2.2/2.2	2.9	2.1/2.1/2.2
Motor RPM:	1765	1765	1735	1735
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:	4400	4127		
Return Air CFM:			4400	5037
Exhaust Air CFM:				
Outside Air CFM:	1600	1478 *1		
Suction Pressure:	NL	0.63	NL	1.4
Discharge Pressure:	NL	0.06	NL	0.04
Fan Static Pressure:	1.75	0.69	NL	NA
External Pressure:	1.2	0.39	0.95	1.44
RPM	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Fan RPM:	NL	882	1820	1922
Motor Drive:	NL	BK40H	NL	2VP34
Motor Size/Bore:	NL	H 1 1/8"	NL	7/8"
Fan Drive:	NL	BK80	NL	AK30
Fan Size/Bore:	NL	1"	NL	H 1 1/4"
Belt Size / Number:	NL	B32/1	NL	A33/2
Shafts C-C:	NL	7"	NL	12 1/2
Turns Open:	NL	FIXED	NL	2

Comments: ***1 O.A. damper @ 40%.**

Project:	Suffolk Superior Court		
Address:	Boston, MA		
Date:	5/28/2021	**Project No.**	21-210

ROOM PRESSURIZATION
AC-9 / RF-9 COURTROOM SYSTEM



Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

AIR DISTRIBUTION

SYSTEM: AC-9

SUPPLY [X] RETURN [ ] EXHAUST [ ]

ROOM OR LOCATION	UNIT NUMBER	UNIT SIZE	AREAxK FACTOR	DESIGN FT/MIN	TEST FT/MIN	DESIGN CFM	TESTED CFM
COURT 808	1	24X24	FH	NA	NA	730	675
COURT 808	2	24X24	FH	NA	NA	730	659
COURT 808	3	24X24	FH	NA	NA	730	722
COURT 808	4	24X24	FH	NA	NA	730	738
COURT 808	5	24X24	FH	NA	NA	730	662
COURT 808	6	24X24	FH	NA	NA	730	671
					TOTALS:	4380	4127

Comments:

Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

TRAVERSE DATA

SYSTEM: RF-9 TRAVERSE NUMBER : T1
TRAVERSE LOCATION: M810

DUCT SIZE (ROUND)	18	" DIAMETER	Sq Ft =	1.77
DUCT SIZE (RECT.)		" WIDTH x	" DEPTH Sq Ft =	0.00

AIR DENSITY DATA

STATIC PRESS @ CL:	1.5	InWg.	DESIGN CFM =	4400
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	5037
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**5059**

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	2808	2883	889	3200			
B	2687	3007	1283	2808			
C	3438	2875	2147	3331			
D	3361	3110	3397	3414			
E	2664	2869	3464	3403			
F							
G							
H							
I							

NO. OF READINGS = 20 AVERAGE FPM = 2852

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Brian Murphy

Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

TRAVERSE DATA

SYSTEM: AC-9 TRAVERSE NUMBER : T1
TRAVERSE LOCATION: OSA

DUCT SIZE (ROUND)		" DIAMETER			Sq Ft =	0.00
DUCT SIZE (RECT.)	27	" WIDTH x	27	" DEPTH	Sq Ft =	5.06

AIR DENSITY DATA

STATIC PRESS @ CL:	-0.31	InWg.	DESIGN CFM =	1600
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	1478
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**1478**

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	235	281	278	298	294		
B	279	308	216	334	295		
C	233	242	226	340	364		
D	245	275	244	336	367		
E	297	316	342	326	329		
F							
G							
H							
I							

NO. OF READINGS = 25 AVERAGE FPM = 292

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Greg Miller

Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

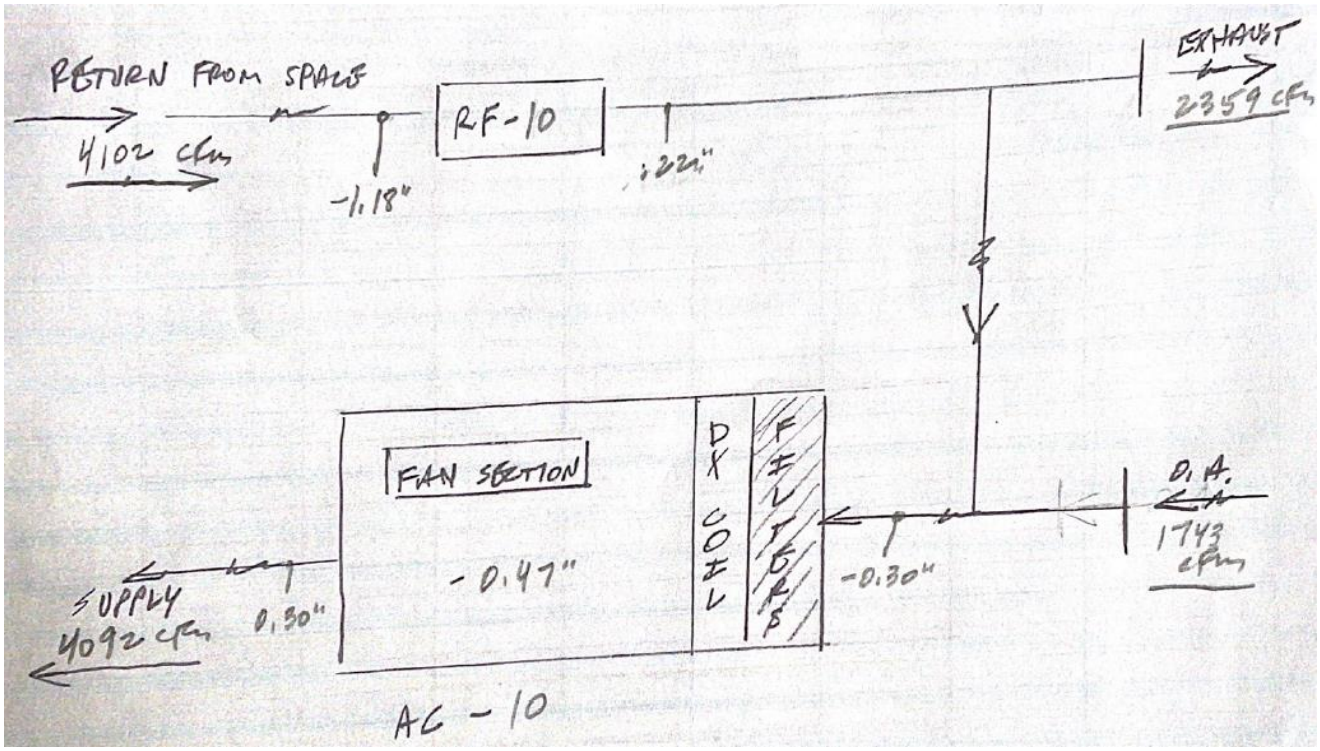
FAN DATA SHEET

	FAN NO. AC-10		FAN NO. RF-10	
Serves / Location:	COURT 817	M861	COURT 817	M861
Manufacturer:	TRANE		GREENHECK	
Model Number:	SC1H10043		SWB-216-20	
Size:	NL		NL	
Serial Number:	NL		NL	
MOTOR	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Manufacturer:	NL	WEG	NL	MARATHON
Frame Number:	NL	182T	NL	145T
Horsepower:	NL	3	NL	2
Brake Horsepower:	NL	NA	NL	NA
Safety Factor:	NL	1.25	NL	1.15
Volts/Phase:	460/3	460	460/3	460
Motor Amperage:	3.9	2.3/2.2/2.2	2.9	2.2/2.1/2.2
Motor RPM:	1765	1765	1735	1735
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:	4400	4092		
Return Air CFM:			4400	4094
Exhaust Air CFM:				
Outside Air CFM:	1600	1743 *1		
Suction Pressure:	NL	0.47	NL	1.18
Discharge Pressure:	NL	0.3	NL	0.22
Fan Static Pressure:	1.75	0.77	NL	NA
External Pressure:	1.2	0.6	0.95	1.4
RPM	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Fan RPM:	NL	882	1820	1920
Motor Drive:	NL	BK40H	NL	2VP34
Motor Size/Bore:	NL	H 1 1/8"	NL	7/8"
Fan Drive:	NL	BK80	NL	AK30
Fan Size/Bore:	NL	1"	NL	H 1 1/4"
Belt Size / Number:	NL	B32/1	NL	A33/2
Shafts C-C:	NL	7"	NL	12 1/2
Turns Open:	NL	FIXED	NL	2

Comments: ***1 O.A. damper @ 60%.**

Project:	Suffolk Superior Court		
Address:	Boston, MA		
Date:	5/28/2021	**Project No.**	21-210

ROOM PRESSURIZATION
AC-10 / RF-10 COURTROOM SYSTEM



Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

AIR DISTRIBUTION

SYSTEM: AC-10
SUPPLY [X] RETURN [ ] EXHAUST [ ]

ROOM OR LOCATION	UNIT NUMBER	UNIT SIZE	AREAxK FACTOR	DESIGN FT/MIN	TEST FT/MIN	DESIGN CFM	TESTED CFM
COURT 817	1	24X24	FH	NA	NA	730	600
COURT 817	2	24X24	FH	NA	NA	730	590
COURT 817	3	24X24	FH	NA	NA	730	719
COURT 817	4	24X24	FH	NA	NA	730	747
COURT 817	5	24X24	FH	NA	NA	730	754
COURT 817	6	24X24	FH	NA	NA	730	682
					TOTALS:	4380	4092

Comments:

Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

TRAVERSE DATA

SYSTEM: AC-10 TRAVERSE NUMBER : T1
Relief TRAVERSE LOCATION: M805

DUCT SIZE (ROUND)		" DIAMETER			Sq Ft =	0.00
DUCT SIZE (RECT.)	26	" WIDTH x	26	" DEPTH	Sq Ft =	4.69

AIR DENSITY DATA

STATIC PRESS @ CL:	NA	InWg.	DESIGN CFM =	NL
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	2357
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**2359**

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	608	677	674	651	630		
B	620	596	595	614	464		
C	494	574	507	580	532		
D	423	536	393	446	326		
E	412	294	283	374	251		
F							
G							
H							
I							

NO. OF READINGS = 25 AVERAGE FPM = 502

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Brian Murphy

Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

TRAVERSE DATA

SYSTEM: RF-10 TRAVERSE NUMBER : T1
TRAVERSE LOCATION: M805

DUCT SIZE (ROUND)	18	" DIAMETER	Sq Ft =	1.77
DUCT SIZE (RECT.)		" WIDTH x	" DEPTH Sq Ft =	0.00

AIR DENSITY DATA

STATIC PRESS @ CL:	1.18	InWg.	DESIGN CFM =	4400
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	4094
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**4108**

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	739	2569	432	2452			
B	1586	2604	944	1623			
C	2136	2698	2106	2835			
D	2752	2774	2306	2954			
E	3315	2965	3511	3054			
F							
G							
H							
I							

NO. OF READINGS = 20 AVERAGE FPM = 2318

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Greg Miller

Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

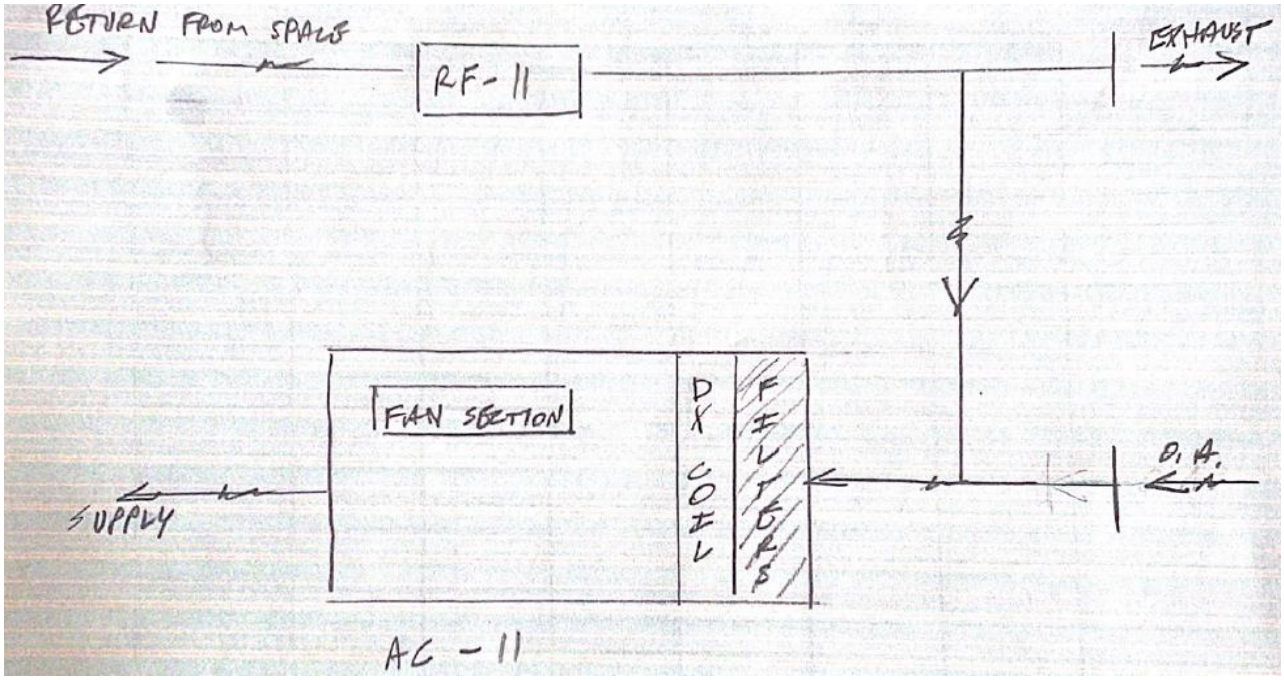
FAN DATA SHEET

	FAN NO. AC-11		FAN NO. RF-11	
Serves / Location:	COURT 815	M861	COURT 815	M861
Manufacturer:	TRANE		GREENHECK	
Model Number:	SC1H10043		SWB-216-20	
Size:	NL		NL	
Serial Number:	NL		NL	
MOTOR	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Manufacturer:	NL	WEG	NL	MARATHON
Frame Number:	NL	182T	NL	145T
Horsepower:	NL	3	NL	2
Brake Horsepower:	NL	NA	NL	NA
Safety Factor:	NL	1.25	NL	1.15
Volts/Phase:	460/3	460	460/3	
Motor Amperage:	3.9		2.9	
Motor RPM:	1765		1735	
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:	4400	1870 *1		
Return Air CFM:			4400	4745
Exhaust Air CFM:				
Outside Air CFM:	1600			
Suction Pressure:	NL		NL	
Discharge Pressure:	NL		NL	
Fan Static Pressure:	1.75		NL	
External Pressure:	1.2		0.95	
RPM	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Fan RPM:	NL		1820	1920
Motor Drive:	NL	BK40H	NL	2VP34
Motor Size/Bore:	NL	H 1 1/8"	NL	7/8"
Fan Drive:	NL	BK80	NL	AK30
Fan Size/Bore:	NL	1"	NL	H 1 1/4"
Belt Size / Number:	NL	B32/1	NL	A33/2
Shafts C-C:	NL	7"	NL	12 1/2
Turns Open:	NL	FIXED	NL	2

Comments: ***1 Return air damper actuator disconnected resulting in low airflow (damper Approx. 10% open).**

Project:	Suffolk Superior Court		
Address:	Boston, MA		
Date:	5/28/2021	**Project No.**	21-210

ROOM PRESSURIZATION
AC-11 / RF-11 COURTROOM SYSTEM



Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

AIR DISTRIBUTION

SYSTEM: AC-11

SUPPLY [X] RETURN [ ] EXHAUST [ ]

ROOM OR LOCATION	UNIT NUMBER	UNIT SIZE	AREAxK FACTOR	DESIGN FT/MIN	TEST FT/MIN	DESIGN CFM	TESTED CFM
COURT 815	1	24X24	FH	NA	NA	730	236
COURT 815	2	24X24	FH	NA	NA	730	319
COURT 815	3	24X24	FH	NA	NA	730	334
COURT 815	4	24X24	FH	NA	NA	730	329
COURT 815	5	24X24	FH	NA	NA	730	340
COURT 815	6	24X24	FH	NA	NA	730	312
					TOTALS:	4380	1870

Comments:

Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

TRAVERSE DATA

SYSTEM: RF-11 TRAVERSE NUMBER : T1
TRAVERSE LOCATION: M805

DUCT SIZE (ROUND)	18	" DIAMETER	Sq Ft =	1.77
DUCT SIZE (RECT.)		" WIDTH x	" DEPTH Sq Ft =	0.00

AIR DENSITY DATA

STATIC PRESS @ CL:	NA	InWg.	DESIGN CFM =	4400
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	4745
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**4748**

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	2008	1802	404	2862			
B	2716	3180	766	3053			
C	3189	3177	1837	3134			
D	3008	3187	3308	3154			
E	3048	3161	3621	3118			
F							
G							
H							
I							

NO. OF READINGS = 20 AVERAGE FPM = 2687

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Brian Murphy

Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

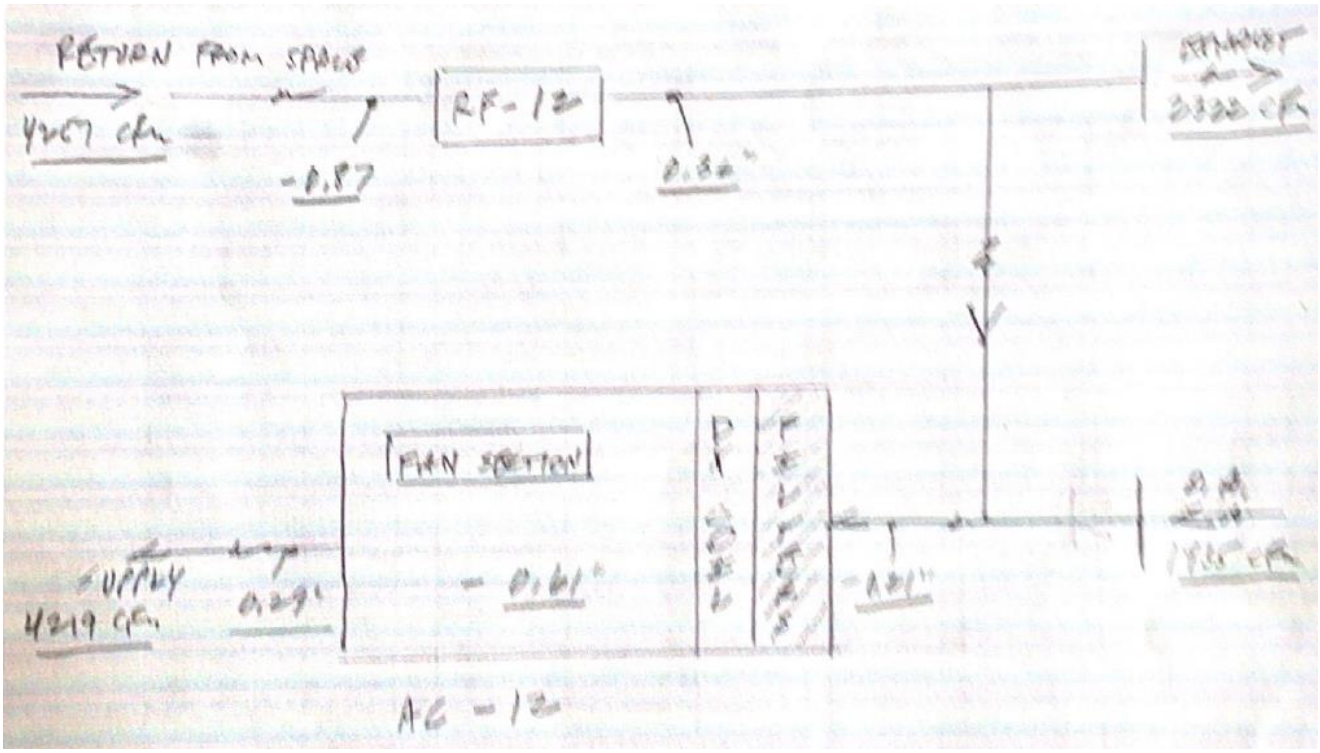
FAN DATA SHEET

	FAN NO. AC-12		FAN NO. RF-12	
Serves / Location:	COURT 906	M953	COURT 906	M953
Manufacturer:	TRANE		GREENHECK	
Model Number:	SC1H10043		QEI-16-1-20	
Size:	NL		NL	
Serial Number:	NL		NL	
MOTOR	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Manufacturer:	NL	WEG	NL	MARATHON
Frame Number:	NL	182T	NL	145T / 90
Horsepower:	NL	3	NL	2
Brake Horsepower:	NL	NA	NL	NA
Safety Factor:	NL	1.25	NL	1.15
Volts/Phase:	460/3	460	460/3	460
Motor Amperage:	3.9	2.2/2.4/2.2	2.9	1.9/1.9/2.0
Motor RPM:	1765	1765	1735	1735
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:	4400	4219		
Return Air CFM:			4400	4249
Exhaust Air CFM:				
Outside Air CFM:	1600	1935 *1		
Suction Pressure:	NL	0.61	NL	0.87
Discharge Pressure:	NL	0.29	NL	0.36
Fan Static Pressure:	1.75	0.9	NL	NA
External Pressure:	1.2	0.5	0.95	1.23
RPM	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Fan RPM:	NL	882	1573	INLINE
Motor Drive:	NL	BK40H	NL	4" OD
Motor Size/Bore:	NL	H 1 1/8"	NL	7/8"
Fan Drive:	NL	BK80	NL	INLINE
Fan Size/Bore:	NL	1"	NL	INLINE
Belt Size / Number:	NL	B32/1	NL	A49/1
Shafts C-C:	NL	7"	NL	18 1/2
Turns Open:	NL	FIXED	NL	FIXED

Comments: ***1 O.A. damper @ 45%.**

Project:	Suffolk Superior Court		
Address:	Boston, MA		
Date:	5/28/2021	**Project No.**	21-210

ROOM PRESSURIZATION
AC-12 / RF-12 COURTROOM SYSTEM



Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

AIR DISTRIBUTION

SYSTEM: AC-12

SUPPLY [X] RETURN [ ] EXHAUST [ ]

ROOM OR LOCATION	UNIT NUMBER	UNIT SIZE	AREAxK FACTOR	DESIGN FT/MIN	TEST FT/MIN	DESIGN CFM	TESTED CFM
COURT 906	1	24X24	FH	NA	NA	730	742
COURT 906	2	24X24	FH	NA	NA	730	692
COURT 906	3	24X24	FH	NA	NA	730	699
COURT 906	4	24X24	FH	NA	NA	730	703
COURT 906	5	24X24	FH	NA	NA	730	721
COURT 906	6	24X24	FH	NA	NA	730	662
Comments:					TOTALS:	4380	4219

Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

TRAVERSE DATA

SYSTEM: RF-12 TRAVERSE NUMBER : T1
TRAVERSE LOCATION: M910

DUCT SIZE (ROUND)	18	" DIAMETER	Sq Ft =	1.77
DUCT SIZE (RECT.)		" WIDTH x	" DEPTH Sq Ft =	0.00

AIR DENSITY DATA

STATIC PRESS @ CL:	0.87	InWg.	DESIGN CFM =	4400
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	4249
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**4260**

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	3260	583	2317	2651			
B	2703	1136	2469	2538			
C	2582	2028	2817	2601			
D	2650	2238	2529	2653			
E	2530	2469	2609	2747			
F							
G							
H							
I							

NO. OF READINGS = 20 AVERAGE FPM = 2406

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Brian Murphy

Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

TRAVERSE DATA

SYSTEM: AC-12 TRAVERSE NUMBER : T1
TRAVERSE LOCATION: OSA

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:	NA	InWg.	DESIGN CFM =	1600
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	1935
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**1936**

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	-265	-195	-339			
B	-256	73	131	67			
C	478	450	389	361			
D	818	844	893	842			
E	899	963	999	932			
F							
G							
H							
I							

NO. OF READINGS = 20 AVERAGE FPM = 387

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Brian Murphy

Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

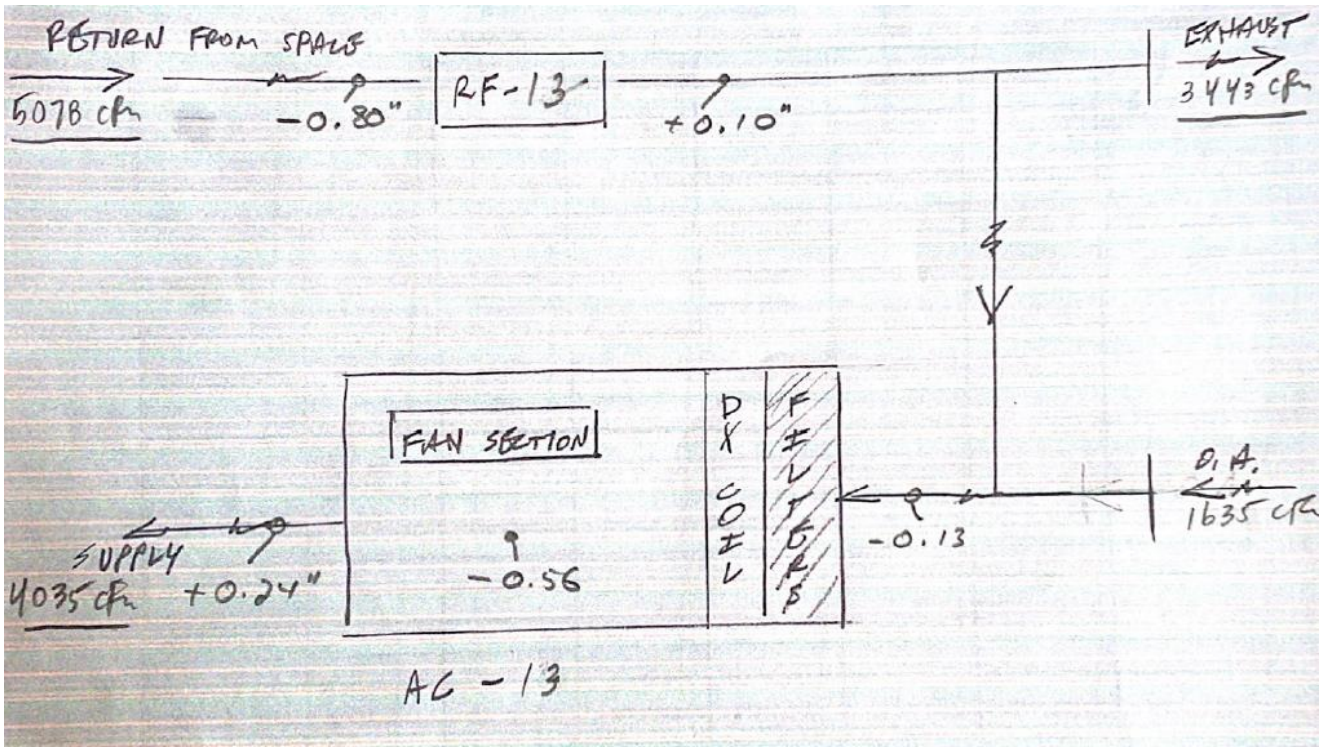
FAN DATA SHEET

	FAN NO. AC-13		FAN NO. RF-13	
Serves / Location:	COURT 907	M957	COURT 907	M957
Manufacturer:	TRANE		GREENHECK	
Model Number:	SC1H10043		QEI-16-1-20	
Size:	NL		NL	
Serial Number:	NL		NL	
MOTOR	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Manufacturer:	NL	WEG	NL	MARATHON
Frame Number:	NL	182T	NL	145T / 90
Horsepower:	NL	3	NL	2
Brake Horsepower:	NL	NA	NL	NA
Safety Factor:	NL	1.25	NL	1.15
Volts/Phase:	460/3	460	460/3	460
Motor Amperage:	3.9	2.1/2.1/2.3	2.9	1.8/1.8/1.8
Motor RPM:	1765	1765	1735	1735
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:	4400	4035		
Return Air CFM:			4400	5096
Exhaust Air CFM:				
Outside Air CFM:	1600	1636 *1		
Suction Pressure:	NL	-0.56	NL	1.8
Discharge Pressure:	NL	0.29	NL	0.1
Fan Static Pressure:	1.75	0.8	NL	NA
External Pressure:	1.2	1.37	0.95	1.3
RPM	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Fan RPM:	NL	882	1573	INLINE
Motor Drive:	NL	BK40H	NL	4" OD
Motor Size/Bore:	NL	H 1 1/8"	NL	7/8"
Fan Drive:	NL	BK80	NL	INLINE
Fan Size/Bore:	NL	1"	NL	INLINE
Belt Size / Number:	NL	B32/1	NL	A49/1
Shafts C-C:	NL	7"	NL	18 1/2
Turns Open:	NL	FIXED	NL	FIXED

Comments: ***1 O.A. damper @ 55% open.**

Project:	Suffolk Superior Court		
Address:	Boston, MA		
Date:	5/28/2021	**Project No.**	21-210

ROOM PRESSURIZATION
AC-13 / RF-13 COURTROOM SYSTEM



Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

AIR DISTRIBUTION

SYSTEM: AC-13
SUPPLY [X] RETURN [ ] EXHAUST [ ]

ROOM OR LOCATION	UNIT NUMBER	UNIT SIZE	AREAxK FACTOR	DESIGN FT/MIN	TEST FT/MIN	DESIGN CFM	TESTED CFM
COURT 907	1	24X24	FH	NA	NA	730	688
COURT 907	2	24X24	FH	NA	NA	730	672
COURT 907	3	24X24	FH	NA	NA	730	663
COURT 907	4	24X24	FH	NA	NA	730	659
COURT 907	5	24X24	FH	NA	NA	730	691
COURT 907	6	24X24	FH	NA	NA	730	662
					TOTALS:	4380	4035

Comments:

Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

TRAVERSE DATA

SYSTEM: AC-13 TRAVERSE NUMBER : T1
O.A. TRAVERSE LOCATION:

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:	0.09	InWg.	DESIGN CFM =	1600
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	1636
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	440	594	566	449			
B	333	505	515	520			
C	330	453	504	475			
D	105	134	245	346			
E	-112	-112	63	191			
F							
G							
H							
I							

NO. OF READINGS = 20 AVERAGE FPM = 327

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Greg Miller

Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

TRAVERSE DATA

SYSTEM: RF-13 TRAVERSE NUMBER : T1
TRAVERSE LOCATION: M957

DUCT SIZE (ROUND)	22	" DIAMETER	Sq Ft =	2.64
DUCT SIZE (RECT.)		" WIDTH x	" DEPTH Sq Ft =	0.00

AIR DENSITY DATA

STATIC PRESS @ CL:	0.81	InWg.	DESIGN CFM =	4400
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	5096
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**5109**

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	1832	2201	1232	2101			
B	1540	2020	1110	2238			
C	1784	2080	1258	2173			
D	2170	2291	1854	2226			
E	2061	2185	2184	2085			
F							
G							
H							
I							

NO. OF READINGS = 20 AVERAGE FPM = 1931

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Brian Murphy

Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

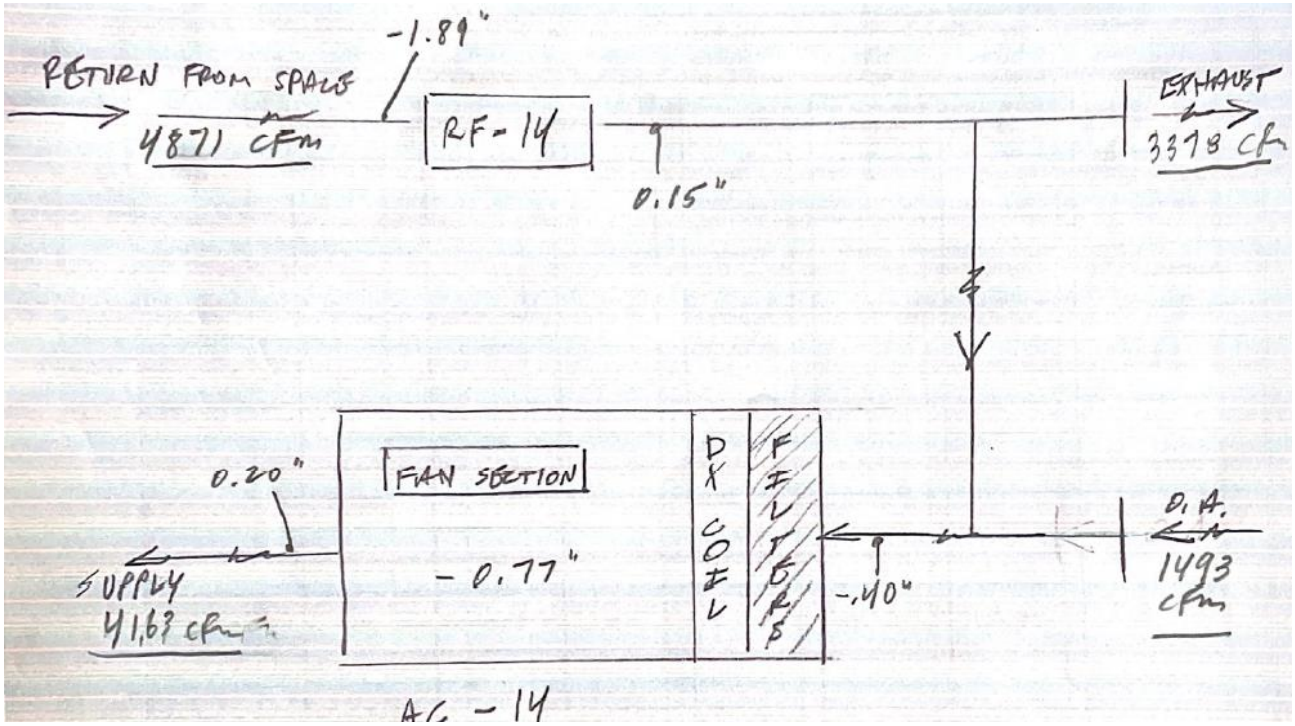
FAN DATA SHEET

	FAN NO. AC-14		FAN NO. RF-14	
Serves / Location:	COURT 916	M960	COURT 916	M960
Manufacturer:	TRANE		GREENHECK	
Model Number:	SC1H10043		SWB-216-20	
Size:	NL		NL	
Serial Number:	NL		NL	
MOTOR	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Manufacturer:	NL	WEG	NL	MARATHON
Frame Number:	NL	182T	NL	145T
Horsepower:	NL	3	NL	2
Brake Horsepower:	NL	NA	NL	NA
Safety Factor:	NL	1.25	NL	1.15
Volts/Phase:	460/3	460	460/3	460
Motor Amperage:	3.9	2.0/2.1/2.2	2.9	2.5/2.5/2.4
Motor RPM:	1765	1765	1735	1735
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:	4400	4163		
Return Air CFM:			4400	4860
Exhaust Air CFM:				
Outside Air CFM:	1600	1493 *1		
Suction Pressure:	NL	0.77	NL	1.89
Discharge Pressure:	NL	0.2	NL	0.15
Fan Static Pressure:	1.75	0.97	NL	NA
External Pressure:	1.2	0.6	0.95	2.04
RPM	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Fan RPM:	NL	882	1820	1922
Motor Drive:	NL	BK40H	NL	2VP34
Motor Size/Bore:	NL	H 1 1/8"	NL	7/8"
Fan Drive:	NL	BK80	NL	AK30
Fan Size/Bore:	NL	1"	NL	H 1 1/4"
Belt Size / Number:	NL	B32/1	NL	A33/2
Shafts C-C:	NL	7"	NL	12 1/2
Turns Open:	NL	FIXED	NL	2

Comments: ***1 O.A. damper @ 45%.**

Project:	Suffolk Superior Court		
Address:	Boston, MA		
Date:	5/28/2021	**Project No.**	21-210

ROOM PRESSURIZATION
AC-14 / RF-14 COURTROOM SYSTEM



Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

AIR DISTRIBUTION

SYSTEM: AC-14
SUPPLY [X] RETURN [ ] EXHAUST [ ]

ROOM OR LOCATION	UNIT NUMBER	UNIT SIZE	AREAxK FACTOR	DESIGN FT/MIN	TEST FT/MIN	DESIGN CFM	TESTED CFM
COURT 916	1	24X24	FH	NA	NA	730	667
COURT 916	2	24X24	FH	NA	NA	730	707
COURT 916	3	24X24	FH	NA	NA	730	712
COURT 916	4	24X24	FH	NA	NA	730	701
COURT 916	5	24X24	FH	NA	NA	730	691
COURT 916	6	24X24	FH	NA	NA	730	685
Comments:					TOTALS:	4380	4163

Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

TRAVERSE DATA

SYSTEM: AC-14 TRAVERSE NUMBER : T1
O.A. TRAVERSE LOCATION: OSA

DUCT SIZE (ROUND)		" DIAMETER		Sq Ft =	0.00
DUCT SIZE (RECT.)	27	" WIDTH x	27 " DEPTH	Sq Ft =	5.06

AIR DENSITY DATA

STATIC PRESS @ CL:	-0.38	InWg.	DESIGN CFM =	1600
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	1493
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**1492**

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	358	179	148	146	174		
B	426	298	244	154	198		
C	435	301	205	243	260		
D	480	366	248	215	312		
E	476	434	371	308	393		
F							
G							
H							
I							

NO. OF READINGS = 25 AVERAGE FPM = 295

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Greg Miller

Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

TRAVERSE DATA

SYSTEM: RF-14 TRAVERSE NUMBER : T1
TRAVERSE LOCATION: M905

DUCT SIZE (ROUND)	18	" DIAMETER	Sq Ft =	1.77
DUCT SIZE (RECT.)		" WIDTH x	" DEPTH Sq Ft =	0.00

AIR DENSITY DATA

STATIC PRESS @ CL:	1.03	InWg.	DESIGN CFM =	4400
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	4860
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**4875**

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	656	2418	2252	2919			
B	2452	2912	2899	3072			
C	3092	3118	2662	2868			
D	3009	3212	3118	2799			
E	2982	3222	3007	2361			
F							
G							
H							
I							

NO. OF READINGS = 20 AVERAGE FPM = 2752

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Brian Murphy

Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

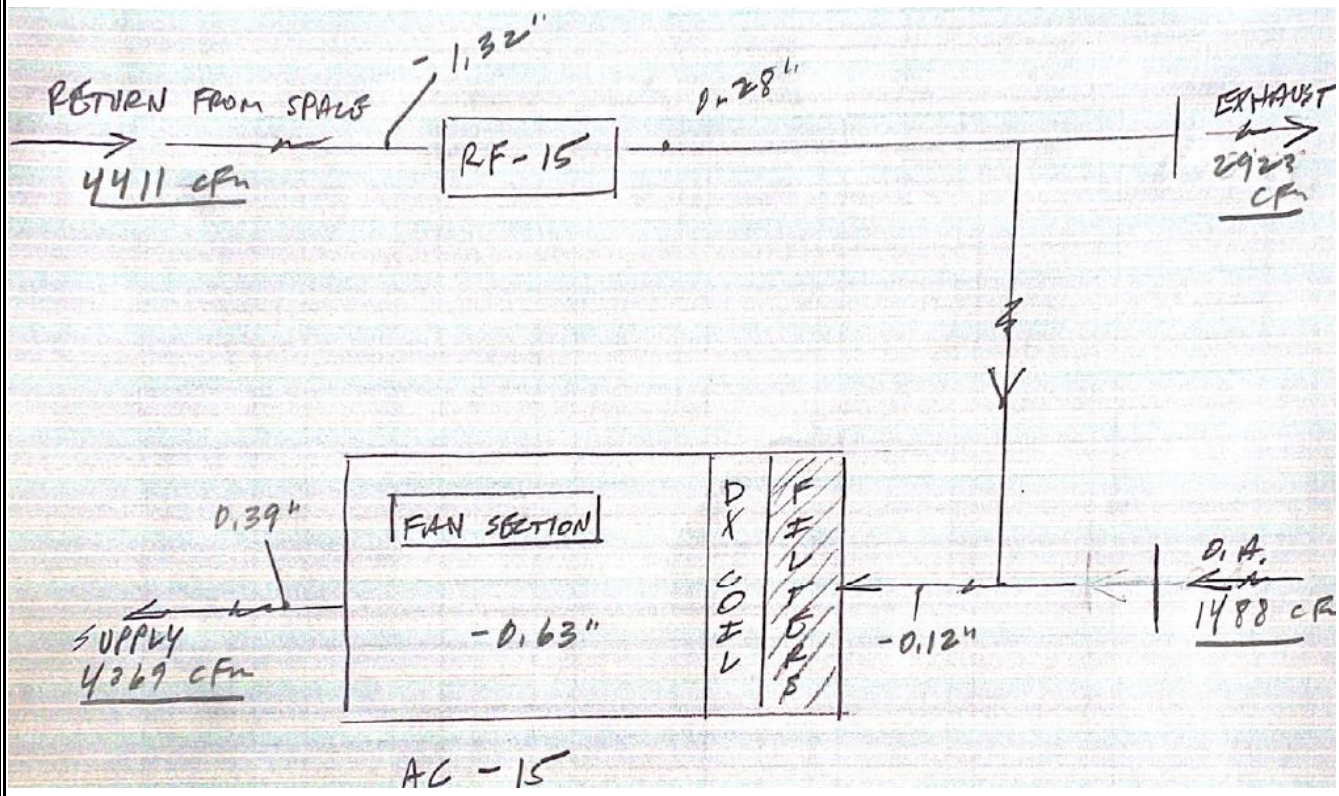
FAN DATA SHEET

	FAN NO. AC-15		FAN NO. RF-15	
Serves / Location:	COURT 914	M960	COURT 914	M960
Manufacturer:	TRANE		GREENHECK	
Model Number:	SC1H10043		SWB-216-20	
Size:	NL		NL	
Serial Number:	NL		NL	
MOTOR	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Manufacturer:	NL	WEG	NL	MARATHON
Frame Number:	NL	182T	NL	145T
Horsepower:	NL	3	NL	2
Brake Horsepower:	NL	NA	NL	NA
Safety Factor:	NL	1.25	NL	1.15
Volts/Phase:	460/3	460	460/3	460
Motor Amperage:	3.9	2.5/2.4/2.4	2.9	2.3/2.3/2.1
Motor RPM:	1765	1765	1735	1735
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:	4400	4369		
Return Air CFM:			4400	4622
Exhaust Air CFM:				
Outside Air CFM:	1600	1488 *1		
Suction Pressure:	NL	0.63	NL	1.32
Discharge Pressure:	NL	0.39	NL	0.28
Fan Static Pressure:	1.75	1.02	NL	NA
External Pressure:	1.2	0.51	0.95	1.6
RPM	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Fan RPM:	NL	882	1820	1922
Motor Drive:	NL	BK40H	NL	2VP34
Motor Size/Bore:	NL	H 1 1/8"	NL	7/8"
Fan Drive:	NL	BK80	NL	AK30
Fan Size/Bore:	NL	1"	NL	H 1 1/4"
Belt Size / Number:	NL	B32/1	NL	A33/2
Shafts C-C:	NL	7"	NL	12 1/2
Turns Open:	NL	FIXED	NL	2

Comments: ***1 O.A. damper @ 60%.**

Project:	Suffolk Superior Court		
Address:	Boston, MA		
Date:	5/28/2021	**Project No.**	21-210

ROOM PRESSURIZATION
AC-15 / RF-15 COURTROOM SYSTEM



Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

AIR DISTRIBUTION

SYSTEM: AC-15
SUPPLY [X] RETURN [ ] EXHAUST [ ]

ROOM OR LOCATION	UNIT NUMBER	UNIT SIZE	AREAxK FACTOR	DESIGN FT/MIN	TEST FT/MIN	DESIGN CFM	TESTED CFM
COURT 914	1	24X24	FH	NA	NA	730	762
COURT 914	2	24X24	FH	NA	NA	730	753
COURT 914	3	24X24	FH	NA	NA	730	692
COURT 914	4	24X24	FH	NA	NA	730	721
COURT 914	5	24X24	FH	NA	NA	730	733
COURT 914	6	24X24	FH	NA	NA	730	708
					TOTALS:	4380	4369

Comments:

Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

TRAVERSE DATA

SYSTEM: AC-15 TRAVERSE NUMBER : T1
O.A. TRAVERSE LOCATION: EXHAUST

DUCT SIZE (ROUND)		" DIAMETER			Sq Ft =	0.00
DUCT SIZE (RECT.)	26	" WIDTH x	26	" DEPTH	Sq Ft =	4.69

AIR DENSITY DATA

STATIC PRESS @ CL:	-0.09	InWg.	DESIGN CFM =	NL
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	2843
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**2844**

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	331	670	836	854	838		
B	804	834	781	717	726		
C	818	727	714	682	826		
D	659	525	545	344	691		
E	433	148	0	0	635		
F							
G							
H							
I							

NO. OF READINGS = 25 AVERAGE FPM = 606

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Greg Miller

Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

TRAVERSE DATA

SYSTEM: RF-15 TRAVERSE NUMBER : T1
TRAVERSE LOCATION: M905

DUCT SIZE (ROUND)	18	" DIAMETER		Sq Ft =	1.77
DUCT SIZE (RECT.)		" WIDTH x	" DEPTH	Sq Ft =	0.00

AIR DENSITY DATA

STATIC PRESS @ CL:	1.28	InWg.	DESIGN CFM =	4400
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	4622
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**4639**

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	3092	3161	1427	2315			
B	3202	3311	2133	2441			
C	3131	3400	2676	2082			
D	2782	2802	2258	2730			
E	3242	2021	2038	2092			
F							
G							
H							
I							

NO. OF READINGS = 20 AVERAGE FPM = 2617

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Brian Murphy

Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

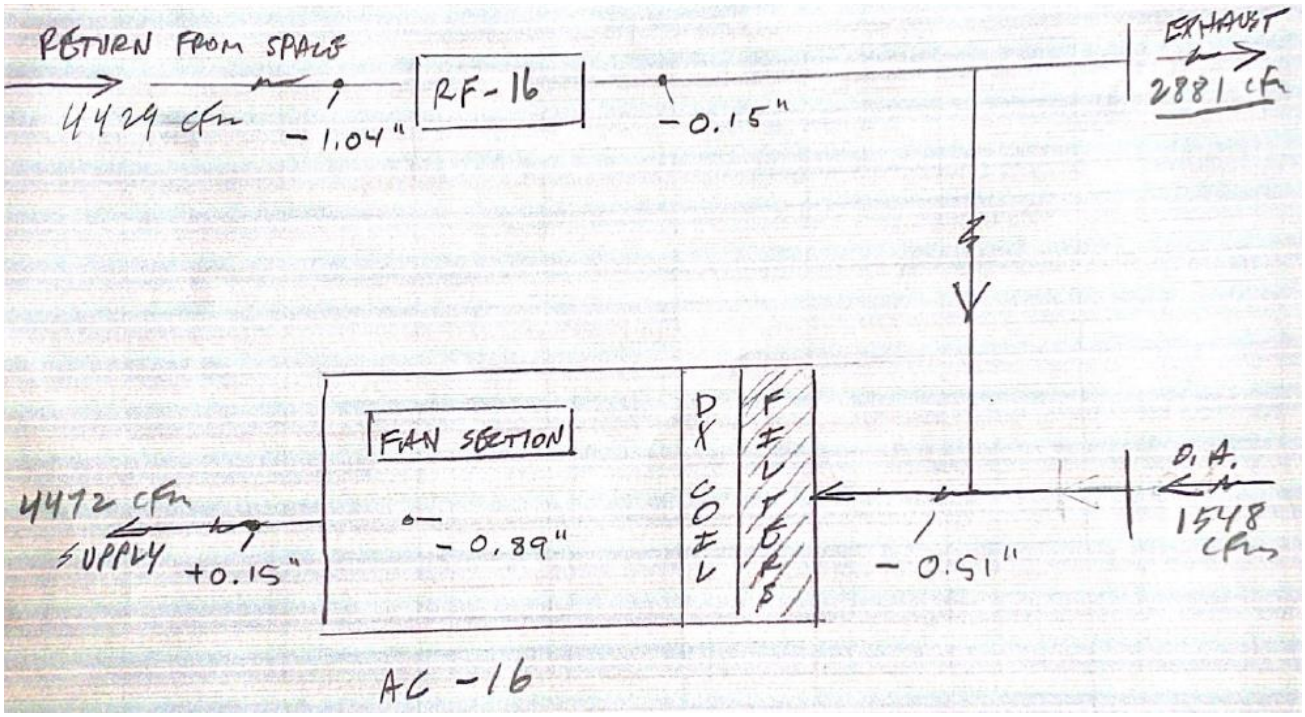
FAN DATA SHEET

	FAN NO. AC-16		FAN NO. RF-16	
Serves / Location:	COURT 1006	M1055	COURT 1006	M1055
Manufacturer:	TRANE		GREENHECK	
Model Number:	SC1H10043		SWB-216-20	
Size:	NL		NL	
Serial Number:	NL		NL	
MOTOR	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Manufacturer:	NL	WEG	NL	MARATHON
Frame Number:	NL	182T	NL	145T
Horsepower:	NL	3	NL	2
Brake Horsepower:	NL	NA	NL	NA
Safety Factor:	NL	1.25	NL	1.15
Volts/Phase:	460/3	460	460/3	460
Motor Amperage:	3.9	2.3/2.2/2.2	2.9	1.7/1.9/1.9
Motor RPM:	1765	1765	1735	1735
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:	4400	4472		
Return Air CFM:			4400	4778
Exhaust Air CFM:				
Outside Air CFM:	1600	1547 *1		
Suction Pressure:	NL	-0.89	NL	-1.04
Discharge Pressure:	NL	0.15	NL	-0.15
Fan Static Pressure:	1.75	1.04	NL	NA
External Pressure:	1.2	0.66	0.95	1.19
RPM	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Fan RPM:	NL	882	1820	1922
Motor Drive:	NL	BK40H	NL	2VP34
Motor Size/Bore:	NL	H 1 1/8"	NL	7/8"
Fan Drive:	NL	BK80	NL	AK30
Fan Size/Bore:	NL	1"	NL	H 1 1/4"
Belt Size / Number:	NL	B32/1	NL	A33/2
Shafts C-C:	NL	7"	NL	12 1/2
Turns Open:	NL	FIXED	NL	2

Comments: ***1 O.A. damper @ 50%.**

Project:	Suffolk Superior Court		
Address:	Boston, MA		
Date:	5/28/2021	**Project No.**	21-210

ROOM PRESSURIZATION
AC-16 / RF-16 COURTROOM SYSTEM



Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

TRAVERSE DATA

SYSTEM: AC-16 TRAVERSE NUMBER : T1
O.A. TRAVERSE LOCATION: M1010A

DUCT SIZE (ROUND)		" DIAMETER			Sq Ft =	0.00
DUCT SIZE (RECT.)	24	" WIDTH x	24	" DEPTH	Sq Ft =	4.00

AIR DENSITY DATA

STATIC PRESS @ CL:	0.46	InWg.	DESIGN CFM =	1600
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	1547
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**1549**

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	337	241	118	415			
B	397	208	246	327			
C	458	356	466	377			
D	491	730	529	491			
E							
F							
G							
H							
I							

NO. OF READINGS = 16 AVERAGE FPM = 387

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Brian Murphy

Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

TRAVERSE DATA

SYSTEM: RF-16 TRAVERSE NUMBER : T1
TRAVERSE LOCATION: M1010A

DUCT SIZE (ROUND)	18	" DIAMETER	Sq Ft =	1.77
DUCT SIZE (RECT.)		" WIDTH x " DEPTH	Sq Ft =	0.00

AIR DENSITY DATA

STATIC PRESS @ CL:	1.5	InWg.	DESIGN CFM =	4400
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	4778
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**4798**

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	1328	2992	1535	2918			
B	2240	3031	2376	2949			
C	2752	3007	2609	2998			
D	2934	2996	2905	3122			
E	2964	2890	2518	3035			
F							
G							
H							
I							

NO. OF READINGS = 20 AVERAGE FPM = 2705

J							
K							
L							
M							
N							
O							
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R							

TECHNICIAN: Brian Murphy

Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

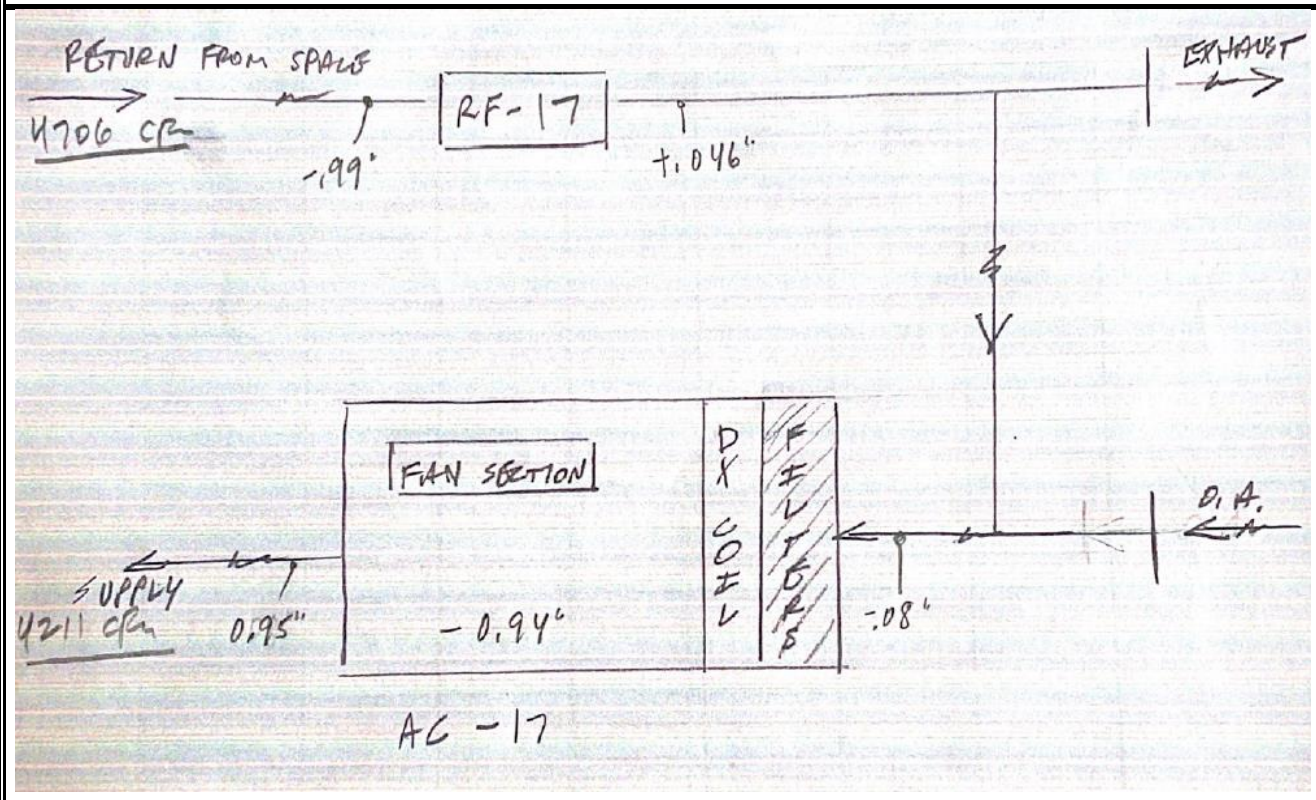
FAN DATA SHEET

	FAN NO. AC-17		FAN NO. RF-17	
Serves / Location:	COURT 1008	M1055	COURT 1008	M1055
Manufacturer:	TRANE		GREENHECK	
Model Number:	SC1H10043		SWB-216-20	
Size:	NL		NL	
Serial Number:	NL		NL	
MOTOR	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Manufacturer:	NL	WEG	NL	MARATHON
Frame Number:	NL	182T	NL	145T
Horsepower:	NL	3	NL	2
Brake Horsepower:	NL	NA	NL	NA
Safety Factor:	NL	1.25	NL	1.15
Volts/Phase:	460/3	460	460/3	460
Motor Amperage:	3.9	2.2/2.1/2.2	2.9	2.3/2.1/2.2
Motor RPM:	1765	1765	1735	1735
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:	4400	4211		
Return Air CFM:			4400	4696
Exhaust Air CFM:				
Outside Air CFM:	1600	1712 *1		
Suction Pressure:	NL	-0.94	NL	0.99
Discharge Pressure:	NL	0.95	NL	0.46
Fan Static Pressure:	1.75	1.89	NL	NA
External Pressure:	1.2	1.03	0.95	1.45
RPM	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Fan RPM:	NL	882	1820	1922
Motor Drive:	NL	BK40H	NL	2VP34
Motor Size/Bore:	NL	H 1 1/8"	NL	7/8"
Fan Drive:	NL	BK80	NL	AK30
Fan Size/Bore:	NL	1"	NL	H 1 1/4"
Belt Size / Number:	NL	B32/1	NL	A33/2
Shafts C-C:	NL	7"	NL	12 1/2
Turns Open:	NL	FIXED	NL	2

Comments: ***1 O.A. damper @ 50%.**

Project:	Suffolk Superior Court		
Address:	Boston, MA		
Date:	5/28/2021	**Project No.**	21-210

ROOM PRESSURIZATION
AC-17 / RF-17 COURTROOM SYSTEM



Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

AIR DISTRIBUTION

SYSTEM: AC-17

SUPPLY [X] RETURN [ ] EXHAUST [ ]

ROOM OR LOCATION	UNIT NUMBER	UNIT SIZE	AREAxK FACTOR	DESIGN FT/MIN	TEST FT/MIN	DESIGN CFM	TESTED CFM
1008	1	24X24	FH	NA	NA	730	682
1008	2	24X24	FH	NA	NA	730	700
1008	3	24X24	FH	NA	NA	730	692
1008	4	24X24	FH	NA	NA	730	703
1008	5	24X24	FH	NA	NA	730	712
1008	6	24X24	FH	NA	NA	730	722
					TOTALS:	4380	4211

Comments:

Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

TRAVERSE DATA

SYSTEM: RF-17 TRAVERSE NUMBER : T1
TRAVERSE LOCATION: M1010A

DUCT SIZE (ROUND)	18	" DIAMETER	Sq Ft =	1.77
DUCT SIZE (RECT.)		" WIDTH x	" DEPTH Sq Ft =	0.00

AIR DENSITY DATA

STATIC PRESS @ CL:	-1.12	InWg.	DESIGN CFM =	4400
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	4696
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**4685**

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	2748	3164	722	2679			
B	2984	710	2551	2931			
C	2809	2648	2892	3010			
D	2794	2802	3063	3181			
E	2674	2858	2768	3183			
F							
G							
H							
I							

NO. OF READINGS = 20 AVERAGE FPM = 2659

J							
K							
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R							

TECHNICIAN: Brian Murphy

Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

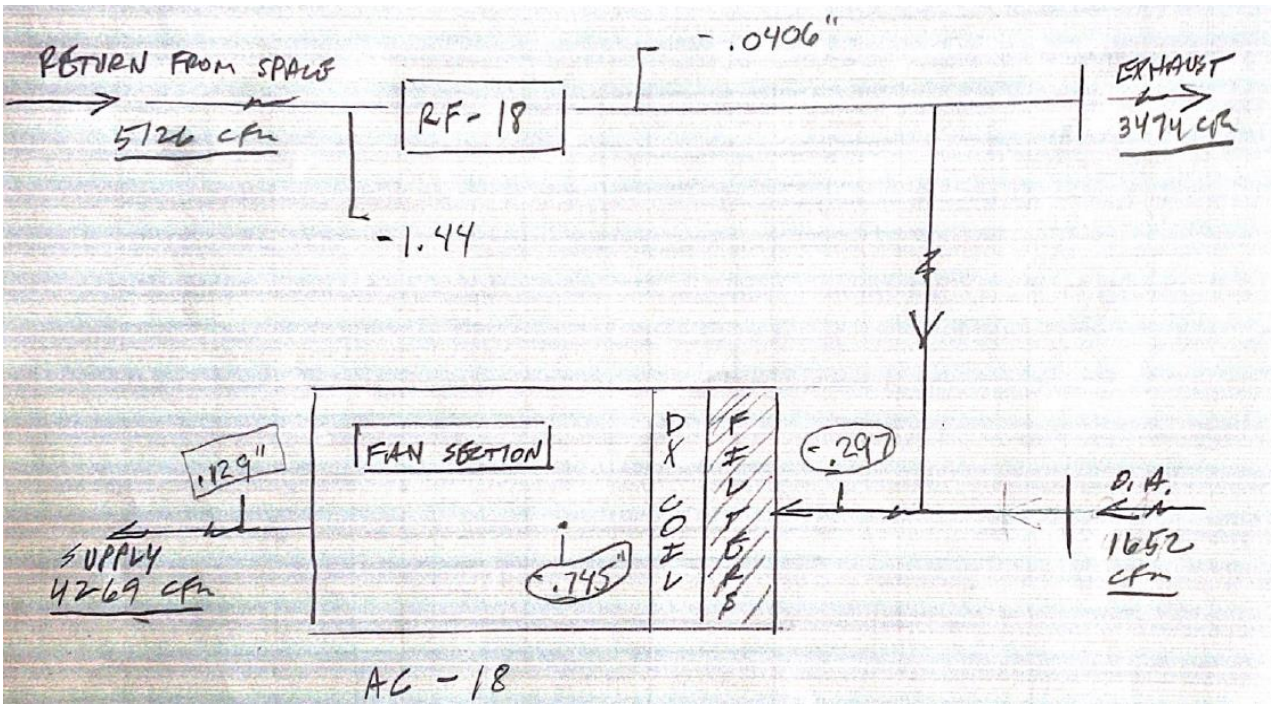
FAN DATA SHEET

	FAN NO. AC-18		FAN NO. RF-18	
Serves / Location:	COURT 1015	M105A	COURT 1015	M105A
Manufacturer:	TRANE		GREENHECK	
Model Number:	SC1H10043		SWB-216-20	
Size:	NL		NL	
Serial Number:	NL		NL	
MOTOR	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Manufacturer:	NL	WEG	NL	MARATHON
Frame Number:	NL	182T	NL	145T
Horsepower:	NL	3	NL	2
Brake Horsepower:	NL	NA	NL	NA
Safety Factor:	NL	1.25	NL	1.15
Volts/Phase:	460/3	460	460/3	460
Motor Amperage:	NL	11.9/12.1/11	2.9	2.2/2.1/2.1
Motor RPM:	1765	1765	1735	1735
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:	4400	4269		
Return Air CFM:			4400	5115
Exhaust Air CFM:				
Outside Air CFM:	1600	1650		
Suction Pressure:	NL	0.745	NL	-1.44
Discharge Pressure:	NL	0.129	NL	0.4
Fan Static Pressure:	1.75	0.874	NL	1.84
External Pressure:	1.2	0.43	0.95	
RPM	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Fan RPM:	NL	882	1820	1922
Motor Drive:	NL	BK40H	NL	2VP34
Motor Size/Bore:	NL	H 1 1/8"	NL	7/8"
Fan Drive:	NL	BK80	NL	AK30
Fan Size/Bore:	NL	1"	NL	H 1 1/4"
Belt Size / Number:	NL	B32/1	NL	A33/2
Shafts C-C:	NL	7"	NL	12 1/2
Turns Open:	NL	FIXED	NL	2

Comments:

Project:	Suffolk Superior Court		
Address:	Boston, MA		
Date:	5/28/2021	**Project No.**	21-210

ROOM PRESSURIZATION
AC-18 / RF-18 COURTROOM SYSTEM



Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

AIR DISTRIBUTION

SYSTEM: AC-18

SUPPLY [X] RETURN [ ] EXHAUST [ ]

ROOM OR LOCATION	UNIT NUMBER	UNIT SIZE	AREAxK FACTOR	DESIGN FT/MIN	TEST FT/MIN	DESIGN CFM	TESTED CFM
1015	1	24X24	FH	NA	NA	730	709
1015	2	24X24	FH	NA	NA	730	680
1015	3	24X24	FH	NA	NA	730	722
1015	4	24X24	FH	NA	NA	730	718
1015	5	24X24	FH	NA	NA	730	711
1015	6	24X24	FH	NA	NA	730	729
					TOTALS:	4380	4269

Comments:

Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

TRAVERSE DATA

SYSTEM: AC-18 TRAVERSE NUMBER : T1
O.A. TRAVERSE LOCATION: M1005A

DUCT SIZE (ROUND)		" DIAMETER			Sq Ft =	0.00
DUCT SIZE (RECT.)	24	" WIDTH x	24	" DEPTH	Sq Ft =	4.00

AIR DENSITY DATA

STATIC PRESS @ CL:	-0.3	InWg.	DESIGN CFM =	1600
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	1650
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**1650**

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	264	100	100	107	520		
B	316	276	104	109	556		
C	589	390	366	573	647		
D	540	617	629	709	738		
E							
F							
G							
H							
I							

NO. OF READINGS = 20 AVERAGE FPM = 413

J							
K							
L							
M							
N							
O							
P							
Q							
R							

TECHNICIAN: Dave Burns

Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

TRAVERSE DATA

SYSTEM: RF-18 TRAVERSE NUMBER : T1
TRAVERSE LOCATION: Fan Rm 10th

DUCT SIZE (ROUND)	18	" DIAMETER	Sq Ft =	1.77
DUCT SIZE (RECT.)		" WIDTH x " DEPTH	Sq Ft =	0.00

AIR DENSITY DATA

STATIC PRESS @ CL:	-0.73	InWg.	DESIGN CFM =	4400
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	5115
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**5108**

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	1879	3444	331	3219			
B	3282	3413	3161	3013			
C	3291	3380	3394	2682			
D	3118	3316	3421	1987			
E							
F							
G							
H							
I							

NO. OF READINGS = 16 AVERAGE FPM = 2896

J							
K							
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M							
N							
O							
P							
Q							
R							

TECHNICIAN: Dave Burns

Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

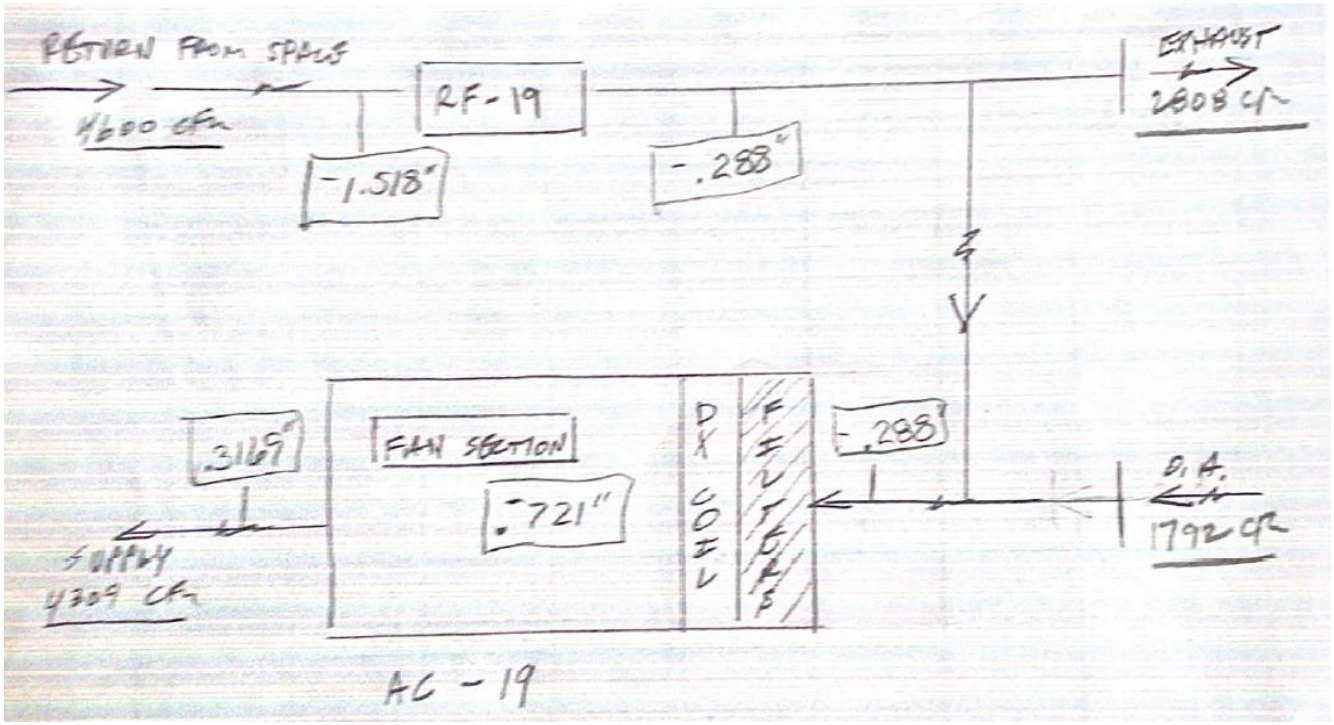
FAN DATA SHEET

	FAN NO. AC-19		FAN NO. RF-19	
Serves / Location:	COURT 1015	M105A	COURT 1015	M105A
Manufacturer:	TRANE		GREENHECK	
Model Number:	SC1H10043		SWB-216-20	
Size:	NL		NL	
Serial Number:	NL		NL	
MOTOR	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Manufacturer:	NL	WEG	NL	MARATHON
Frame Number:	NL	182T	NL	145T
Horsepower:	NL	3	NL	2
Brake Horsepower:	NL	NA	NL	NA
Safety Factor:	NL	1.25	NL	1.15
Volts/Phase:	460/3	460	460/3	460
Motor Amperage:	3.9	2.3/2.3/2.2	2.9	2.1/2.2/2.2
Motor RPM:	1765	1765	1735	1735
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:	4400	4309		
Return Air CFM:			4400	4591
Exhaust Air CFM:				
Outside Air CFM:	1600	1792 *1		
Suction Pressure:	NL	0.721	NL	1.52
Discharge Pressure:	NL	0.317	NL	0.288
Fan Static Pressure:	1.75	1.04	NL	NA
External Pressure:	1.2	0.6	0.95	1.81
RPM	**DESIGN**	**TESTED**	**DESIGN**	**TESTED**
Fan RPM:	NL	882	1820	1922
Motor Drive:	NL	BK40H	NL	2VP34
Motor Size/Bore:	NL	H 1 1/8"	NL	7/8"
Fan Drive:	NL	BK80	NL	AK30
Fan Size/Bore:	NL	1"	NL	H 1 1/4"
Belt Size / Number:	NL	B32/1	NL	A33/2
Shafts C-C:	NL	7"	NL	12 1/2
Turns Open:	NL	FIXED	NL	2

Comments: ***1 O.A. damper @ 60%.**

Project:	Suffolk Superior Court		
Address:	Boston, MA		
Date:	5/28/2021	**Project No.**	21-210

ROOM PRESSURIZATION
AC-19 / RF-19 COURTROOM SYSTEM



Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

AIR DISTRIBUTION

SYSTEM: AC-19
SUPPLY [X] RETURN [ ] EXHAUST [ ]

ROOM OR LOCATION	UNIT NUMBER	UNIT SIZE	AREAxK FACTOR	DESIGN FT/MIN	TEST FT/MIN	DESIGN CFM	TESTED CFM
1017	1	24X24	FH	NA	NA	730	739
1017	2	24X24	FH	NA	NA	730	728
1017	3	24X24	FH	NA	NA	730	731
1017	4	24X24	FH	NA	NA	730	692
1017	5	24X24	FH	NA	NA	730	718
1017	6	24X24	FH	NA	NA	730	701
					TOTALS:	4380	4309

Comments:

Project: Suffolk Superior Court
Address: Boston, MA
Date: 5/28/2021 **Project No.** 21-210

TRAVERSE DATA

SYSTEM: RF-19 TRAVERSE NUMBER : T1
TRAVERSE LOCATION: M1005A

DUCT SIZE (ROUND)	18	" DIAMETER		Sq Ft =	1.77
DUCT SIZE (RECT.)		" WIDTH x	" DEPTH	Sq Ft =	0.00

AIR DENSITY DATA

STATIC PRESS @ CL:	-1.43	InWg.	DESIGN CFM =	4400
DUCT AIR TEMP :	70	Deg F	ACTUAL CFM =	4591
BAROMETRIC PRESS :	29.92	In Hg.	SCFM=	**4577**

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	586	1705	3252	3409	3439		
B	3188	3274	3217	3160	3113		
C	877	1601	2827	3124	3287		
D	3231	3131	2727	1291	1545		
E							
F							
G							
H							
I							

NO. OF READINGS = 20 AVERAGE FPM = 2599

J							
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P							
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R							

TECHNICIAN: Dave Burns