

MADISON PUBLIC SCHOOLS COVID COMMISSIONING

Brown Intermediate School, Daniel Hand High School, Polson Middle School, Jeffrey Elementary School, Ryerson Elementary School, and Town Campus Learning Center



November 17, 2020



MADISON PUBLIC SCHOOLS COVID Commissioning Support Table of Contents

Executive Summary	3
Daniel Hand High School Summary	
Walter C Polson Middle School Summary	
Ryerson Elementary School Summary:	
J Milton Jeffrey Elementary School Summary:	8
Dr. Robert H. Brown Intermediate School Summary:	9
Town Campus Learning Center Summary:	9
Appendix: Air Balancing Reports	11



Executive Summary

Colliers Project Leaders was hired by Madison Public Schools to review the Heating, Ventilation, and Air Conditioning (HVAC) system operations, verify design outdoor air ventilation rates in accordance with the CT Department of Public Health guidelines dated 6/22/2020.

Colliers was engaged to visit the following schools:

- Daniel Hand High School located at 286 Green Hill Rd
- Walter C Polson Middle School located at 302 Green Hill Rd
- Ryerson Elementary School located at 982 Durham Rd
- J Milton Jeffrey Elementary School located at 331 Copse Rd
- Dr. Robert H. Brown Intermediate School located at 980 Durham Rd
- Town Campus Learning Center located at 2 Campus Dr

A brief review of the mechanical systems, findings, and recommendations are below:

- **Daniel Hand High School**: There are nine (9) Roof Top Units (RTU) classroom and common spaces with direct digital controls (DDC). RTU-8 was not tested as it was disabled for maintenance.
 - RTU outside air dampers and airflows were increased where possible to provide the design fresh air into the building.
 - o All terminal units were reviewed and select variable air volume (VAV) boxes were calibrated.
 - System schedules is recommended to be adjusted to allow all units to start 2 hours prior to school and run for at least 1 hour after all school activities have been completed. The current occupied schedule is from 6 AM to 4PM.
 - RTUs were observed with MERV-8 air filter, which the facility staff have ordered and plans to replace with MERV-13 filters. This will increase the filtration efficacy.
- Walter C Polson Middle School: There are forty-six (46) mechanical ventilation units, comprised of RTUs, Air Handling Units (AHUs), and Heating & Ventilating units (HV) with a mixture of pneumatic, stand-alone electronic, and DDC controls.
 - System schedules is recommended to be adjusted to allow all units to start 2 hours prior to school and run for at least 1 hour after all school activities have been completed. The current occupied schedule is from 6 AM to 4PM.
 - Toilet exhaust fans should operate 24/7.
 - Some classrooms do not have a source of mechanical ventilation. These areas have an exhaust fa
 installed with operable windows. Recommendation is to open the operable windows to allow fresh air
 to the space.
 - Many RTU outdoor air damper actuators were found inoperable and the outdoor air dampers were found in the full closed position. Note that these parts may not be commercially available and facility staff have sourced used parts via eBay in the past. Damper positions were set manually to allow proper outdoor air ventilation, but repair or replacement of the actuators is recommended.
 - o Wrestling room and fitness room above ceiling Heating & Ventilation unit outdoor intake was found capped. Facility staff report this was due to maximize space comfort heating during the winter season. Recommendation for the outdoor intake not to be blocked, and further investigation may be necessary to verify proper heating operation. The pneumatic control heating valve is recommended to be verified for proper operation and repair or replacement of the valve if necessary.
 - RTUs were observed with MERV-8 air filter, which the facility staff have ordered and plans to replace with MERV-13 filters. This will increase the filtration efficacy.
 - H&V-2 is not in Operation. Controls were removed and unit remains OFF.
 - Unable to command and insert setpoints to open or close outdoor air damper from the BMS.
 Colliers recommends ALC to provide additional support.
 - H&V-3, H&V-4, H&V-5, H&V-6 outdoor air dampers were found in the closed position and unable to command the damper to open position from BMS.
 - H&V-1 was found with the outside air damper 50% open.



4

- Old Gym H&V unit, Outdoor air damper controls are in process of installation. Unable to take measurements.
- Ryerson Elementary School: Each classroom utilizes a pneumatically controlled unit ventilator (UV) for heating and ventilation.
 - Outdoor intake louvers were found fouled with dust and debris which limits the proper outdoor fresh air to the classroom. Recommendation is to clean each UV outdoor intake louvers.
 - Outdoor air dampers utilize a pneumatic actuator, many of which were observed to be 95% closed. Recommendation for the Pneumatic control valve actuators to be repaired/calibrated or replaced if necessary.
 - Outdoor air flow rates were measured and set to approximately 20%.
 - Some outdoor intake in the exterior of the classroom were found capped. Facility staff report this is to maximize the comfort heating in the classroom. Recommendation for the pneumatic heating control valve to be repaired/calibrated or replaced if necessary.
 - UVs were observed with MERV-8 air filter, which the facility staff have ordered and plans to replace with MERV-13 filters. This will increase the filtration efficacy.
- J Milton Jeffrey Elementary School: Each classroom utilizes a pneumatically controlled unit ventilator (UV) for heating and ventilation and six (6) classroom RTUs with standalone electronic controls.
 - Recommendation for the RTUs is to operate at all time to allow fresh air to the space and controls to be modified to implement an operation schedule.
 - Some UV outdoor intake louvers were found fouled with dust and debris limiting the proper outdoor fresh air to the classroom. Recommendation is to clean each UV outdoor intake louvers.
 - Outdoor air dampers utilize a pneumatic actuator, many of which were observed to be 95% closed. Recommendation for the Pneumatic control valve actuators to be repaired/calibrated or replaced if necessary.
 - Outdoor air flow rates were measured and set to approximately 20%
 - Some outdoor intake in the exterior of the classroom were found capped, the reason of being capped is to maximize the comfort heating in the classroom. Recommendation for the Heating pneumatic control valve to be repaired/calibrated or replaced if necessary
 - UVs and RTUs were observed with MERV-8 air filter, which the facility staff have ordered and plans to replace with MERV-13 filters. This will increase the filtration efficacy.
 - o AHU unit was low on supply air flow. See TAB report for details.

• Dr. Robert H. Brown Intermediate School:

- System schedules is recommended to be adjusted to allow all units to start 2 hours prior to school and run for at least 1 hour after all school activities have been completed. The current occupied schedule is from 6 AM to 4PM.
- Some AHU main supply ductwork has air leakage. Recommendation to seal the ductwork of the associated AHU with air leakage.
- Some supply and return fan belts were observed to be loose, which the facility staff replaced.
- AHUs and RTUs were observed with MERV-8 air filter, which the facility staff have ordered and plans to replace with MERV-13 filters. This will increase the filtration efficacy.
- H&V-2 unit in the Gym, was found in alarm. Madison Staff reset the fan in the field, fan was able to energize and operate.
- Boy & Girls Locker room, BMS does not control dampers. Unable to open or close dampers from BMS

• Town Campus Learning Center:

o Roof Top Unit (14) serving dedicated (14) classroom is currently installed with a local control T-



- stat and Turns on and OFF based on space temperature setpoint. Recommendation for the RTU's to operate at all times to allow fresh air to the space and controls to be modified to implement an operation schedule
- RTUs were observed with MERV-8 air filter, which the facility staff have ordered and plans to replace with MERV-13 filters. This will increase the filtration efficacy.



Daniel Hand High School Summary

The Daniel Hand High School serves grades 9-12. The school HVAC system consist of (9) Roof Top Unit (RTU) located on the roof and variable air volume (VAV) boxes with reheat coils serving multiples classroom and administration offices. (2) Heating & Ventilation unit installed in the woodshop ceiling in the building. Exhaust fans, Roof Top Unit, H&V unit and VAVs are controlled by the Building Management System. Existing design drawings were provided to Colliers for a better understanding of the facility.

The RTU outdoor air minimum ventilation had been reduced below the original design as part of a previous energy efficiency project. The new ventilation rate was designed to automatically open in response to rising CO2 levels (demand control ventilation) to provide sufficient ventilation as required by ASHRAE 60.1 standards. To comply with the DPH guidance, each unit's ventilation rate was increased and verified at the minimum design parameters with support of a certified testing and balancing contractor. Increasing the minimum ventilation rates are not recommended as operating beyond the design conditions could result in the loss of controlled airflow within the building. This could result in improper ventilation of certain areas, increased energy consumption, and temperature control issues. Note that the economizer mode is still available and will automatically increase the ventilation rates when the outdoor air conditions are favorable. The RTU air filters were inspected and noted to be MERV-8, as per the design. Since DPH has recommended the filtration be increased to MERV-13 (which provide additional filtration with increased pressure drop), facility staff have ordered the new filters and expect to replace them upon arrival. All VAVs were reviewed and (47) were observed to have issues such as low airflow, or no airflow. Each of these (47) selected VAVs were calibrated by the TAB contractor and specific issues were noted in the tracking commissioning issues log. Dedicated exhaust fans are also installed to ventilate other specific areas of the facility. Some of these areas include the gym, kitchen, and toilet rooms.

During our investigation we noticed the operation of the units are set to be energized starting at 6am -4pm Mon-Fri, units may be kept operating longer than 4pm, this is requested in advanced. Roof Top Unit #5 was having issues with the cooling stages and compressors which was addressed. Also Roof Top Unit #8 was indicating a Fail alarm on BMS and the unit was tripped and shutdown.

Daniel Hand High School major ventilation equipment is as follows:

- 9 Roof Top Units (AHU)- BMS
- H&V unit- BMS
- Exhaust Fans-BMS
- VAV Boxes with Reheat-BMS

Walter C Polson Middle School Summary

The Walter C Polson Middle School ventilation system consists of multiple AHUs installed in (9) rooftop compartments referred to as "doghouses". Each doghouse contains Lennox AHUs which utilize a mixture of BMS and standalone controls and provide ventilation and conditioned air to classrooms. The two (2) gymnasiums contain Heating & Ventilation Units (6) serving the new Gymnasium, (2) Heating & Ventilation unit serving the old Gymnasium.

Split Air Conditioning installed in a few classrooms, exhaust fan installed serving multiples classroom and administration offices, Roof Top Unit -1 serving the Fitness center, H&V unit serving the wrestling room. During our field visit investigation, it was noted that each RTU installed in a bundle of (6) in an enclosed compartment called doghouse, the outdoor air damper control actuator was found defective and recommended to be replaced on each RTU. During the measurement with the TAB contractor, the outdoor air damper was manually forced to the desired open position to allow minimum fresh air required to the dedicated classroom. To comply with the DPH guidance, each unit's ventilation rate was increased and verified at the minimum design parameters with support of a certified testing and balancing contractor. Increasing outdoor minimum



ventilation rates beyond the current settings are not recommended during outdoor conditions of below 35 deg F, which could result in freezing and damaging the heating coils and cause temperature control issues in the classroom. Classroom #23 – Classroom #43 have no source of mechanical ventilation into the space, and have operable windows installed, with perimeter heating and general exhaust ventilation. Some exhaust fans are not operational. Recommendation for associated classroom with no outdoor fresh air, to open operable windows to allow fresh air to the classroom. Few classrooms have split air conditioning installed to satisfy the comfort cooling of the space during the summer season. The H&V unit serving the wrestling was found capped on the outdoor air intake, it was informed that the capped was to prevent from freezing the reheat coils and maximize the comfort heating during the winter season. Recommendation to perform a further investigation on the pneumatic heating control valve and make necessary repair or replacement of the valve. We noticed the operation of the units are set to be energized starting at 6am -4pm Mon-Fri, units may be kept in operation longer than 4pm, this is requested in advanced.

Air filters were inspected and expected to be upgraded from MERV-8 to MERV-13. Since DPH has recommended the filtration be increased to MERV-13 (which provide additional filtration with increased pressure drop), facility staff have ordered the new filters and expect to replace them upon arrival. Dedicated exhaust fans are also installed to ventilate other specific areas of the facility. Some of these areas include the gym, kitchen, and toilet rooms.

Walter C Polson Middle School Major Ventilation Equipment is as follows:

- Lennox RTU- Total of (9) Doghouse-BMS
- H&V units- Stand alone
- Split AC unit in Classroom- Stand alone
- Roof Exhaust Fans- Stand alone
- · Various Window AC units- Stand alone

Ryerson Elementary School Summary:

The Ryerson Elementary School, Ventilation systems consist of Unit Ventilators drawing outdoor fresh air with a hillo speed adjustment with hydronic heating coils in each classroom. Hot Water perimeter heating radiation is installed along with an exhaust grille for each classroom. (2) Split air conditioning unit is installed in the library and Heating Ventilation unit serving the cafeteria. Exhaust fans, Uni Ventilators unit, Split AC unit, Window AC unit, perimeter Heating are installed with a standalone controls.

During our field visit investigation, it was noticed the Outdoor air intake louvers contained dust and debris, for each UV. Recommendation is to clean each outdoor intake louvers associated with each UV. Each outdoor air pneumatic control damper was found at 95% in the closed positions. To comply with the DPH guidance, each unit's ventilation rate was increased and verified at the minimum design parameters with support of a certified testing and balancing contractor. During the measurement with the TAB contractor, the outdoor air damper was manually forced to the desired open position to allow minimum fresh air required to the dedicated classroom. During the measurements the TAB contractor manually adjusted the Outdoor air damper to an average of 20% of fresh air. Increasing outdoor minimum ventilation rates beyond the current settings are not recommended during outdoor conditions of below 35 deg F, it could result in freezing and damaging the heating coils and cause temperature control issues in the classroom. It was noticed that the H&V unit serving the cafeteria have no operation schedule. Recommendation is to implement a schedule for the H&V unit. Many window air-conditioning unit, split air conditioning unit are installed in few classrooms to allow comfort space cooling. Some outdoor intake in the exterior of the classroom were found capped. Facility staff report this is to maximize the comfort heating in the classroom. Recommendation for the pneumatic heating control valve to be repaired/calibrated or replaced if necessary.

Air filters were inspected and expected to be upgraded from MERV-8 to MERV-13. Since DPH has recommended the filtration be increased to MERV-13 (which provide additional filtration with increased pressure drop), facility staff



have ordered the new filters and expect to replace them upon arrival.

Dedicated exhaust fans are also installed to ventilate other specific areas of the facility. Some of these areas include the gym, kitchen, and toilet rooms.

Ryerson Elementary School Major Ventilation Equipment is as follows:

- Classroom Unit Ventilators- Stand alone
- H&V unit Stand alone
- · Various Window AC unit- Stand alone
- Split AC unit Stand alone

J Milton Jeffrey Elementary School Summary:

The J Milton Jeffrey Elementary School ventilation system consist of (6) Roof Top Unit installed on the roof serving (6) dedicated classroom. Unit ventilator drawing outdoor fresh air with hydronic heating coils is installed in the classroom. Heating & Ventilation unit is installed in the Gymnasium high ceiling serving the gym. Dedicated AHU heating and Dx cooling is installed inside the classroom#8 serving classroom room #8, window Ac unit and Split Ac unit is installed in few classrooms. RTUs, AHU, Perimeters radiation heating, Exhaust fans, Uni Ventilators unit, Split AC unit, Window AC unit, H&V unit perimeter Heating are installed with a standalone controls

During our field visit it was noticed on the Roof Top Unit, the Outdoor air grille was found full of debris, it was addressed by the facility staff. It was also noticed the Outdoor air intake louvers is full of dust and debris, for each UV. Recommendation is to clean each outdoor intake louvers associated with each UV. Each outdoor air pneumatic control damper was found at 95% in the closed positions. To comply with the DPH guidance, each unit's ventilation rate was increased and verified at the minimum design parameters with support of a certified testing and balancing contractor. During the measurement with the TAB contractor, the outdoor air damper was manually forced to the desired open position to allow minimum fresh air required to the dedicated classroom. During the measurements the TAB contractor manually adjusted the Outdoor air damper to an average of 20% of fresh air Outdoor damper blade has a manual adjustment to set the outdoor blade damper at desired positions. Increasing outdoor minimum ventilation rates beyond the current settings are not recommended during outdoor conditions of below 35 deg F, it could result in freezing and damaging the heating coils and cause temperature control issues in the classroom. Some outdoor intake in the exterior of the classroom were found capped. Facility staff report this is to maximize the comfort heating in the classroom. Recommendation for the pneumatic heating control valve to be repaired/calibrated or replaced if necessary. Few classrooms included Window Ac unit and split AC unit. Classroom #8 is installed with a window Ac unit, Dedicated AHU with Dx cooling and heating, and a split Ac unit. Recommendation is to further investigate the purpose of having many cooling units and only focus on (1) unit that can satisfy heating and cooling.

Dedicated exhaust fans are also installed to ventilate other specific areas of the facility. Some of these areas include the gym, kitchen, and toilet rooms

Air filters were inspected and expected to be upgraded from MERV-8 to MERV-13. Since DPH has recommended the filtration be increased to MERV-13 (which provide additional filtration with increased pressure drop), facility staff have ordered the new filters and expect to replace them upon arrival.

J Milton Jeffrey Elementary School major ventilation equipment is as follows:

- (6) Roof Top Unit- Stand alone
- Classroom Unit Ventilator units Stand alone
- Exhaust Fan Stand alone
- Window AC unit Stand alone
- AHU- Classroom#8 Stand alone



• Split AC unit - Stand alone

Dr. Robert H. Brown Intermediate School Summary:

The Dr. Robert H. Brown Intermediate School, Ventilation system consist of (17) Air Handling unit which includes Roof Top unit located in the roof and inside the school building mechanical room equipment. Variable Air Volume boxes installed associated with AHU-7. The remaining of AHU are constant volume. Exhaust fans, Roof Top Unit, AHU, and VAVs are installed with Building Management System. Existing design drawings were provided to Colliers for a better understanding of the facility.

During our field visit investigation, it was noted all outdoors air damper control valve is out of calibration and some may require repairs or replacement. Recommendation to calibrate and make necessary adjustment or replacement to each control damper actuator. Air Handling Unit #7 was found to reading below design on supply airflow, Facilities staff addressed the issue and found a by-pass damper open. Air Leakage was noted on few AHU's and recommendation is to seal the ductwork. To comply with the DPH guidance, each unit's ventilation rate was increased and verified at the minimum design parameters with support of a certified testing and balancing contractor. Increasing the minimum ventilation rates are not recommended as operating beyond the design conditions could result in the loss of controlled airflow within the building. This could result in improper ventilation of certain areas, increased energy consumption, and temperature control issues. Note that the economizer mode is still available and will automatically increase the ventilation rates when the outdoor air conditions are favorable. During the measurements the TAB contractor manually adjusted the Outdoor air damper to ensure the minimum outdoor parameters were satisfied as per original design. The AHUs, RTU air filters were inspected and noted to be MERV-8, as per the design. Since DPH has recommended the filtration be increased to MERV-13 (which provide additional filtration with increased pressure drop), facility staff have ordered the new filters and expect to replace them upon arrival.

Dedicated exhaust fans are also installed to ventilate other specific areas of the facility. Some of these areas include the gym, kitchen, and toilet rooms.

During our investigation we noticed the operation of the units are set to be energized starting at 6am -4pm Mon-Fri, units may be kept operating longer than 4pm, this is requested in advanced.

Daniel Hand High School major ventilation equipment is as follows:

- 17 Roof Top Units (AHU)- BMS
- Exhaust Fans-BMS
- VAV Boxes with Reheat-BMS

Town Campus Learning Center Summary:

The Town Campus Learning Center, Ventilation system consist of (14) Roof Top units located in the roof and serving dedicated (14) classrooms. Exhaust fans, are installed with a standalone control

During our field visit it was noticed on the Roof Top Unit, the Outdoor air grille was found full of debris, it was addressed by the facility staff. To comply with the DPH guidance, each unit's ventilation rate was increased and verified at the minimum design parameters with support of a certified testing and balancing contractor. During the measurement with the TAB contractor, the outdoor air damper was manually forced to the desired open position to allow minimum fresh air required to the dedicated classroom. During the measurements the TAB contractor manually adjusted the Outdoor air damper to an average of 20% of fresh air Outdoor damper blade has a manual adjustment to set the outdoor blade damper at desired positions. Roof Top Unit (14) serving dedicated (14) classroom is currently installed with a local control T-stat and Turns on and OFF based on space temperature setpoint. Recommendation for the RTU's to operate at all time to allow fresh air to the space and controls to be



modified to implement an operation schedule

The RTU air filters were inspected and noted to be MERV-8, as per the design. Since DPH has recommended the filtration be increased to MERV-13 (which provide additional filtration with increased pressure drop), facility staff have ordered the new filters and expect to replace them upon arrival.

Dedicated exhaust fans are also installed to ventilate other specific areas of the facility. Some of these areas include toilet rooms.

Town Campus Learning Center major ventilation equipment is as follows:

- 14 Roof Top Units Stand alone
- Exhaust Fans



Appendix: Air Balancing Reports

Environmental Testing & Balancing, Inc.

154 STATE STREET SUITE 204 NORTH HAVEN, CT 06473 (203) 234-2089 FAX (203) 234-2147

CERTIFIED TESTING AND BALANCING REPORT

Date:	September 3, 2020	
Project:	Daniel Hand High School	
	Ventilation Survey	
Address:	286 Green Hill Road	
	Madison	
	Connecticut	
HVAC Contractor:	Colliers	

The data presented in this report is a record of the system measurements and final adjustments that have been obtained in accordance with the current edition of the NEBB Procedural Standards for Testing, Adjusting and Balancing of Environmental Systems. Any variance from design quantities which exceed NEBB or project tolerances are noted in the Test-Adjust-Balance report Remarks.

Submitted and Certified by: NEBB Professional John E. Burgess



TABLE OF CONTENTS

RTU-3 Air Apparatus Test Sheet 11 Air Outlet Test Sheet 12 RTU-4 13 Air Apparatus Test Sheet 14 RTU-5 15 Air Apparatus Test Sheets 16 - 19 RTU-6 16 - 19 Air Apparatus Test Sheets 20 - 22 RTU-7 22 - 22 RTU-8 23 - 23 RTU-8 24 - 24 Air Apparatus Test Sheet 24 - 24 RTU-9 - 25 - 25 Air Apparatus Test Sheet 25 - 25	Sheet Title	Page Numbers	
Glossary / Notes (two pages) Remarks 1 - 2 RTU-1 3 Air Apparatus Test Sheets 3 3 RTU-2 3 Air Apparatus Test Sheet 10 RTU-3 11 Air Apparatus Test Sheet 1 12 RTU-4 1 1 Air Outlet Test Sheet 1 13 Air Outlet Sheet 1 13 Air Outlet Test Sheet 1 15 Air Apparatus Test Sheet 1 15 Air Outlet Test Sheets 1 15 Air Apparatus Test Sheet 2 2 Air Apparatus Test Sheet 2 2 RTU-6 2 2 Air Apparatus Test Sheet 2 2 RTU-7 2 2 Air Apparatus Test Sheet 2 2 RTU-8 2 2 Air Apparatus Test Sheet 2 2 Air Apparatus Test Sheet 2 2 Air Apparatus Test Sheet 2 2	Luckum and Calibration Short		
Remarks 1 - 2 RTU-1 Air Apparatus Test Sheets 4 - 9 RTU-2 Air Apparatus Test Sheet 10 RTU-3 Air Apparatus Test Sheet 1 1 Air Outlet Test Sheet 1 1 Air Apparatus Test Sheet 1 1 Air Outlet Test Sheets 1 1 Air Apparatus Test Sheets 1 1 Air Outlet Test Sheets 1 1 Air Outlet Test Sheets 2 1 RTU-6 2 2 Air Apparatus Test Sheet 2 2 RTU-7 2 2 Air Apparatus Test Sheet 2 2 RTU-8 2 2 Air Apparatus Test Sheet 2 2 RTU-8 2 2 Air Apparatus Test Sheet 2 2 RTU-9 2 2 Air Apparatus Test Sheet 2 2 RTU-9 2 2 Air Apparatus			
RTU-1 Air Apparatus Test Sheet 3 Air Outlet Test Sheets 4 - 9 RTU-2 Air Apparatus Test Sheet 10 RTU-3 11 Air Apparatus Test Sheet 11 Air Outlet Test Sheet 12 Air Apparatus Test Sheet 14 RTU-5 Air Apparatus Test Sheets 15 Air Outlet Test Sheets 16 17 RTU-6 Air Apparatus Test Sheet 20 Air Outlet Test Sheets 20 Air Apparatus Test Sheet 20 Air Apparatus Test Sheet 22 RTU-7 21 2 RTU-8 24 Air Apparatus Test Sheet 24 RTU-9 Air Apparatus Test Sheet 25 Air Apparatus Test Sheet 25			_
Air Apparatus Test Sheets 3 Air Outlet Test Sheets 4 - 9 RTU-2 - 10 Air Apparatus Test Sheet 10 11 Air Apparatus Test Sheet 11 12 Air Outlet Test Sheet 13 13 Air Outlet Test Sheet 14 14 RTU-5 15 15 Air Apparatus Test Sheets 15 15 Air Outlet Test Sheets 16 - 19 RTU-6 20 20 Air Apparatus Test Sheets 20 20 Air Outlet Test Sheets 20 20 Air Outlet Test Sheets 20 20 Air Apparatus Test Sheets 20 20 Air Apparatus Test Sheets 23 22 RTU-7 23 24 Air Apparatus Test Sheet 23 24 RTU-8 24 24 Air Apparatus Test Sheet 24 24 RTU-9 25 25 Air Apparatus Test Sheet 25 25		1 -	2
Air Outlet Test Sheets 4 - 9 RTU-2 Air Apparatus Test Sheet 10 RTU-3 - 11 Air Apparatus Test Sheet 12 12 RTU-4 - 13 Air Apparatus Test Sheet 13 14 RTU-5 - 15 Air Apparatus Test Sheets 16 - 19 RTU-6 - 19 RTU-7 - 20 20 Air Apparatus Test Sheets 20 20 Air Outlet Test Sheets 20 20 Air Outlet Test Sheets 20 20 Air Apparatus Test Sheet 20 20 RTU-7 - 22 22 RTU-8 23 23 Air Apparatus Test Sheet 23 24 RTU-9 - 24 Air Apparatus Test Sheet 25 25 RTU-9 - 25 25 Air Apparatus Test Sheet 25 25			
RTU-2 Air Apparatus Test Sheet 10 RTU-3 11 Air Apparatus Test Sheet 12 RTU-4 12 Air Apparatus Test Sheet 13 Air Outlet Test Sheet 14 RTU-5 15 Air Apparatus Test Sheets 16 - 19 RTU-6 20 Air Apparatus Test Sheets 20 - 22 RTU-7 21 - 22 RTU-8 23 RTU-8 Air Apparatus Test Sheet 24 RTU-9 24 RTU-9 Air Apparatus Test Sheet 25	**		
Air Apparatus Test Sheet 10 RTU-3 11 Air Apparatus Test Sheet 12 RTU-4 12 Air Apparatus Test Sheet 13 Air Outlet Test Sheet 14 RTU-5 15 Air Apparatus Test Sheets 16 - 19 RTU-6 20 Air Apparatus Test Sheets 20 - 22 RTU-7 21 - 22 RTU-8 23 - 23 RTU-8 24 - 24 Air Apparatus Test Sheet 24 - 24 RTU-9 25 - 25 - 25 Air Apparatus Test Sheet 24 - 25 RTU-9 - 25 - 25 - 25 Air Apparatus Test Sheet 24 - 25 RTU-9 - 25 - 25 Air Apparatus Test Sheet 25 - 25		4 -	9
RTU-3 Air Apparatus Test Sheet 11 Air Outlet Test Sheet 12 RTU-4 13 Air Apparatus Test Sheet 14 RTU-5 15 Air Apparatus Test Sheets 16 - 19 RTU-6 16 - 19 Air Apparatus Test Sheets 20 - 22 RTU-7 22 - 22 RTU-8 23 - 23 RTU-8 24 - 24 Air Apparatus Test Sheet 24 - 24 RTU-9 - 25 - 25 Air Apparatus Test Sheet 25 - 25	RTU-2		
Air Apparatus Test Sheet 11 Air Outlet Test Sheet 12 Air Apparatus Test Sheet 13 Air Outlet Test Sheet 14 RTU-5 15 Air Apparatus Test Sheets 16 - 19 RTU-6 20 Air Apparatus Test Sheets 20 - 22 RTU-7 22 - 22 RTU-8 23 - 23 RTU-8 24 - 24 Air Apparatus Test Sheet 24 - 24 RTU-9 - 25 - 25 Air Apparatus Test Sheet 24 - 25 Air Apparatus Test Sheet 24 - 25 Air Apparatus Test Sheet 24 - 25 Air Apparatus Test Sheet 25 - 25	Air Apparatus Test Sheet		10
Air Outlet Test Sheet 12 RTU-4 13 Air Apparatus Test Sheet 14 RTU-5 15 Air Apparatus Test Sheets 16 - 19 RTU-6 16 - 19 Air Apparatus Test Sheet 20 - 22 Air Outlet Test Sheets 21 - 22 RTU-7 - 22 - 23 RTU-8 - 23 Air Apparatus Test Sheet 24 RTU-9 - 24 Air Apparatus Test Sheet 24 RTU-9 - 25	RTU-3		
RTU-4 Air Apparatus Test Sheet 13 Air Outlet Test Sheet 14 RTU-5 15 Air Apparatus Test Sheets 16 - 19 RTU-6 20 Air Apparatus Test Sheet 20 Air Outlet Test Sheets 21 - 22 RTU-7 23 Air Apparatus Test Sheet 23 RTU-8 24 Air Apparatus Test Sheet 24 RTU-9 25 Air Apparatus Test Sheet 25	Air Apparatus Test Sheet		11
Air Apparatus Test Sheet Air Outlet Test Sheet RTU-5 Air Apparatus Test Sheet Air Outlet Test Sheets 15 Air Outlet Test Sheets 16 - 19 RTU-6 Air Apparatus Test Sheet Air Outlet Test Sheets 20 Air Outlet Test Sheets 21 - 22 RTU-7 Air Apparatus Test Sheet RTU-8 Air Apparatus Test Sheet 23 RTU-9 Air Apparatus Test Sheet 24 RTU-9 Air Apparatus Test Sheet	Air Outlet Test Sheet		12
Air Outlet Test Sheet RTU-5 Air Apparatus Test Sheet Air Outlet Test Sheets Air Outlet Test Sheets Air Apparatus Test Sheet Air Apparatus Test Sheet Air Outlet Test Sheets 20 Air Outlet Test Sheets 21 - 22 RTU-7 Air Apparatus Test Sheet RTU-8 Air Apparatus Test Sheet 23 RTU-9 Air Apparatus Test Sheet 24 RTU-9 Air Apparatus Test Sheet	RTU-4		
RTU-5 Air Apparatus Test Sheet Air Outlet Test Sheets RTU-6 Air Apparatus Test Sheet Air Apparatus Test Sheet Air Outlet Test Sheets 20 Air Outlet Test Sheets 21 - 22 RTU-7 Air Apparatus Test Sheet RTU-8 Air Apparatus Test Sheet 23 RTU-9 Air Apparatus Test Sheet 24 RTU-9 Air Apparatus Test Sheet	Air Apparatus Test Sheet		13
Air Apparatus Test Sheets Air Outlet Test Sheets RTU-6 Air Apparatus Test Sheet Air Apparatus Test Sheet Air Outlet Test Sheets 20 Air Outlet Test Sheets 21 - 22 RTU-7 Air Apparatus Test Sheet RTU-8 Air Apparatus Test Sheet 23 RTU-9 Air Apparatus Test Sheet 24 RTU-9 Air Apparatus Test Sheet	Air Outlet Test Sheet		14
Air Outlet Test Sheets RTU-6 Air Apparatus Test Sheet Air Outlet Test Sheets Air Outlet Test Sheets 20 Air Outlet Test Sheets 21 - 22 RTU-7 Air Apparatus Test Sheet RTU-8 Air Apparatus Test Sheet Air Apparatus Test Sheet 24 RTU-9 Air Apparatus Test Sheet 25	RTU-5		
RTU-6 Air Apparatus Test Sheet Air Outlet Test Sheets 20 RTU-7 Air Apparatus Test Sheet RTU-8 Air Apparatus Test Sheet Air Apparatus Test Sheet RTU-9 Air Apparatus Test Sheet 23 RTU-9 Air Apparatus Test Sheet	Air Apparatus Test Sheet		15
Air Apparatus Test Sheets 20 Air Outlet Test Sheets 21 - 22 RTU-7 Air Apparatus Test Sheet 23 RTU-8 Air Apparatus Test Sheet 24 RTU-9 Air Apparatus Test Sheet 25	Air Outlet Test Sheets	16 -	19
Air Outlet Test Sheets RTU-7 Air Apparatus Test Sheet RTU-8 Air Apparatus Test Sheet Air Apparatus Test Sheet RTU-9 Air Apparatus Test Sheet 21 - 22 RTU-8 23 RTU-8 24 RTU-9 Air Apparatus Test Sheet	RTU-6		
RTU-7 Air Apparatus Test Sheet RTU-8 Air Apparatus Test Sheet Air Apparatus Test Sheet RTU-9 Air Apparatus Test Sheet 23 24 25	Air Apparatus Test Sheet		20
Air Apparatus Test Sheet RTU-8 Air Apparatus Test Sheet Air Apparatus Test Sheet 24 RTU-9 Air Apparatus Test Sheet 25	Air Outlet Test Sheets	21 -	22
RTU-8 Air Apparatus Test Sheet 24 RTU-9 Air Apparatus Test Sheet 25	RTU-7		
RTU-8 Air Apparatus Test Sheet 24 RTU-9 Air Apparatus Test Sheet 25	Air Apparatus Test Sheet		23
Air Apparatus Test Sheet RTU-9 Air Apparatus Test Sheet 24 25			
RTU-9 Air Apparatus Test Sheet 25			24
Air Apparatus Test Sheet 25			
			25
		26 -	27

Environmental Testing & Balancing, Inc.

Instrument Calibration Sheet

Date Calibrated	Instrument	Model #	Serial #	Manufacturer
Air Test Equipment				
November 2019	Air Data Multimeter	ADM860	M01616	Shortridge
April 2020	Digital Anemometer	RVA801	A00142	Alnor
April 2020	Digital Ampmeter	324	33230041WS	Fluke
February 2020	Pocket Laser Tach	PTL200	1940830	Monarch
Hydronics Test Equipn	nent			
February 2020	Hydrodata Multimeter	HDM250	W14102	Shortridge

Glossary

Abbreviation	Meaning	Abbreviation	Meaning		
" W.G.	(measured in) Inches Water Gauge	LWT	Leaving Water Temperature		
A/C	Air Changes per Hour	MA	Mixed Air		
AHU	Air Handling Unit	MAU, MUA	Make-Up Air Unit		
AMPS	Amperages	Max	Maximum		
BHP	Brake Horsepower	MBH	Thousand BTUs per Hour		
BTU	British Thermal Unit	Min	Minimum		
CD	Ceiling Diffuser	N/A	Not Available, Not Accessible		
CEF	Ceiling Exhaust Fan	No.	Number		
CF for DDC	BMS Correction Factor	OA	Outside Air		
CFM	Cubic Feet per Minute	OBD	Opposed Blade Damper		
СН	Chiller	OD	Outside Diameter		
CHWC, CC	Chilled Water Coil, Cooling Coil	OED	Open End Duct		
CS	Circuit Setter	PSI	Pounds per Square Inch		
СТ	Cooling Tower	RA	Return Air		
CV	Constant Volume	RCP	Radiant Ceiling Panel		
dB	Decibel	Req'd	Required		
Dia	Diameter	RG	Return Grille		
dP, DP	Differential Pressure	RGD(s)	Register(s), Grille(s), Diffuser(s)		
EADB	Entering Air Dry Bulb	RHC	Reheat Coil		
EAWB	Entering Air Wet Bulb	Rm Press	Room Pressure		
EF	Exhaust Fan	RP	Radiant Panel		
EG	Exhaust Grille	RPM	Revolutions per Minute		
ER	Exhaust Register	RTU	Roof Top Unit		
EWT	Entering Water Temperatrue	SA	Supply Air		
EX / EXH	Exhaust	SD	Supply Diffuser		
F	Fahrenheit	SL	Slot		
FLA	Full Load Amperage	SNRKL	Snorkel		
FCU	Fan Coil Unit	SP	Static Pressure		
FPM	Feet per Minute	TADBF	Total Air Delivered by Fan		
GPM	Gallons per Minute	TF	Thermafuser		
HP	Horsepower	VAV	Variable Air Volume		
HWC, HC	Hot Water Coil, Heating Coil	VFD	Variable Frequency Drive		
НХ	Heat Exchanger				
kW	Kilowatt				
LADB	Leaving Air Dry Bulb				
LAWB	Leaving Air Wet Bulb				
LD	Linear Diffuser				

Notes

Measuring with Flow Hood (referencing Air Outlet Test Sheets and Grille, Register & Diffuser Test Sheets):

Registers, diffusers and grilles are read directly in cfm. (Report program indicates 1.00 in Ak Factor column.)

Measuring in Velocity (referencing Air Outlet Test Sheets and Grille, Register & Diffuser Test Sheets):

Ak Factor indicates actual area of registers, following multipying the Ak by the area equals the actual free area; therefore cfm is calculated and based on this factor (fpm x Ak).

Codes (referencing Air Outlet Test Sheets and Grille, Register & Diffuser Test Sheets):

If codes are not listed here, please reference design drawings.

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Daniel Hand High School Ventilation Survey

Remarks

September 3, 2020

General Notes:

At the time of testing RTU-1, RTU-2, RTU-3, RTU-4, RTU-5, RTU-6, RTU-7, RTU-9 Second Floor VAVs were not responding to BMS commands.

RTU-8

Unit was down for repairs at the time of testing,

RTU-1

VAV-V2024 - box needs further investigation; flex at VAV inlet pulled back to inspect components; VAV seems to be in good physical condition

VAV-V2038 - air flow ring does not read properly over 1100 cfm; calibrated and left at 1000 cfm maximum

VAV-V2040 - VAV not responding to thermostat (rectified 8/22/2020)

VAV-V3035 - BMS showing cfm with damper position at zero; damper and motor need further investigation

RTU-3

VAV-V3027 - calculated K factor of 15.27; box needs further investigation

RTU-4

VAV-V1001 - actual flow is 1428 cfm whereas BMS reads 53 cfm

VAV-V1019 - actual flow is 1621 cfm whereas BMS reads 164 cfm

RTU-5

VAV-V1002 - Belimo actuator not responding

VAV-V2005 - VAV was calibrated and meeting design criteria

RTU-6

VAV-V1012 - Belimo actuator not responding

VAV-V2010 - VAV motorized damper bound up, and will not fully open

RTU-7

VAV-V4003 - calibrated with a K factor of 10.23; ABS needs to repair / replace controller

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Daniel Hand High School Ventilation Survey

VAV-V4003 - calibrated with a K factor of 6.0; ABS needs to repair / replace controller

VAV-V4004 - calibrated with a K factor of 8.0; ABS needs to repair / replace controller

VAV-V4007 - actual flow is 1321 cfm whereas BMS reads 273 cfm; ABS needs to repair / replace controller

VAV-V4010 - actual flow is 983 cfm whereas BMS reads 314 cfm; ABS needs to repair / replace controller

VAV-V4015 - calibrated with a K factor of 5.0; ABS needs to repair / replace controller

Second Floor VAVs

VAV-V2042 - terminal blocks for low voltage connection are disconnected from control board; no power to controller

VAV-V2042 - air flow ring does not read properly over 1100 cfm; calibrated and left at 1000 cfm maximum

VAV-V2019 - VAV was calibrated and meeting design criteria

VAV-V2012 - VAV was calibrated and meeting design criteria

VAV-V2013 - VAV was calibrated and meeting design criteria

AIR APPARATUS TEST SHEET

Job Name: Daniel Hand High School Ventilation Survey

Tested By: B Cooney / P Ouellette / M A DeZinno September 3, 2020 (20203DH)

RTU-1 DESIGN DATA

Manufacturer =	York	Model No. =	YPAL060CYC46BBAX
Type =		Serial No. =	RKLM004233
Total Scheduled cfm =	20990		
Outside Air cfm =			
Total Static Pressure =		External Static P	ressure =
Fan rpm =		Brake Horsepowe	er =

MOTOR DESIGN DATA

Horsepower =	Voltage =	Phase =	rpm =
AIR TEST DATA	@ 55 Hertz		
Total cfm by Louver Scan =	15111		
Outside Air =	4350		

PRESSURE TEST DATA

Total Suction Static Pressure =	-0.86	
Total Discharge Static Pressure =	2.00	
	Total Static Pressure =	2.86
External Suction Static Pressure =	-0.47	
External Discharge Static Pressure	= 2.00	
	External Static Pressure =	2.47
DX Coil DP =	0.31	
Filters DP =	0.08	

MOTOR TEST DATA

Motor Manufacturer / Frame =							
Horsepower =	Phase =		Voltage =				
Full Load Amps =			FLA Corrected for Voltage =				
Motor rpm =	Motor rpm =			Service Factor =			
No Load Amps =			Operating Amps =				
Calculated Brake Horsepower	=						

FAN TEST DATA

Motor Sheave Model / Dia. =			
Motor Sheave Bore =			
Fan Sheave Model / Dia. =			
Fan Sheave Bore =		1	Fan rpm =
Adjustable Sheave Dia. =			Center Line Distance =
Belts =			
Filters =			
Outside Air Setting =	20%		
Static Control Setpoint =	<u> </u>		

Job Name: Daniel Hand High School Ventilation Survey

Tested By:		B Coon	ey / P Oue	llette / M A	DeZinno	Septem	ber 3, 202	0 (20203	DH)	
Outlet	Room			"Ak"	Des	ign	First	New	Fin	ıal
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
		RTU-1								
		_								
VAV	-V103S									
1	102	SL	48x2sl	1.00	200	200	347	209	212	212
2	102	SL	48x2sl	1.00	200	200	365	209	220	220
3	102	SL	48x2sl	1.00	200	200	321	209	196	196
4	102	SL	48x2sl	1.00	200	<u>200</u>	339	209	207	<u>207</u>
						800				835
										104%
Box Type	Box Size		Flow Cor	rection Fact	or for DD0	2	Design N	/Iinimum	Test Mi	nimum
VAV	10			1.95			480		486	
VAV	V-1037									
1	100C	SD	10x10	1.00	220	220	185	237	232	232
2	100C	SD	10x10	1.00	220	220	192	237	241	241
						440				473
										108%
Box Type	Box Size		Flow Cor	rection Fact	or for DDC	\mathbb{C}	Design N	/Iinimum	Test Mi	
VAV	8			0.68			250		261	
,,,,,										
VAV	V-1039									
1	100B	SD	10x10	1.00	220	220	175	214	209	209
2	100B	SD	10x10	1.00	220	220	183	214	219	219
	100B	SE	10/110	1.00	220	440	105	211	217	428
						110				97%
Box Type	Box Size		Flow Cor	rection Fact	or for DD(7	Design N	/inimum	Test Mi	
VAV	8		1 low Con	0.92	.01 101 DDC		250	/IIIIIIIIIIIII	256	IIIIIIIIII
VAV	0			0.72			230		230	

Job Name: Daniel Hand High School Ventilation Survey

Outlet	Room	D COOK		"Ak"	Des		First	New	Fin	al
Number	Number	Code	Size	Factor	fpm	cfm	Test	Reg'd	fpm	cfm
Nullibei	Number	Coue	Size	ractor	трш	CIII	1681	Key u	трш	CIIII
VAV	V-1040									
1	100A	SD	10x10	1.00	220	220	196	226	240	240
2	100A	SD	10x10	1.00	220	220	164	226	211	211
	10011	SB	TONTO	1.00	220	440	101	220	211	451
										103%
Box Type	Box Size		Flow Cor	rection Fact	tor for DD	C	Design N	/Iinimum	Test Mir	
VAV	8			0.76			250		242	
VAV	Y-V2024									
1	227	SD	12x12	1.00	200	200	283	201	173	173
2	227	SL	48x2sl	1.00	165	165	310	166	189	189
3	227	SL	48x2sl	1.00	165	<u>165</u>	281	166	171	<u>171</u>
						530				533
										101%
Box Type	Box Size		Flow Cor	rection Fact	tor for DD	C	Design N	1inimum	Test Mir	nimum
VAV	8			9.41			480		498	
VAV	V-2037									
1	206	SL	48x2sl	1.00	150	150	345	147	191	191
2	206	SL	48x2sl	1.00	150	150	247	147	136	136
3	206A	SD	10x10	1.00	150	150	166	147	92	92
4	206B	SD	10x10	1.00	110	<u>110</u>	238	108	131	<u>131</u>
						560				550
										98%
Box Type	Box Size		Flow Cor	rection Fact	tor for DD	C	Design N	1inimum	Test Mir	nimum
VAV	8			4.89			440		445	
	Y-V2038]	1	1.00				10.1		
1	2007	SD	16x16	1.00	600	600	766	494	515	515
2	2007	SD	16x16	1.00	600	<u>600</u>	704	494	473	473
						1200				988
D	D C:		El C	·	C 55		D : :	F	m . 3.51	82%
Box Type	Box Size		Flow Cor	rection Fact	tor for DD	<i></i>	Design N	/Inimum	Test Min	nımum
VAV	10			1.24			450		469	

Job Name: Daniel Hand High School Ventilation Survey

Tested By:		B Coon	ey / P Oue	llette / M A	DeZinno	Septem	<u>ber 3, 202</u>	0 (20203		
Outlet	Room			"Ak"	Des	sign	First	New	Fin	al
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
VAV	-V2039									
1	203	SD	12x12	1.00	350	350	280	312	280	280
2	203	SL	12x12	1.00	350	350	285	312	285	285
3	203	SL	48x2sl	1.00	200	200	231	178	231	231
4	203	SL	48x2sl	1.00	200	<u>200</u>	185	178	185	<u>185</u>
						1100				981
										89%
Box Type	Box Size		Flow Cor	rection Fact	tor for DD	C	Design N	/Iinimum	Test Mi	nimum
VAV	10			0.88			460		471	
VAV	-V2040									
1	200	SD	14x14	1.00	500	500	605	676	605	605
2	200	SL	48x2sl	1.00	200	200	352	270	352	352
3	200	SL	48x2sl	1.00	200	200	218	270	218	218
4	200	SL	48x2sl	1.00	200	200	312	270	312	312
						1100			-	1487
										135%
Box Type	Box Size		Flow Cor	rection Fact	or for DD		Design N	// // // // // // // // // // // // //	Test Mi	
VAV	10		11011 COL	0.79	.01 101 101		450		461	
7217	10			0.79			150		101	
VAV	-V2041									
1	201	SD	12x12	1.00	300	300	309	321	255	255
2	201	SL	12x12	1.00	200	200	228	214	189	189
3	201	SL	48x2sl	1.00	200	200	315	214	261	261
4	201	SL	48x2sl	1.00	200	200	343	214	285	285
5	201	SL	48x2sl	1.00	200	200	227	214	188	188
	-					1100				1178
										107%
Box Type	Box Size		Flow Cor	rection Fact	or for DD	C	Design N	// // // // // // // // // // // // //	Test Mi	
VAV	10		11011 COL	1.22	101 101 111		480		476	mmum
, , , , ,	10			1.22			100		170	
			1							

Job Name: Daniel Hand High School Ventilation Survey

Tested By:		B Coon	ey / P Oue	llette / M A	DeZinno	Septem	ber 3, 202	0 (20203		
Outlet	Room			"Ak"	Des	ign	First	New	Fin	al
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
VAV	-V2043									
1	204	SD	12x12	1.00	300	300	166	246	245	245
2	204	SL	12x12	1.00	300	300	178	246	245	245
3	204	SL	12x12	1.00	300	300	164	246	248	248
4	204	SL	12x12	1.00	300	<u>300</u>	187	246	246	<u>246</u>
						1200				984
										82%
Box Type	Box Size		Flow Cor	rection Fact	or for DD0	\Box	Design N	1inimum	Test Mi	nimum
VAV	12			0.62			400		400	
VAV	-V3034									
1	3007	SD	16x16	1.00	600	600	572	548	572	572
2	3007	SD	16x16	1.00	600	600	523	548	523	523
_						1200				1095
						1200				91%
Box Type	Box Size		Flow Cor	rection Fact	or for DD0	7	Design N	/inimum	Test Mi	
VAV	10		110W C011	0.84	.01 101 DDV	<u> </u>	540		552	
V / L V	10			0.04			340		332	
VAV	Y-V3035	1								
1	306	SL	48x2sl	1.00	150	150	301	152	193	193
2	306	SL	48x2sl	1.00	150	150	199	152	137	137
				 						
3	306A	SD	10x10	1.00	150	150	223	152	143	143
4	306B	SD	10x10	1.00	110	<u>110</u>	135	112	96	<u>96</u>
						560				569
D	D 0'				2 55	~				102%
Box Type	Box Size		Flow Cor	rection Fact	or for DDO	3	Design N	/Inimum	Test Mi	nımum
VAV	8		I	3.31			200		210	

Job Name: Daniel Hand High School Ventilation Survey

Tested By:		B Coon	ey / P Oue	llette / M A			ber 3, 202	0 (20203		
Outlet	Room			"Ak"	Des		First	New	Fir	
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
VAV	-V3036									
1	303	SD	14x14	1.00	350	350	377	343	281	281
2	303	SD	14x14	1.00	350	350	400	343	298	298
3	303	SL	48x2sl	1.00	200	200	163	196	237	237
4	303	SL	48x2sl	1.00	200	<u>200</u>	145	196	263	<u>263</u>
						1100				1079
										98%
Box Type	Box Size		Flow Cor	rection Fact	tor for DD	С	Design N	1inimum	Test Mi	nimum
VAV	10			4.03			440		450	
VAV	V- 203 7									
1	206	SL	48x2sl	1.00	150	150	345	147	191	191
2	206	SL	48x2sl	1.00	150	150	247	147	136	136
3	206A	SD	10x10	1.00	150	150	166	147	92	92
4	206B	SD	10x10	1.00	110	<u>110</u>	238	108	131	<u>131</u>
						560				550
										98%
Box Type	Box Size		Flow Cor	rection Fact	tor for DD	C	Design N	1inimum	Test Mi	nimum
VAV	8			4.89			440		445	
VAV	-V3038									
1	301	SD	14x14	1.00	300	300	290	313	217	217
2	301	SD	10x10	1.00	200	200	241	209	180	180
3	301	SL	48x2sl	1.00	200	200	333	209	249	249
4	301	SL	48x2sl	1.00	200	200	325	209	243	243
5	301	SL	48x2sl	1.00	200	<u>200</u>	347	209	259	<u>259</u>
						1100				1148
										104%
Box Type	Box Size		Flow Cor	rection Fact	tor for DD	C	Design N	/Iinimum	Test Mi	nimum
VAV	8			1.44			500		493	
									I	

Job Name: Daniel Hand High School Ventilation Survey

Outlet	Room	7	l suc	"Ak"	Des		First	New	Fir	ıal
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
TAUIIIDEI	Number	Couc	SIZC	Tactor	трш	CIII	1 CSt	IXCQ U	трш	CIII
VAV	V-V3039	1								
1	300	SD	14x14	1.00	500	500	404	540	404	404
2	300	SL	48x2sl	1.00		200	256		256	256
3	300	SL	48x2sl	1.00		200	235		235	235
4	300	SL	48x2sl	1.00	200	200	292		292	<u>292</u>
•	200	J. J.	10/1251	1.00	200	1100	2,2	210	2,2	1187
						1100				108%
Box Type	Box Size		Flow Cor	rection Fac	tor for DD0	 C	Design N	Minimum	Test Mi	
VAV	8			1.11			280		289	
,,,,,										
			-							

AIR APPARATUS TEST SHEET

Job Name: **Daniel Hand High School Ventilation Survey**

Tested By: B Cooney / P Ouellette / M A DeZinno September 3, 2020 (20203DH)

DESIGN DATA

Manufacturer =	York	Model No. =	YPAL060CYC46BBAX
Type =		Serial No. =	RKLM004234
Total Scheduled cfm =	20990		
Outside Air cfm =	4435		
Total Static Pressure =		External Static P	ressure =
Fan rpm =		Brake Horsepow	er =

MOTOR DESIGN DATA

Horsepower =	Voltage =	Phase =	rpm =
AIR TEST DATA			

Total cfm by Louver Scan =	19783	
Outside Air =	4479	

PRESSURE TEST DATA

Total Suction Static Pressure =	-1.50		
Total Discharge Static Pressure =	1.60		
,	Total Static Pressure =	3.10	
External Suction Static Pressure =	0.60		
External Discharge Static Pressure =	= 1.60		
	External Static Pressure =	1.00	
DX Coil DP =	0.70		
Filters DP =	0.20		

MOTOR TEST DATA

Motor Manufacturer / Frame =					
Horsepower =	Phase =		Voltage =		
Full Load Amps =		FLA Corrected for Voltage =			
Motor rpm =			Service Factor =		
No Load Amps =		Operating Amps =			
Calculated Brake Horsepower =					

FAN TEST DATA

Motor Sheave Model / Dia. =		
Motor Sheave Bore =		
Fan Sheave Model / Dia. =		
Fan Sheave Bore =		Fan rpm =
Adjustable Sheave Dia. =		Center Line Distance =
Belts =		
Filters =		
Outside Air Setting =	20%	

AIR APPARATUS TEST SHEET

Job Name: **Daniel Hand High School Ventilation Survey**

Tested By: B Cooney / P Ouellette / M A DeZinno September 3, 2020 (20203DH)

RTU-3 **DESIGN DATA**

Manufacturer =	York	Model No. = Ypal060cvc46bbax
Type =		Serial No. = RKLM004235
Total Scheduled cfm =	24130	
Outside Air cfm =	4826	
Total Static Pressure =		External Static Pressure =
Fan rpm =		Brake Horsepower =

MOTOR DESIGN DATA

Horsepower =	Voltage =	Phase =	rpm =
AIR TEST DATA			

Total cfm by Traverse =	20170	
Outside Air =	4897	

PRESSURE TEST DATA

Total Suction Static Pressure =	-1.42		
Total Discharge Static Pressure =	1.05		
To	otal Static Pressure =	2.47	
External Suction Static Pressure =	-0.66		
External Discharge Static Pressure =	1.05		
E	xternal Static Pressure =	1.71	
DX Coil DP =	0.70		
Filters DP =	0.06		

MOTOR TEST DATA

Motor Manufacturer / Frame =					
Horsepower =	Phase =		Voltage =		
Full Load Amps =		FLA Corrected for Voltage =			
Motor rpm =		Service Factor =			
No Load Amps =			Operating Amps =		
Calculated Brake Horsepower =					

FAN TEST DATA

Motor Sheave Model / Dia. =					
Motor Sheave Bore =					
Fan Sheave Model / Dia. =	Fan Sheave Model / Dia. =				
Fan Sheave Bore =			Fan rpm =		
Adjustable Sheave Dia. =			Center Line Distance =		
Belts =					
Filters =					
Outside Air Setting =	20%				
Static Control Setpoint =					

Job Name: Daniel Hand High School Ventilation Survey

Tested By:		B Coon	ey / P Oue	llette / M A	A DeZinno	Septem	ber 3, 202	0 (20203	DH)	
Outlet	Room			"Ak"	Des	ign	First	New	Fin	al
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
					1					
		RTU-3								
VAV	-V1023									
1	120B	SD	9x9	1.00	240	240	272	249	248	248
2	118	SD	9x9	1.00	150	150	178	156	161	161
3	corridoe	SD	9x9	1.00	170	<u>170</u>	190	177	173	<u>173</u>
						560				582
										104%
Box Type	Box Size		Flow Cor	rection Fact	tor for DD0	2	Design N	/Iinimum	Test Mi	nimum
VAV	8			4.08			250		249	
VAV	V-3027									
1	321	SD	10x10	1.00	200	200	223	196	223	223
2	321	SD	10x10	1.00	300	300	295	293	295	295
3	321	SL	48x2sl	1.00	200	200	83	196	83	83
4	321	SL	48x2sl	1.00	200	200	225	196	225	225
5	321	SL	48x2sl	1.00	200	<u>200</u>	250	196	250	<u>250</u>
						1100				1076
										98%
Box Type	Box Size		Flow Cor	rection Fact	tor for DD0	2	Design N	/Iinimum	Test Mi	nimum
VAV	10			15.27			700		700	
			<u> </u>							

AIR APPARATUS TEST SHEET

Job Name: Daniel Hand High School Ventilation Survey

Tested By: B Cooney / P Ouellette / M A DeZinno September 3, 2020 (20203DH)

RTU-4	DESIGN DATA

Manufacturer =	York	Model No. =	YPAl060CVC46BBAX
Type =		Serial No. =	RKLM004266
Total Scheduled cfm =	23765		
Outside Air cfm =	4753		
Total Static Pressure =		External Static Press	ure =
Fan rpm =		Brake Horsepower =	

MOTOR DESIGN DATA

Horsepower =	Voltage =	Ph	nase =	rpm =
AIR TEST DATA				
Total ofm by Trayonea -	228	76		

Total cfm by Traverse =	22876	
Outside Air =	4801	

PRESSURE TEST DATA

Total Suction Static Pressure =	-1.67	
Total Discharge Static Pressure =	1.70	
	Total Static Pressure =	3.37
External Suction Static Pressure =	-0.88	
External Discharge Static Pressure	= 1.70	
	External Static Pressure =	2.58
DX Coil DP =	0.59	
Filters DP =	0.20	

MOTOR TEST DATA

Motor Manufacturer / Frame =				
Horsepower = Phase =		Voltage =		
Full Load Amps =		FLA Corrected for Voltage =		
Motor rpm =		Service Factor =		
No Load Amps =		Operating Amps =		
Calculated Brake Horsepower =				

FAN TEST DATA

Motor Sheave Model / Dia. =			
Motor Sheave Bore =			
Fan Sheave Model / Dia. =			
Fan Sheave Bore =		1	Fan rpm =
Adjustable Sheave Dia. =			Center Line Distance =
Belts =			
Filters =			
Outside Air Setting =	20%		
Static Control Setpoint =	<u> </u>		

Job Name: Daniel Hand High School Ventilation Survey

Outlet	Room	2 20011	, i ouc	"Ak"	Des		First	New	Fin	 al	
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm	
Number	Number	Couc	Size	ractor	трш	CIII	1681	Key u	1pm	CIII	
		RTU-4									
VAV	-V1001	1									
1	lobby 1003	SD	16x16	1.00	600	600	804	714	804	804	
2	lobby 1003	SD	16x16	1.00	600	<u>600</u>	624	714	624	<u>624</u>	
						1200				1428	
										119%	
Box Type	Box Size		Flow Cor	rection Fact	or for DD0	C	Design N	/Iinimum	Test Min	nimum	
VAV	10			0.75			480		500		
VAV	V-V1017]									
1	1047	SL	48x2sl	1.00	150	150	219	158	157	157	
2	1047	SL	48x2sl	1.00	150	150	254	158	183	183	
3	1047	SL	48x2sl	1.00	150	150	240	158	173	173	
4	1047	SL	48x2sl	1.00	150	150	218	158	157	157	
5	1047	SL	48x2sl	1.00	200	200	293	210	211	211	
6	1047	SL	48x2sl	1.00	200	200	321	210	231	231	
7	1047	SL	48x2sl	1.00	200	<u>200</u>	207	210	149	<u>149</u>	
						1200				1261	
										105%	
Box Type	Box Size		Flow Cor	rection Fact	or for DDO	2	Design N	1inimum	Test Minimum		
VAV	10			1.16			500		525		
VAV	V-V1019	1									
1	1047	SD	16x16	1.00	450	450	725	540	725	725	
2	1047	SD	16x16	1.00	450	450	796	540	796	796	
3	1047	SD	16x16	1.00	450	<u>450</u>	100	540	100	100	
	1017	52	10.110	1.00		1350	100	2.0	100	1621	
						1220				120%	
Box Type	Box Size		Flow Cor	rection Fact	or for DD0	\mathbb{C}	Design N	/Iinimum	Test Min		
VAV	12						440		515		
											

AIR APPARATUS TEST SHEET

Job Name: **Daniel Hand High School Ventilation Survey**

B Cooney / P Ouellette / M A DeZinno September 3, 2020 (20203DH) **Tested By:**

RTU-5 **DESIGN DATA**

Manufacturer =	York	Model No. =	YPAl060CVC46BBAX
Type =		Serial No. =	RKLM004267
Total Scheduled cfm =	25090		
Outside Air cfm =	5018		
Total Static Pressure =		External Static P	ressure =
Fan rpm =		Brake Horsepow	er =

MOTOR DESIGN DATA

Horsepower =	Voltage =	Phase =	rpm =
AIR TEST DATA			
Total cfm by Traverse =	19525		

Total cfm by Traverse =	19525	
Outside Air =	5477	

PRESSURE TEST DATA

Total Suction Static Pressure =	-1.53		
Total Discharge Static Pressure =	1.50		
r	Total Static Pressure =	3.03	
External Suction Static Pressure =	-0.65		
External Discharge Static Pressure =	= 1.50		
]	External Static Pressure =	2.15	
Cooling Coil DP =	0.73		
Pre Filters DP =	0.15		

MOTOR TEST DATA

Motor Manufacturer / Frame =								
Horsepower =	Phase =		Voltage =					
Full Load Amps =			FLA Corrected for Voltage =					
Motor rpm =			Service Factor =					
No Load Amps =	Operating Amps =							
Calculated Brake Horsepower	=							

FAN TEST DATA

Motor Sheave Model / Dia. =			
Motor Sheave Bore =			
Fan Sheave Model / Dia. =			
Fan Sheave Bore =		Fa	n rpm =
Adjustable Sheave Dia. =		Ce	nter Line Distance =
Belts =			
Filters =			
Outside Air Setting =	15% Open		
Static Control Setpoint =			

Job Name: Daniel Hand High School Ventilation Survey

Tested By:	D -	D COON	cy / r Oue	llette / M A			ber 3, 2020			- 1
Outlet	Room		g.	"Ak"	Des		First	New	Fin	
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
		RTU-5								
L										
VAV	-V1002									
1	122	SD	9x9	1.00	150	150	115	158	170	170
2	122	SD	9x9	1.00	150	150	90	158	133	133
3	122	SL	48x2sl	1.00	200	200	141	211	209	209
4	122	SL	48x2sl	1.00	200	200	152	211	225	225
5	122	SL	48x2sl	1.00	200	200	146	211	216	216
6	122	SL	48x2sl	1.00	200	<u>200</u>	139	211	206	206
						1100				1159
										105%
Box Type	Box Size		Flow Cor	rection Fact	or for DD0	C	Design N	1inimum	Test Mir	nimum
VAV	10			2.67			700		710	
VAV	-V1004									
1	boys	SD	12x12	1.00	300	300	360	315	316	316
2	girls	SD	12x12	1.00	300	300	344	315	302	302
3	storage	SD	10x10	1.00	180	<u>180</u>	231	189	202	202
						780				820
										105%
Box Type	Box Size		Flow Cor	rection Fact	or for DD0	2	Design N	/Iinimum	Test Minimum	
VAV	10			5.23			390		410	
	-V1014		10.10	1.00	200	200	200	100	170	1.50
1	120I	SD	10x10	1.00	200	200	309	198	179	179
2	120I	SD	10x10	1.00	200	200	277	198	162	162
3	120I	SL	48x2sl	1.00	200	200	386	198	226	226
4	120I	SL	48x2sl	1.00	200	200	358	198	209	209
5	120I	SL	48x2sl	1.00	200	<u>200</u>	370	198	216	<u>216</u>
						1000				992
										99%
Box Type	Box Size		Flow Cor	rection Fact	or for DD0	C	Design N	1inimum	Test Mir	nimum
VAV	10			1.31	Т		500		510	

Job Name: Daniel Hand High School Ventilation Survey

<u>y:</u>		B COON	ey / P Oue	llette / M A			ber 3, 202			
t	Room			"Ak"	Des		First	New	Fin	
r	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
AV-V	V1015]								
	120J	SD	12x12	1.00	300	300	442	313	340	340
	120J	SD	12x12	1.00	400	400	480	417	369	369
	120J	SD	12x12	1.00	300	300	402	313	309	309
	120J	SD	12x12	1.00	300	300	438	313	337	337
	120J	SD	12x12	1.00	400	400	472	417	363	363
	120J	SD	12x12	1.00	300	<u>300</u>	480	313	369	<u>369</u>
						2000				2087
										104%
oe	Box Size		Flow Cor	rection Fact	or for DD0	2	Design N	/Iinimum	Test Mi	nimum
	14			1.11			500		513	
AV-V	V2005									
	233	SD	15x15	1.00	300	300	364	297	364	364
	233	SD	15x15	1.00	400	400	385	395	385	385
	233	SL	15x15	1.00	400	400	396	395	396	396
	233	SL	15x15	1.00	300	300	307	297	307	307
	233	SL	15x15	1.00	400	400	335	395	335	335
	233	SL	15x15	1.00	300	<u>300</u>	289	297	289	<u>289</u>
						2100				2076
										99%
oe	Box Size		Flow Cor	rection Fact	or for DD0	2	Design N	1inimum	Test Mi	nimum
	14			1.50			700		700	
	12002	1								
AV-	V3003		14.14	1.00	200	200	2.15	21.4	2.15	2.15
	333	SD	14x14	1.00	300	300	345	314	345	345
	333	SD	14x14	1.00	400	400	390	418	390	390
	333	SD	14x14	1.00	300	300	305	314	305	305
	333	SD	14x14	1.00	400	400	433	418	433	433
	333	SD	14x14	1.00	300	<u>300</u>	304	314	304	<u>304</u>
						1700				1777
										105%
oe			Flow Cor		or for DDO	2		/Iinimum		nimum
\perp	14		T	0.92			400		414	
pe	Box Size 14		Flow Corr	0.92		ctor for DDG	etor for DDC	etor for DDC Design N 400		5

Job Name: Daniel Hand High School Ventilation Survey

Outlet	Room			"Ak"	Des	ign	First	New	Fin	al
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
VAV	-V3004									
1	boys	SD	12x12	1.00	300	300	314	290	314	314
2	girls	SD	12x12	1.00	300	<u>300</u>	265	290	265	<u> 265</u>
						600				579
										97%
Box Type	Box Size		Flow Cor	rection Fact	tor for DD0	\mathbb{C}	Design N	/Iinimum	Test Mi	nimum
VAV	8			2.25			300		307	
VAV	Y-V3005									
1	342	SD	10x10	1.00	200	200	186	208	164	164
2	342	SD	10x10	1.00	200	200	197	208	173	173
3	342	SD	10x10	1.00	200	200	288	208	254	254
4	342	SD	10x10	1.00	200	200	225	208	198	198
5	342	SD	10x10	1.00	200	200	275	208	242	242
6	342	SD	10x10	1.00	200	<u>200</u>	245	208	216	<u>216</u>
						1200				1247
										104%
Box Type	Box Size		Flow Cor	rection Fact	tor for DD0	2	Design Minimum		Test Minimum	
VAV	10			2.93		400		400 39		
VAV	Y-V3013									
1	341	SD	12x12	1.00	350	350	363	347	294	294
2	341	SD	12x12	1.00	350	350	375	347	304	304
3	341	SL	48x2sl	1.00	200	200	306	198	250	250
4	341	SL	48x2sl	1.00	200	<u>200</u>	298	198	242	<u>242</u>
						1100				1090
										99%
Box Type	Box Size		Flow Cor	rection Fact	tor for DD0	C	Design N	/Iinimum	Test Mi	nimum
VAV	10		ı	1.08			480		497	

Job Name: Daniel Hand High School Ventilation Survey

Outlet	Room			"Ak"	Des		First	New	Fin	 ıal	
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm	
VAV	V-V3016										
1	339	SD	12x12	1.00	300	300	329	307	237	237	
2	339	SD	10x10	1.00	200	200	260	205	187	187	
3	339	SL	48x2sl	1.00	200	200	331	205	238	238	
4	339	SL	48x2s1	1.00	200	200	326	205	234	234	
5	339	SL	48x2s1	1.00	200	<u>200</u>	319	205	230	<u>230</u>	
						1100				1126	
										102%	
Box Type	Box Size		Flow Cor	rection Fact	tor for DD0	2	Design N	/Iinimum	Test Mi	nimum	
VAV	10			0.94			400		422		
VAV	V-V3017										
1	338	SD	14x14	1.00	350	350	408	367	365	365	
2	338	SD	14x14	1.00	350	350	365	367	327	327	
3		+					147			131	
4		-	 				287			<u>257</u>	
										1080	
										105%	
Box Type	Box Size		Flow Cor	rection Fact	tor for DD0	2	Design Minimum		Test Minimum		
							400				
VAV 1 2 3	/-V3017	SD SD SL SL	14x14 48x2sl 48x2sl		350 165 165	350 165 <u>165</u> 1030	408 365 147 287 Design N	367 173 173	365 327 131 257	32 1. 22 108 105	

AIR APPARATUS TEST SHEET

Job Name: Daniel Hand High School Ventilation Survey

Tested By: B Cooney / P Ouellette / M A DeZinno September 3, 2020 (20203DH)

RTU-6 DESIGN DATA

Manufacturer =	York	Model No. =	YPAl060CVC46BBAX
Type =		Serial No. =	RKLM004268
Total Scheduled cfm =	23540		
Outside Air cfm =	4708		
Total Static Pressure =		External Static P	ressure =
Fan rpm =		Brake Horsepow	er =

MOTOR DESIGN DATA

Horsepower =	Voltage =	Phase =	rpm =
AIR TEST DATA			

Total cfm by Traverse =	20524	
Outside Air =	4769	

PRESSURE TEST DATA

Total Suction Static Pressure =	-1.40		
Total Discharge Static Pressure =	1.40		
	Total Static Pressure = 2.80		
External Suction Static Pressure =	-0.60		
External Discharge Static Pressure	= 1.40		
External Static Pressure =		2.00	
Cooling Coil DP =	0.55		
Pre Filters DP =	0.15		

MOTOR TEST DATA

Motor Manufacturer / Frame =					
Horsepower =	Phase =		Voltage =		
Full Load Amps =		FLA Corrected for Voltage =			
Motor rpm =		Service Factor =			
No Load Amps =			Operating Amps =		
Calculated Brake Horsepower	=				

FAN TEST DATA

Motor Sheave Model / Dia. =			
Motor Sheave Bore =			
Fan Sheave Model / Dia. =			
Fan Sheave Bore = Fan rpm =		Fan rpm =	
Adjustable Sheave Dia. =		Center Line Distance =	
Belts =			
Filters =			
Outside Air Setting =	20% Open		
Static Control Setpoint =			

Job Name: Daniel Hand High School Ventilation Survey

Number Number Code Size Factor fpm cfm Test Req'd fpm cfm cfm	Tested By:		B Coon	ey / P Oue	llette / M A			ber 3, 202	0 (20203	DH)	
NAV-VI012 1 128 SD 10x10 1.00 250 250 138 240 181 181 181 182 128 SD 10x10 1.00 250 250 149 240 195 19	1 11				"Ak"	Des		First		Fin	
VAV-V1012 1 128 SD 10x10 1.00 2.50 2.50 1.38 2.40 1.81 1.81 1.81 1.81 2.2 1.28 SD 10x10 1.00 2.50 2.50 1.49 2.40 1.95 1.	Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
VAV-V1012 1 128 SD 10x10 1.00 2.50 2.50 1.38 2.40 1.81 1.81 1.81 1.81 2.2 1.28 SD 10x10 1.00 2.50 2.50 1.49 2.40 1.95 1.											
1			RTU-6	T							
1											
2											
3											181
A											195
S											250
NAV-2008 SD 16x16					 						225
See Note See Note	5	128	SL	48x2s1	1.00	200		156	192	204	<u>204</u>
Box Type Box Size Flow Correction Factor for DDC Design Minimum Test Mi							1100				1055
VAV 10 0.72 800 786 VAV-2008 1 2009 SD 16x16 1.00 600 600 613 619 613 612 2 2009 SD 16x16 1.00 600 600 625 619 625 622 Box Type Box Size Flow Correction Factor for DDC Design Minimum Test Minimum VAV 10 5.24 600 610 VAV-2009 1 244 SD 10x10 1.00 240 240 379 247 247 Box Type Box Size Flow Correction Factor for DDC Design Minimum Test Minimum											
VAV-2008 1 2009 SD 16x16 1.00 600 600 613 619 613 613 2 2009 SD 16x16 1.00 600 600 625 619 625 62: Box Type Box Size Flow Correction Factor for DDC Design Minimum Test Minimum VAV 10 5.24 600 610 VAV-2009 1 244 SD 10x10 1.00 240 240 379 247 247 Box Type Box Size Flow Correction Factor for DDC Design Minimum Test Minimum				Flow Cor		tor for DDC	2		Ainimum		nimum
1 2009 SD 16x16 1.00 600 600 613 619 613 612 2 2009 SD 16x16 1.00 600 600 625 619 625 622 3 3 3 3 3 4 5 5 5 5 5 5 5 5 6 6 6 6 6 7 7 7 8 7 7 9 8 5 7 1 244 SD 10x10 1.00 240 240 379 247 247 8 8 5 7 7 9 8 8 5 5 5 10x10 1.00 240 240 379 247 247 10x10 10x20 10x20 10x20 10x10 1.00 1.00 1.00 240 240 379 247 10x20 9 9 9 9 9 9 9 9 9	VAV	10			0.72			800		786	
1 2009 SD 16x16 1.00 600 600 613 619 613 612 2 2009 SD 16x16 1.00 600 600 625 619 625 622 3 3 3 3 3 4 5 5 5 5 5 5 5 5 6 6 6 6 6 7 7 7 8 7 7 9 8 5 7 1 244 SD 10x10 1.00 240 240 379 247 247 8 8 5 7 7 9 8 8 5 5 5 10x10 1.00 240 240 379 247 247 10x10 10x20 10x20 10x20 10x10 1.00 1.00 1.00 240 240 379 247 10x20 9 9 9 9 9 9 9 9 9											
1 2009 SD 16x16 1.00 600 600 613 619 613 612 2 2009 SD 16x16 1.00 600 600 625 619 625 622 3 3 3 3 3 4 5 5 5 5 5 5 5 5 6 6 6 6 6 7 7 7 8 7 7 9 8 5 7 1 244 SD 10x10 1.00 240 240 379 247 247 8 8 5 7 7 9 8 8 5 5 5 10x10 1.00 240 240 379 247 247 10x10 10x20 10x20 10x20 10x10 1.00 1.00 1.00 240 240 379 247 10x20 9 9 9 9 9 9 9 9 9											
1 2009 SD 16x16 1.00 600 600 613 619 613 612 2 2009 SD 16x16 1.00 600 600 625 619 625 622 3 3 3 3 3 4 5 5 5 5 5 5 5 5 6 6 6 6 6 7 7 7 8 7 7 9 8 5 7 1 244 SD 10x10 1.00 240 240 379 247 247 8 8 5 7 7 9 8 8 5 5 5 10x10 1.00 240 240 379 247 247 10x10 10x20 10x20 10x20 10x10 1.00 1.00 1.00 240 240 379 247 10x20 9 9 9 9 9 9 9 9 9											
2 2009 SD 16x16 1.00 600 600 625 619 625 622 Box Type Box Size Flow Correction Factor for DDC Design Minimum Test Minimum VAV 10 5.24 600 610 VAV-2009 1 244 SD 10x10 1.00 240 240 379 247 247 Box Type Box Size Flow Correction Factor for DDC Design Minimum Test Minimum	VAV										
1200		2009	SD	16x16	1.00	600	600		619	613	613
Box Type Box Size Flow Correction Factor for DDC Design Minimum Test Minimum	2	2009	SD	16x16	1.00	600	<u>600</u>	625	619	625	<u>625</u>
Box Type Box Size Flow Correction Factor for DDC Design Minimum Test Minimum							1200				1238
VAV 10 5.24 600 610 VAV-2009 I June 10 June											103%
VAV-2009 1 244 SD 10x10 1.00 240 240 379 247 247 Box Type Box Size Flow Correction Factor for DDC Design Minimum Test Minimum	Box Type	Box Size		Flow Cor	rection Fact	tor for DDO	2	Design N	/Iinimum	Test Mi	nimum
1 244 SD 10x10 1.00 240 240 379 247 247 Box Type Box Size Flow Correction Factor for DDC Design Minimum Test Minimum	VAV	10			5.24			600		610	
1 244 SD 10x10 1.00 240 240 379 247 247 Box Type Box Size Flow Correction Factor for DDC Design Minimum Test Minimum											
1 244 SD 10x10 1.00 240 240 379 247 247 Box Type Box Size Flow Correction Factor for DDC Design Minimum Test Minimum											
1 244 SD 10x10 1.00 240 240 379 247 247 Box Type Box Size Flow Correction Factor for DDC Design Minimum Test Minimum											
Box Type Box Size Flow Correction Factor for DDC Design Minimum Test Minimum	VAV	V-2009									
Box Type Box Size Flow Correction Factor for DDC Design Minimum Test Minimum	1	244	SD	10x10	1.00	240	240	379		247	247
											103%
VAV 6 3.37 100 100	Box Type	Box Size		Flow Cor	rection Fact	tor for DDO	C	Design N	/Iinimum	Test Mi	nimum
	VAV	6			3.37			100		100	

Job Name: Daniel Hand High School Ventilation Survey

O-do	D	D COOL	- January 1	Hette / IVI A			Der 3, 202		,	al
Outlet	Room		g.	"Ak"	Des		First	New	Fin	
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
VAV	V-2010	<u> </u>								
1	249	SD	10x10	1.00	200	200	241	210	213	213
2	249	SD	10x10	1.00	200	200	236	210	209	209
3	249	SD	10x10	1.00	200	200	229	210	202	202
4	249	SD	10x10	1.00	200	200	254	210	225	225
5	249	SD	10x10	1.00	200	200	237	210	210	210
6	249	SD	10x10	1.00	200	<u>200</u>	225	210	199	<u>199</u>
						1200				1258
										105%
Box Type	Box Size		Flow Cor	rection Fact	or for DD0	C	Design N	/Iinimum	Test Mi	nimum
VAV	10			5.80			480		501	
VAV	V-3007									
1	3009	SD	16x16	1.00	600	600	436	623	632	632
2	3009	SD	16x16	1.00	600	600	418	623	605	605
3	storage	SD	10x10	1.00	240	240	178	249	258	258
3	storage	SD	10X10	1.00	240	1440	176	243	236	1495
						1440				
D T	D C:		F1 C		C DD(7	D N	Λ::	T (M:	104%
Box Type	Box Size		Flow Cor	rection Fact	or for DDC	٥	Design N	/linimum	Test Mi	nımum
VAV	12			0.93			600		593	

AIR APPARATUS TEST SHEET

Job Name: **Daniel Hand High School Ventilation Survey**

Tested By: B Cooney / P Ouellette / M A DeZinno September 3, 2020 (20203DH)

Manufacturer =	York	Model No. =	YPAL090HBC46BVAX
Type =	RTU	Serial No. =	RLLM004269
Total Scheduled cfm =	30000		
Outside Air cfm =	6000		
Total Static Pressure =		External Static P	ressure =
Fan rpm =		Brake Horsepowe	er =

MOTOR DESIGN DATA

Horsepower =	Voltage =	Phase =	rpm =
AIR TEST DATA			

AIR TEST DATA

Total cfm by Louver Scan =	21017	
Outside Air =	6213	

PRESSURE TEST DATA

Total Suction Static Pressure =	-1.98		
Total Discharge Static Pressure =	1.02		
Ţ.	Total Static Pressure =	3.00	
External Suction Static Pressure =	-1.38		
External Discharge Static Pressure =	= 1.02		
J	External Static Pressure =	2.40	
DX Coil DP =	0.38		
Filters DP =	0.22		

MOTOR TEST DATA

Motor Manufacturer / Frame =					
Horsepower =	Phase =		Voltage =		
Full Load Amps =			FLA Corrected for Voltage =		
Motor rpm =		Service Factor =			
No Load Amps =			Operating Amps =		
Calculated Brake Horsepower	=				

FAN TEST DATA

Motor Sheave Model / Dia. =		
Motor Sheave Bore =		
Fan Sheave Model / Dia. =		
Fan Sheave Bore =		Fan rpm =
Adjustable Sheave Dia. =		Center Line Distance =
Belts =		
Filters =		
Outside Air Setting =	20% Open	

AIR APPARATUS TEST SHEET

Job Name: Daniel Hand High School Ventilation Survey

Tested By: B Cooney / P Ouellette / M A DeZinno September 3, 2020 (20203DH)

RTU-8 DESIGN DATA

Manufacturer =	York	Model No. =	YPAL090HBC46BVAX
Type =	RTU	Serial No. =	RLLM004270
Total Scheduled cfm =	30000		
Outside Air cfm =	6000		
Total Static Pressure =		External Static P	ressure =
Fan rpm =		Brake Horsepow	er =

MOTOR DESIGN DATA

Horsepower =	Voltage =	Phase =	rpm =

AIR TEST DATA

Total cfm by Traverse =	
Outside Air =	

PRESSURE TEST DATA

Total Suction Static Pressure =	
Total Discharge Static Pressure =	
Total Static Pressure =	0.00
External Suction Static Pressure =	
External Discharge Static Pressure =	
External Static Pressur	e = 0.00
Cooling Coil DP =	Heating Coil DP =
Pre Filters DP =	Final Filters DP =

MOTOR TEST DATA

Motor Manufacturer / Frame =				
Horsepower =	Phase =	Voltage =		
Full Load Amps =		FLA Corrected for Voltage =		
Motor rpm =		Service Factor =		
No Load Amps =	Operating Amps =			
Calculated Brake Horsepower =				

FAN TEST DATA

Motor Sheave Model / Dia. =	
Motor Sheave Bore =	
Fan Sheave Model / Dia. =	
Fan Sheave Bore =	Fan rpm =
Adjustable Sheave Dia. =	Center Line Distance =
Belts =	
Filters =	
Outside Air Setting =	

AIR APPARATUS TEST SHEET

Job Name: Daniel Hand High School Ventilation Survey

Tested By: B Cooney / P Ouellette / M A DeZinno September 3, 2020 (20203DH)

RTU-9	DESIGN DATA

Manufacturer =	York	Model No. =	YPAL090HBC46BVAX
Type =	RTU	Serial No. =	RLLM004269
Total Scheduled cfm =	30000		
Outside Air cfm =	6000		
Total Static Pressure =		External Static P	ressure =
Fan rpm =		Brake Horsepowe	er =

MOTOR DESIGN DATA

Horsepower =	Voltage =	Phase =	rpm =
AIR TEST DATA			
Total cfm by Louver Scan =	6122		
Outside Air =	6213		

PRESSURE TEST DATA

Total Suction Static Pressure =	-2.10		
Total Discharge Static Pressure =	0.50		
T	Total Static Pressure =	2.60	
External Suction Static Pressure =	-1.22		
External Discharge Static Pressure =	1.02		
E	External Static Pressure =	2.24	
DXCoil DP =	0.67		
Filters DP =	0.21		

MOTOR TEST DATA

Motor Manufacturer / Frame =						
Horsepower =	Phase =		Voltage =			
Full Load Amps =		FLA Corrected for Voltage =				
Motor rpm =		Service Factor =				
No Load Amps =			Operating Amps =			
Calculated Brake Horsepower	=					

FAN TEST DATA

Motor Sheave Model / Dia. =		
Motor Sheave Bore =		
Fan Sheave Model / Dia. =		
Fan Sheave Bore =		Fan rpm =
Adjustable Sheave Dia. =		Center Line Distance =
Belts =		
Filters =		
Outside Air Setting =	22% Open	

TRAVERSE SUMMARY TEST SHEET

Job Name: Daniel Hand High School Ventilation Survey

Tested By:	B Cooney / P Ouellette		e / M A D	A DeZinno September 3, 20		2020 (202	020 (20203DH)		
System	Zone /	Height /			Des	sign	Т	est	Static
No.	Room	Dia.	Width	Area	Velocity	cfm	Velocity	cfm	Pressure
RTU-1	Supply	40	78	32.2	651	20990	469	15111	2.00
		38	40						
	OA	40	78	32.2	130	4200	135	4350	20%
		38	40						
RTU-2	Supply	40	78	32.2	688	22165	614	19783	1.60
		38	40						
	OA	40	78	32.2	138	4433	139	4479	20%
		38	40						
RTU-3	Supply	40	78	32.2	749	24130	626	20170	1.05
		38	40						
	OA	40	78	32.2	150	4826	152	4897	20%
		38	40						
RTU-4	Supply	40	78	32.2	738	23765	710	22876	1.70
	11 5	38	40						
	OA	40	78	32.2	148	4753	149	4801	20%
		38	40						
RTU-5	Supply	40	78	32.2	779	25090	606	19525	1.50
	11.5	38	40						
	OA	40	78	32.2	156	5018	170	5477	15%
		38	40						
RTU-6	Supply	40	78	32.2	731	23540	637	20524	1.40
	11 3	38	40						
	OA	40	78	32.2	146	4708	148	4769	20%
		38	40						
RTU-7	Supply	40	78	41.7	719	30000	504	21017	1.02
	11 7	76	80						
	OA	40	78	41.7	144	6000	149	6213	20%
		76	80						
RTU-8	Supply	40	78	32.2	931	30000	1	32	1.00
	11 /	76	80						
	OA	40	78	32.2	186	6000	1	32	
		76	80						
		. 0			l .			1	

TRAVERSE SUMMARY TEST SHEET

Job Name: Daniel Hand High School Ventilation Survey

Tested By:		B Cooney / P Ouellette / M A DeZinno September 3, 2020 (20203DH)				03DH)			
System	Zone /	Height /			Des	sign	Te	est	Static
No.	Room	Dia.	Width	Area	Velocity	cfm	Velocity	cfm	Pressure
RTU-9	Supply	40	78	32.2	931	30000	805	25937	0.50
	11.7	76	80						
	OA	40	78	32.2	186	6000	190	6122	22%
		76	80						
		1							

Environmental Testing & Balancing, Inc.

154 STATE STREET SUITE 204 NORTH HAVEN, CT 06473 (203) 234-2089 FAX (203) 234-2147

CERTIFIED TESTING AND BALANCING REPORT

Date:	November 9, 2020
Project:	Polson Middle School
	Ventilation Survey
Address:	302 Green Hill Road
•	Madison
	Connecticut
HVAC Contractor:	Colliers

The data presented in this report is a record of the system measurements and final adjustments that have been obtained in accordance with the current edition of the NEBB Procedural Standards for Testing, Adjusting and Balancing of Environmental Systems. Any variance from design quantities which exceed NEBB or project tolerances are noted in the Test-Adjust-Balance report Remarks.

Submitted and Certified by: NEBB Professional John E. Burgess



TABLE OF CONTENTS

Sneet little	Page Numbers
Instrument Calibration Sheet	
Glossary / Notes (two pages)	
Remarks	1
RTU-1	
Air Outlet Test Sheets	2
RTU-2	
Air Outlet Test Sheet	3
RTU-3	
Air Outlet Test Sheet	4
RTU-4	
Air Outlet Test Sheet	5
RTU-5	
Air Outlet Test Sheets	6
RTU-6	
Air Outlet Test Sheets	7
RTU-7	
Air Outlet Test Sheet	8
RTU-8	
Air Outlet Test Sheet	9
RTU-9	
Air Outlet Test Sheet	10
RTU-11	
Air Outlet Test Sheet	11
Traverse Summary Test Sheet	12

Environmental Testing & Balancing, Inc.

Instrument Calibration Sheet

Date Calibrated	Instrument	Model #	Serial #	Manufacturer
Air Test Equipment				
November 2019	Air Data Multimeter	ADM860	M01616	Shortridge
April 2020	Digital Anemometer	RVA801	A00142	Alnor
April 2020	Digital Ampmeter	324	33230041WS	Fluke
February 2020	Pocket Laser Tach	PTL200	1940830	Monarch
Hydronics Test Equipn	nent			
February 2020	Hydrodata Multimeter	HDM250	W14102	Shortridge

Glossary

Abbreviation	Meaning	Abbreviation	Meaning
" W.G.	(measured in) Inches Water Gauge	LWT	Leaving Water Temperature
A/C	Air Changes per Hour	MA	Mixed Air
AHU	Air Handling Unit	MAU, MUA	Make-Up Air Unit
AMPS	Amperages	Max	Maximum
BHP	Brake Horsepower	MBH	Thousand BTUs per Hour
BTU	British Thermal Unit	Min	Minimum
CD	Ceiling Diffuser	N/A	Not Available, Not Accessible
CEF	Ceiling Exhaust Fan	No.	Number
CF for DDC	BMS Correction Factor	OA	Outside Air
CFM	Cubic Feet per Minute	OBD	Opposed Blade Damper
СН	Chiller	OD	Outside Diameter
CHWC, CC	Chilled Water Coil, Cooling Coil	OED	Open End Duct
CS	Circuit Setter	PSI	Pounds per Square Inch
СТ	Cooling Tower	RA	Return Air
CV	Constant Volume	RCP	Radiant Ceiling Panel
dB	Decibel	Req'd	Required
Dia	Diameter	RG	Return Grille
dP, DP	Differential Pressure	RGD(s)	Register(s), Grille(s), Diffuser(s)
EADB	Entering Air Dry Bulb	RHC	Reheat Coil
EAWB	Entering Air Wet Bulb	Rm Press	Room Pressure
EF	Exhaust Fan	RP	Radiant Panel
EG	Exhaust Grille	RPM	Revolutions per Minute
ER	Exhaust Register	RTU	Roof Top Unit
EWT	Entering Water Temperature	SA	Supply Air
EX / EXH	Exhaust	SD	Supply Diffuser
F	Fahrenheit	SL	Slot
FCU	Fan Coil Unit	SNRKL	Snorkel
FLA	Full Load Amperage	SP	Static Pressure
FPM	Feet per Minute	TADBF	Total Air Delivered by Fan
GPM	Gallons per Minute	TF	Thermafuser
HP	Horsepower	V	Volt / Voltage
HWC, HC	Hot Water Coil, Heating Coil	VAV	Variable Air Volume
HX	Heat Exchanger	VFD	Variable Frequency Drive
kW	Kilowatt		
LADB	Leaving Air Dry Bulb		
LAWB	Leaving Air Wet Bulb		
LD	Linear Diffuser		

Notes

Measuring with Flow Hood (referencing Air Outlet Test Sheets and Grille, Register & Diffuser Test Sheets):

Registers, diffusers and grilles are read directly in cfm. (Report program indicates 1.00 in Ak Factor column.)

Measuring in Velocity (referencing Air Outlet Test Sheets and Grille, Register & Diffuser Test Sheets):

Ak Factor indicates actual area of registers, following multiplying the Ak by the area equals the actual free area; therefore cfm is calculated and based on this factor (fpm x Ak).

Codes (referencing Air Outlet Test Sheets and Grille, Register & Diffuser Test Sheets):

If codes are not listed here, please reference design drawings.

ENVIRONMENTAL TESTING & BALANCING, INC.

Polson Middle School Ventilation Survey

Remarks

November 9, 2020

New Gym Units

Unit 2

All controls are ripped out at the starter; unit is not operational.

General

In operating mode the outdoor air damper remained shut (except unit 1). The logic to set an outdoor air minimum does not seem to exist in the programming. We suggest that a minimum outdoor air setting be written into it.

Job Name: Polson Middle School Ventilation Survey

Tested By:		B Coon	ey/MAD		November	• 9, 2020	(20203P)			
Outlet	Room			"Ak"	Des	sign	First	New	Fin	ıal
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
		RTU-1								
					1					
1	princ/office			1.00	5100	5100	4260		4260	4260
-	print, orne			1.00	2100	0100	.200		.200	84%
										0170

Job Name: Polson Middle School Ventilation Survey

Tested By:		B Coone	ey / M A D		November	· 9, 2020	(20203P)			
Outlet	Room			"Ak"	Des	sign	First	New	Fin	al
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
		RTU-2								
1	Art			1.00	0	N/A	3933	0	3933	3933
2	room 17			1.00	0	N/A	1511	0	1511	1511
3	room 15			1.00	0	N/A	1429	0	1429	1429
4	room 16A			1.00	0	<u>N/A</u>	1616	0	1616	<u> 1616</u>
						11300				8489
										75%

Job Name: Polson Middle School Ventilation Survey

Outlet	Room		ey / MI A L	"Ak"	Des		First	New	Fin	ngl
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
Number	Number	Coue	Size	ractor	трш	CIII	1681	Key u	трш	CIII
		RTU-3								
		K1U-3								
1	ma ama 10			1.00	0	NT/A	1745	0	1745	1745
1 2	room 10 room 12			1.00	0	N/A N/A	1745 2378	0	1745 2378	1745
	100111 12			1.00	U	7800	2318	U	23/8	<u>2378</u> 4123
						/800				53%
										33%

Job Name: Polson Middle School Ventilation Survey

Outlet	Room		ey/MAI	"Ak"	November Des		First	New	Fin	====== al
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
Tiumber	TVUIIDEI	Couc	SIEC	1 deto1	1pm	CIII	1050	Iteq u	Tpm	
		RTU-4								
1	room 19			1.00	0	N/A	902	0	902	902
2	room 20			1.00	0	N/A	2166	0	2166	2166
3	room 21			1.00	0	N/A	2260	0	2260	2260
4	room 22			1.00	0	N/A	2521	0	2521	2521
5	room 23A			1.00	0	N/A	372	0	372	372
6	room 23B/32			1.00	0	N/A	407	0	407	<u>407</u>
						9160				8628
										94%

Job Name: Polson Middle School Ventilation Survey

Number N	Outlet	Room		ey / MI A L	"Ak"	Dos		First	New	Fir	nal
RTU-5 1 Media 1.00 9200 9200 6394 6394 6394			Code	Sizo							
1 Media 1.00 9200 9200 6394 6394 639	Number	Number	Coue	Size	ractor	трш	CIII	1681	Key u	трш	CIII
1 Media 1.00 9200 9200 6394 6394 639			DTII 5								
			K1U-3								
	1	Madia			1.00	0200	0200	6204		6204	6204
	1	Media			1.00	9200	9200	0394		0394	
											70%

Job Name: Polson Middle School Ventilation Survey

Outlet	Room	2 20011	ey / NI A L	"Ak"	Des		First	New	Fin	ıal
Number	Number	Code	Size	Factor	fpm	cfm	Test	Reg'd	fpm	cfm
Tullibei	rumber	Couc	SIZC	ractor	трш	CIII	Test	IXCq u	трш	CIII
		RTU-6								
		K10-0								
1	rms 45A, B, C			1.00	0	N/A	195	0	195	195
2	rm 119 (44A?)			1.00	0	N/A	643	0	643	643
3	room 46			1.00	0	N/A	1090	0	1090	1090
4	rms 46A, 46B			1.00	0	N/A	1393	0	1393	1393
5	room 47			1.00	0	N/A	1125	0	1125	1125
6	room 45			1.00	0	N/A	2564	0	2564	<u>2564</u>
						7000				7010
										100%

Job Name: Polson Middle School Ventilation Survey

Outlet	Room	2 20011	ey/MAI	"Ak"	November Des		(20203P) First	New	Fin	 al
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm cfr	
Number	14umper	Coue	Size	ractor	трш	CIII	1686	Key u	<u>ipin</u>	CIIII
		RTU-7								
		K10-7								
1	rms 8, 9			1.00	0	N/A	2055	0	2055	2055
2	rms 6A, 11A			1.00	0	N/A	696	0	696	696
3	room 5			1.00	0	N/A	1314	0	1314	1314
4	rms 6, 7A			1.00	0	N/A	1410	0	1410	1410
5	room 7			1.00	0	N/A	2057	0	2057	2057
						9500				7532
										79%

Job Name: Polson Middle School Ventilation Survey

Tested By:		B Coon	ey/MAD		November	• 9, 2020	(20203P)			
Outlet	Room			"Ak"	Des	sign	First	New	Fir	ıal
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
		RTU-8								
1	Cafe			1.00	9600	9600	7968		7968	7968
										83%
		+								
		+								

Job Name: Polson Middle School Ventilation Survey

Outlet	Room	D COOK	ey / MI A L	"Ak"	Des		First	New	Fir	ıal
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
Number	Number	Coue	Size	ractor	трш	CIII	1681	Key u	трш	CIII
		RTU-9								
[K1U-9								
1	Cofo			1.00	10300	10200	9190		9190	9190
1	Cafe			1.00	10300	10300	9190		9190	89%
										89%

Job Name: Polson Middle School Ventilation Survey

Outlet	Room	Decom	ey/WIAD	"Ak"	Des		First	New	Fir	 19l
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
rumber	rumber	Couc	Size	ractor	трш	CIII	1 CSt	rcq u	трш	CIII
		RTU-11								
		K1U-11								
1	Band			1.00	5560	5560	4707		4707	4707
1	Dallu			1.00	3300	3300	4/0/		4/0/	85%
										8370

TRAVERSE SUMMARY TEST SHEET

Job Name: Polson Middle School Ventilation Survey

Tested By:		B Cooney /	M A DeZi	nno Nov	vember 9, 20	20 (20203	3P)		
System	Zone /	Height /			Des	sign	Те	st	Static
No.	Room	Dia.	Width	Area	Velocity	cfm	Velocity	cfm	Pressure
RTU-1	OA	48	44	14.7	70	1020	73	1071	25% OA
RTU-2	OA	48	44	14.7	170	2500	185	2713	30% OA
RTU-3	OA	48	44	14.7	170	2500	182	2669	40% OA
RTU-4	OA	76	44	23.2	98	2280	100	2322	20% OA
RTU-5	OA	48	44	14.7	157	2300	160	2347	35% OA
RTU-6	OA	76	44	23.2	75	1750	83	1927	20% OA
RTU-7	OA	76	44	23.2	127	2940	132	3065	35% OA
RTU-8	OA	48	44	14.7	191	2800	206	3021	25% OA
RTU-9	OA	76	44	23.2	159	3700	165	3832	35% OA
Fitness	Total	16	38	4.2	568	2400	510	2153	100%
	OA	16	38	4.2	142	600	155	654	25%
Band	Total	16	72	8.0	300	2400	510	4080	100%
	OA	16	72	8.0	70	560	75	600	15%
New Gym	Supply	30	36	7.5	0	N/A	500	3750	-0.21
Unit 1	OA	54	20	7.5	0	N/A	254	1905	50% OA
New Gym	Supply	30	36	7.5	0	N/A	0	0	
Unit 2	OA	54	20	7.5	0	N/A	0	0	0% OA
New Gym	Supply	30	36	7.5	0	N/A	557	4178	-0.28
Unit 3	OA	54	20	7.5	0	N/A	0	0	0% OA
New Gym	Supply	30	36	7.5	0	N/A	740	5550	-0.81
Unit 4	OA	54	20	7.5	0	N/A	0	0	0% OA

TRAVERSE SUMMARY TEST SHEET

Job Name: Polson Middle School Ventilation Survey

Tested By:		B Cooney /	WI A DEZI	110 1101	ember 9, 20					
System	Zone /	Height /			Des		Tes		Static	
No.	Room	Dia.	Width	Area	Velocity	cfm	Velocity	cfm	Pressure	
New Gym	Supply	30	48	10.0	0	N/A	600	6000	-0.94	
Unit 5	OA	54	24	9.0	0	N/A	0	0	0% OA	
New Gym	Supply	30	48	10.0	0	N/A	536	5360	-0.78	
Unit 6	OA	54	24	9.0	0	N/A	0	0	0% OA	

Environmental Testing & Balancing, Inc.

154 STATE STREET SUITE 204 NORTH HAVEN, CT 06473 (203) 234-2089 FAX (203) 234-2147

CERTIFIED TESTING AND BALANCING REPORT

Date:	September 3, 2020	
Project:	Polson Middle School	
	Ventilation Survey	
Address:	302 Green Hill Road	
	Madison	
	Connecticut	
HVAC Contractor:	Colliers	

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Submitted and Certified by: NEBB Professional John E. Burgess



TABLE OF CONTENTS

Sheet Title	Page Numbers
Instrument Calibration Sheet	
Glossary / Notes (two pages)	
RTU-1	
Air Outlet Test Sheets	1
RTU-2	
Air Outlet Test Sheet	2
RTU-3	
Air Outlet Test Sheet	3
RTU-4	
Air Outlet Test Sheet	4
RTU-5	
Air Outlet Test Sheets	5
RTU-6	
Air Outlet Test Sheets	6
RTU-7	
Air Outlet Test Sheet	7
RTU-8	
Air Outlet Test Sheet	8
RTU-9	
Air Outlet Test Sheet	9
RTU-11	
Air Outlet Test Sheet	10
Traverse Summary Test Sheet	11

Environmental Testing & Balancing, Inc.

Instrument Calibration Sheet

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Air Test Equipment				
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EAWB	Entering Air Wet Bulb	Rm Press	Room Pressure
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EG	Exhaust Grille	RPM	Revolutions per Minute
ER	Exhaust Register	RTU	Roof Top Unit
EWT	Entering Water Temperatrue	SA	Supply Air
EX / EXH	Exhaust	SD	Supply Diffuser
F	Fahrenheit	SL	Slot
FLA	Full Load Amperage	SNRKL	Snorkel
FCU	Fan Coil Unit	SP	Static Pressure
FPM	Feet per Minute	TADBF	Total Air Delivered by Fan
GPM	Gallons per Minute	TF	Thermafuser
HP	Horsepower	VAV	Variable Air Volume
HWC, HC	Hot Water Coil, Heating Coil	VFD	Variable Frequency Drive
НХ	Heat Exchanger		
kW	Kilowatt		
LADB	Leaving Air Dry Bulb		
LAWB	Leaving Air Wet Bulb		
LD	Linear Diffuser		

Notes

Measuring with Flow Hood (referencing Air Outlet Test Sheets and Grille, Register & Diffuser Test Sheets):

Registers, diffusers and grilles are read directly in cfm. (Report program indicates 1.00 in Ak Factor column.)

Measuring in Velocity (referencing Air Outlet Test Sheets and Grille, Register & Diffuser Test Sheets):

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Codes (referencing Air Outlet Test Sheets and Grille, Register & Diffuser Test Sheets):

If codes are not listed here, please reference design drawings.

Job Name: Polson Middle School Ventilation Survey

Tested By:							3P)			
Outlet	Room			"Ak"	Des	sign	First	New	Fin	al
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
		RTU-1								
1	princ/office			1.00	5100	5100	4260		4260	4260
										84%

Job Name: Polson Middle School Ventilation Survey

Tested By:		B Coon	ey / P Oue	llette / M A	M A DeZinno September 3, 2020 (20203P)					
Outlet	Room			"Ak"	Des	ign	First	New	Fin	al
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
					,					
		RTU-2								
1	Art			1.00	0	N/A	3933	0	3933	3933
2	room 17			1.00	0	N/A	1511	0	1511	1511
3	room 15			1.00	0	N/A	1429	0	1429	1429
4	room 16A			1.00	0	<u>N/A</u>	1616	0	1616	<u>1616</u>
						11300				8489
										75%

Job Name: Polson Middle School Ventilation Survey

Tested By:		D COOR	y/1 Out	ellette / M A			ber 3, 2020			
Outlet	Room		Code Size	"Ak"	Des		First	New	Final	
Number	Number	umber Code		Factor	fpm	cfm	Test	Req'd	fpm	cfm
		RTU-3								
1	room 10			1.00	0	N/A	1745	0	1745	1745
2	room 12			1.00	0	N/A	2378	0	2378	2378
						7800				4123
										53%
				+ +						
				+						

Job Name: Polson Middle School Ventilation Survey

Outlet	Room	D COOM	JII Gue	"Ak"	Des		First	New	Fin	ol
Number	Number	Code	Size	11 13		cfm	Test	l li		cfm
Number	Number	Code	Size	Factor	fpm	CIIII	Test	Req'd	fpm	CIII
		DOLL 4								
		RTU-4								
1	room 19			1.00	0	N/A	902	0	902	902
2	room 20			1.00	0	N/A	2166	0	2166	2166
3	room 21			1.00	0	N/A	2260	0	2260	2260
4	room 22			1.00	0	N/A	2521	0	2521	2521
5	room 23A			1.00	0	N/A	372	0	372	372
6	room 23B/32			1.00	0	N/A	407	0	407	407
0	100111 2315/32			1.00	0	9160	407	U	407	8628
						9100				94%
										74/0

Job Name: Polson Middle School Ventilation Survey

Outlet	Room			"Ak"	Des		First	New	Fin	====== ıal
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
rumber	rumber	Couc	Size	Tactor	трш	CIII	1030	rcq u	Ipin	CIII
Ī		RTU-5								
<u>[</u>		KIU-5								
	3.6.11			1.00	0200	0200	6204		620.4	
1	Media			1.00	9200	9200	6394		6394	6394
										70%

Job Name: Polson Middle School Ventilation Survey

Outlet Number	Room	D COOM	Size	"Ak" Factor	Design		First	New		Final	
	Number	Code				cfm	Test	Req'd	fpm	cfm	
Number	Number	Code	Size	Factor	fpm	CIIII	Test	Keq u	трш	CIIII	
		RTU-6									
		KIU-0									
1	rms 45A, B, C			1.00	0	N/A	195	0	195	195	
2	rm 119 (44A?)			1.00	0	N/A	643	0	643	643	
3	room 46			1.00	0	N/A	1090	0	1090	1090	
4	rms 46A, 46B			1.00	0	N/A	1393	0	1393	1393	
5	room 47			1.00	0	N/A	1125	0	1125	1125	
6	room 45			1.00	0	N/A	2564	0	2564	2564	
U	10011113			1.00		7000	2501	0	2501	7010	
						7000				100%	
										10070	

Job Name: Polson Middle School Ventilation Survey

Outlet	Doom	DCOON	cy / 1 Ouc	"Ak"			Finet		Fin	al .
Outlet	Room	C. 1.	C:	11 15	Des		First	New		
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
		RTU-7								
1	rms 8, 9			1.00	0	N/A	2055	0	2055	2055
2	rms 6A, 11A			1.00	0	N/A	696	0	696	696
3	room 5			1.00	0	N/A	1314	0	1314	1314
4	rms 6, 7A			1.00	0	N/A	1410	0	1410	1410
5	room 7			1.00	0	N/A	2057	0	2057	2057
						9500				7532
										79%

Job Name: Polson Middle School Ventilation Survey

Tested By:	y: B Cooney / P Ouellette / M A				A DeZinno September 3, 2020 (20203P)					
Outlet	Room			"Ak"	Des		First	New	Fin	al
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
		RTU-8	1							
1	Cafe			1.00	9600	9600	7968		7968	7968
1	Cuic			1.00	7000	7000	7700		7,00	83%
										0370

Job Name: Polson Middle School Ventilation Survey

Tested By:		B Coon	ey / P Oue	llette / M A	<u> DeZinno</u>	Septem	0 (2020)			
Outlet	Room			"Ak"	Des	sign	First	New	Fin	ıal
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
		RTU-9								
1	Cafe			1.00	10300	10300	9190		9190	9190
										89%

Job Name: Polson Middle School Ventilation Survey

Outlet	Room			"Ak"	Des		First	New	Fin	al
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
Tturiber	114111001		SIEC	1 4001	триг	CIII	1050	110q u	TPIII	
		RTU-11								
ĮL		KTC-II								
1	Band			1.00	5560	5560	4707		4707	4707
1	Bana			1.00	3300	3300	4/0/		4707	85%
										0370

TRAVERSE SUMMARY TEST SHEET

Job Name: Polson Middle School Ventilation Survey

Tested By:		B Cooney /	P Ouellett	e / M A DeZinno September 3, 2020			2020 (2020				
System	Zone /	Height /			Des	sign	Te	st	Static		
No.	Room	Dia.	Width	Area	Velocity	cfm	Velocity	cfm	Pressure		
RTU-1	OA	48	44	14.7	70	1020	73	1071	25% OA		
RTU-2	OA	48	44	14.7	170	2500	185	2713	30% OA		
RTU-3	OA	48	44	14.7	170	2500	182	2669	40% OA		
RTU-4	OA	76	44	23.2	98	2280	100	2322	20% OA		
RTU-5	OA	48	44	14.7	157	2300	160	2347	35% OA		
RTU-6	OA	76	44	23.2	75	1750	83	1927	20% OA		
RTU-7	OA	76	44	23.2	127	2940	132	3065	35% OA		
RTU-8	OA	48	44	14.7	191	2800	206	3021	25% OA		
RTU-9	OA	76	44	23.2	159	3700	165	3832	35% OA		
Fitness	Total	16	38	4.2	568		510	2153	100%		
	OA	16	38	4.2	142	600	155	654	25%		
D 1	TF + 1	1.6	70	0.0	200	2400	510	4000	1000/		
Band	Total	16	72	8.0	300	2400	510	4080	100%		
	OA	16	72	8.0	70	560	75	600	15%		
		1									

Environmental Testing & Balancing, Inc.

154 STATE STREET SUITE 204 NORTH HAVEN, CT 06473 (203) 234-2089 FAX (203) 234-2147

CERTIFIED TESTING AND BALANCING REPORT

The data presented in this report is a record of the system measurements and final adjustments that have been obtained in accordance with the current edition of the NEBB Procedural Standards for Testing, Adjusting and Balancing of Environmental Systems. Any variance from design quantities which exceed NEBB or project tolerances are noted in the Test-Adjust-Balance report Remarks.

Submitted and Certified by: NEBB Professional John E. Burgess



TABLE OF CONTENTS

Sheet Title

Instrument Calibration Sheet
Glossary / Notes (two pages)
General Fans
Grille Test Sheets

1 - 3

Page Numbers

Environmental Testing & Balancing, Inc.

Instrument Calibration Sheet

Date Calibrated	Instrument	Model #	Serial #	Manufacturer
Air Test Equipment				
November 2019	Air Data Multimeter	ADM860	M01616	Shortridge
April 2020	Digital Anemometer	RVA801	A00142	Alnor
April 2020	Digital Ampmeter	324	33230041WS	Fluke
February 2020	Pocket Laser Tach	PTL200	1940830	Monarch
Hydronics Test Equipn	nent			
February 2020	Hydrodata Multimeter	HDM250	W14102	Shortridge

Glossary

Abbreviation	Meaning	Abbreviation	Meaning
" W.G.	(measured in) Inches Water Gauge	LWT	Leaving Water Temperature
A/C	Air Changes per Hour	MA	Mixed Air
AHU	Air Handling Unit	MAU, MUA	Make-Up Air Unit
AMPS	Amperages	Max	Maximum
BHP	Brake Horsepower	MBH	Thousand BTUs per Hour
BTU	British Thermal Unit	Min	Minimum
CD	Ceiling Diffuser	N/A	Not Available, Not Accessible
CEF	Ceiling Exhaust Fan	No.	Number
CF for DDC	BMS Correction Factor	OA	Outside Air
CFM	Cubic Feet per Minute	OBD	Opposed Blade Damper
СН	Chiller	OD	Outside Diameter
CHWC, CC	Chilled Water Coil, Cooling Coil	OED	Open End Duct
CS	Circuit Setter	PSI	Pounds per Square Inch
СТ	Cooling Tower	RA	Return Air
CV	Constant Volume	RCP	Radiant Ceiling Panel
dB	Decibel	Req'd	Required
Dia	Diameter	RG	Return Grille
dP, DP	Differential Pressure	RGD(s)	Register(s), Grille(s), Diffuser(s)
EADB	Entering Air Dry Bulb	RHC	Reheat Coil
EAWB	Entering Air Wet Bulb	Rm Press	Room Pressure
EF	Exhaust Fan	RP	Radiant Panel
EG	Exhaust Grille	RPM	Revolutions per Minute
ER	Exhaust Register	RTU	Roof Top Unit
EWT	Entering Water Temperatrue	SA	Supply Air
EX / EXH	Exhaust	SD	Supply Diffuser
F	Fahrenheit	SL	Slot
FLA	Full Load Amperage	SNRKL	Snorkel
FCU	Fan Coil Unit	SP	Static Pressure
FPM	Feet per Minute	TADBF	Total Air Delivered by Fan
GPM	Gallons per Minute	TF	Thermafuser
HP	Horsepower	VAV	Variable Air Volume
HWC, HC	Hot Water Coil, Heating Coil	VFD	Variable Frequency Drive
НХ	Heat Exchanger		
kW	Kilowatt		
LADB	Leaving Air Dry Bulb		
LAWB	Leaving Air Wet Bulb		
LD	Linear Diffuser		

Notes

Measuring with Flow Hood (referencing Air Outlet Test Sheets and Grille, Register & Diffuser Test Sheets):

Registers, diffusers and grilles are read directly in cfm. (Report program indicates 1.00 in Ak Factor column.)

Measuring in Velocity (referencing Air Outlet Test Sheets and Grille, Register & Diffuser Test Sheets):

Ak Factor indicates actual area of registers, following multipying the Ak by the area equals the actual free area; therefore cfm is calculated and based on this factor (fpm x Ak).

Codes (referencing Air Outlet Test Sheets and Grille, Register & Diffuser Test Sheets):

If codes are not listed here, please reference design drawings.

Job Name: Kathleen H. Ryerson Elementary School Ventilation Survey

Outlet	Room	2 20011	Jir Cae	"Ak"	Requ		First	New	Fin	 al
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	efm
Number	Number	Coue	Size	Factor	трш	CIIII	rest	Keq u	трш	CIIII
	Library U	īV		1						
1	Supply	UV	6x42	1.00	0	N/A	431		431	431
2	Outside Air	oed	6x42	1.00	0	N/A	66		66	66
	Outside 7 III	oca	0.4.12	1.00	U	14/11	00		00	
	Daam V1	TIX7								
1	Room K1		6::42	1.00	0	NI/A	212		212	212
<u>1</u> 2	Supply Outside Air	UV oed	6x42 6x42	1.00	0	N/A N/A	313		313	313
	Outside All	oeu	0X42	1.00	U	IN/A	00		00	
	Room K2	UV								
1	Supply	UV	6x42	1.00	0	N/A	360		360	360
2	Outside Air	oed	6x42	1.00	0	N/A	48		48	48
	Room 1 U	JV								
1	Supply	UV	6x42	1.00	0	N/A	417		417	417
2	Outside Air	oed	6x42	1.00	0	N/A	69		69	69
	Room 2 U	IV								
1	Supply	UV	6x42	1.00	0	N/A	426		426	426
2	Outside Air	oed	6x42	1.00	0	N/A	64		64	64
	Room 3 U	JV								
1	Supply	UV	6x42	1.00	0	N/A	366		366	366
2	Outside Air	oed	6x42	1.00	0	N/A	74		74	74
	Room 4 U	JV								
1	Supply	UV	6x42	1.00	0	N/A	431		431	431
2	Outside Air	oed	6x42	1.00	0	N/A	60		60	60
	Room 5 U	IV								
1	Supply	UV	6x42	1.00	0	N/A	406		406	406
2	Outside Air	oed	6x42	1.00	0	N/A N/A	54		54	54
<u>L</u>	Outside All	oeu	0.442	1.00	U	IN/A	34		34	34
	I .	1	l							

Job Name: Kathleen H. Ryerson Elementary School Ventilation Survey

Outlet	Room		Jac	"Ak"	Requ		First	New	Fin	 al
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
Number	Number	Coue	Size	Factor	трш	CIIII	rest	Keq u	трш	CIIII
	Room 6 U	IV								
1	Supply	UV	6x42	1.00	0	N/A	346		346	346
2	Outside Air	oed	6x42	1.00	0	N/A	67		67	67
	Outside 7 til	ocu	0.4-2	1.00	U	14/11	07		07	07
	Room 7 U	J V]						
1	Supply	UV	6x42	1.00	0	N/A	318		318	318
2	Outside Air	oed	6x42	1.00	0	N/A	61		61	61
	Room 8 U	IV								
1	Supply	UV	6x42	1.00	0	N/A	420		420	420
2	Outside Air	oed	6x42	1.00	0	N/A	77		77	77
	Room 9 U	J V								
1	Supply	UV	6x42	1.00	0	N/A	392		392	392
2	Outside Air	oed	6x42	1.00	0	N/A	76		76	76
	Room 10	IIV								
1	Supply	UV	6x42	1.00	0	N/A	180		180	180
2	Outside Air	oed	6x42	1.00	0	N/A	41		41	41
	Room 11		ı]						
1	Supply	UV	6x42	1.00	0	N/A	365		394	394
2	Outside Air	oed	6x42	1.00	0	N/A	40		154	154
	D 10	FIX 7		1						
1	Room 12		(12	1.00	0	3 1/4	2.45		107	107
2	Supply Outside Air	UV	6x42	1.00	0	N/A	245		197	197
<u> </u>	Outside Air	oed	6x42	1.00	U	N/A	0		102	102
	Room 13	UV								
1	Supply	UV	6x42	1.00	0	N/A	508		508	508
2	Outside Air	oed	6x42	1.00	0	N/A	107		107	107

Job Name: Kathleen H. Ryerson Elementary School Ventilation Survey

Tested By:		B Cooney / P Ouellette / M A DeZinno September 3, 2020 (20203KR)								
Outlet	Room			"Ak"	Requ		First	New	Fin	
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
	Room 14	UV		<u> </u>						
1	Supply	UV	6x42	1.00	0	N/A	467		467	467
2	Outside Air	oed	6x42	1.00	0	N/A	80		80	80
	Room 15	IIV								
1	Supply	UV	6x42	1.00	0	N/A	357		357	357
2	Outside Air	oed	6x42	1.00	0	N/A	90		90	90
_	3 445144 1 111	300	011.2	1.00		1,712	, ,		70	
	Room 16			<u> </u>						
1	Supply	UV	6x42	1.00	0	N/A	287		287	287
2	Outside Air	oed	6x42	1.00	0	N/A	88		88	88
	Room 17	UV								
1	Supply	UV	6x42	1.00	0	N/A	338		338	338
2	Outside Air	oed	6x42	1.00	0	N/A	88		88	88
	Room 18	UV								
1	Supply	UV	6x42	1.00	0	N/A	431		431	431
2	Outside Air	oed	6x42	1.00	0	N/A	126		126	126
	Room 19	IIV								
1	Supply	UV	6x42	1.00	0	N/A	402		402	402
2	Outside Air	oed	6x42	1.00	0	N/A	117		117	117

Environmental Testing & Balancing, Inc.

154 STATE STREET SUITE 204 NORTH HAVEN, CT 06473 (203) 234-2089 FAX (203) 234-2147

CERTIFIED TESTING AND BALANCING REPORT

Date:	November 16, 2020	
Project:	J. Milton Jeffrey Elementary School	
	Ventilation Survey	
Address:	331 Copse Road	
	Madison	
	Connecticut	
HVAC Contractor:	Colliers	

The data presented in this report is a record of the system measurements and final adjustments that have been obtained in accordance with the current edition of the NEBB Procedural Standards for Testing, Adjusting and Balancing of Environmental Systems. Any variance from design quantities which exceed NEBB or project tolerances are noted in the Test-Adjust-Balance report Remarks.

Submitted and Certified by: NEBB Professional John E. Burgess



TABLE OF CONTENTS

Sheet Title	Page Numbers
Instrument Calibration Sheet	
Glossary / Notes (two pages)	
Remarks	1
General Fans	
Fan Unit Test Sheets	2 - 4
Grille Test Sheets	5 - 9
Traverse Summary Test Sheet	10

Environmental Testing & Balancing, Inc.

Instrument Calibration Sheet

Date Calibrated	Instrument	Model #	Serial #	Manufacturer
Air Test Equipment				
November 2019	Air Data Multimeter	ADM860	M01616	Shortridge
April 2020	Digital Anemometer	RVA801	A00142	Alnor
April 2020	Digital Ampmeter	324	33230041WS	Fluke
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Hydronics Test Equipn	nent			
February 2020	Hydrodata Multimeter	HDM250	W14102	Shortridge

Glossary

Abbreviation	Meaning	Abbreviation	Meaning
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CS	Circuit Setter	PSI	Pounds per Square Inch
СТ	Cooling Tower	RA	Return Air
CV	Constant Volume	RCP	Radiant Ceiling Panel
dB	Decibel	Req'd	Required
Dia	Diameter	RG	Return Grille
dP, DP	Differential Pressure	RGD(s)	Register(s), Grille(s), Diffuser(s)
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EAWB	Entering Air Wet Bulb	Rm Press	Room Pressure
EF	Exhaust Fan	RP	Radiant Panel
EG	Exhaust Grille	RPM	Revolutions per Minute
ER	Exhaust Register	RTU	Roof Top Unit
EWT	Entering Water Temperature	SA	Supply Air
EX / EXH	Exhaust	SD	Supply Diffuser
F	Fahrenheit	SL	Slot
FCU	Fan Coil Unit	SNRKL	Snorkel
FLA	Full Load Amperage	SP	Static Pressure
FPM	Feet per Minute	TADBF	Total Air Delivered by Fan
GPM	Gallons per Minute	TF	Thermafuser
HP	Horsepower	V	Volt / Voltage
HWC, HC	Hot Water Coil, Heating Coil	VAV	Variable Air Volume
HX	Heat Exchanger	VFD	Variable Frequency Drive
kW	Kilowatt		
LADB	Leaving Air Dry Bulb		
LAWB	Leaving Air Wet Bulb		
LD	Linear Diffuser		

Notes

Measuring with Flow Hood (referencing Air Outlet Test Sheets and Grille, Register & Diffuser Test Sheets):

Registers, diffusers and grilles are read directly in cfm. (Report program indicates 1.00 in Ak Factor column.)

Measuring in Velocity (referencing Air Outlet Test Sheets and Grille, Register & Diffuser Test Sheets):

Ak Factor indicates actual area of registers, following multiplying the Ak by the area equals the actual free area; therefore cfm is calculated and based on this factor (fpm x Ak).

Codes (referencing Air Outlet Test Sheets and Grille, Register & Diffuser Test Sheets):

If codes are not listed here, please reference design drawings.

ENVIRONMENTAL TESTING & BALANCING, INC.

J. Milton Jeffrey Elementary School Ventilation Survey

Remarks

November 16, 2020

Cafeteria Unit

This unit seems to be under-performing for space size.

Coil and filters are clean, discharge dampers are wide open.

Insulation housing the inlet of the unit contains asbestos, and therefore was not drilled or disturbed during testing. Pneumatic face and bypass damper is no longer operational.

Job Name: J. Milton Jeffrey Elementary School Ventilation Survey
Tested By: B Cooney / M A DeZinno November 16, 2020 (20203J)

Fan Number	Rm 8 AHU	RTU-23	RTU-24
Serving	Room 8	Room 23	Room 24
Manufacturer	Trane	Trane	Trane
Model Number	BCVCO36C1	YCC048F3H0BG	YCC048F3H0BG
Serial Number	T07H59198	R082L602H	R0532TN2H

	Design	Test	Design	Test	Design	Test
Total cfm	2500	2478	N/A	1433	N/A	1274
		<u> </u>		,	<u>'</u>	
Suction Static Pressure		-0.50		-0.47		-0.55
Discharge Static Pressure		0.18		0.41		0.50
External Static Pressure		0.68		0.88		1.05
Motor Sheave						
Model / Diameter						
Bore						
Fan Sheave						
Model / Diameter						
Bore						
Belts						
Center Line Distance						
Motor Manufacturer / Frame						
Horsepower						
Motor rpm						
Phase						·

Motor Manufacturer / Frame						
Horsepower						
Motor rpm						
Phase						
Voltage						
Service Factor						
Rated Amperage						
Corrected for Voltage						
No Load Amperage						
Operating Amperage						
Brake Horsepower						
Fan rpm						

Job Name: J. Milton Jeffrey Elementary School Ventilation Survey
Tested By: B Cooney / M A DeZinno November 16, 2020 (20203J)

Fan Number	RTU-25	RTU-26	RTU-27
Serving	Room 25	Room 26	Room 27
Manufacturer	Trane	Trane	Trane
Model Number	YCC048F3H0BG	YCC048F3H0BG	YCC048F3H0BG
Serial Number	R06KYE72H	R0812992H	R07457K2H

	Design	Test	Design	Test	Design	Test
Total cfm	N/A	1246	N/A	1259	N/A	1310
C . C . C . D		0.40		0.52		0.47
Suction Static Pressure		-0.49		-0.52		-0.47
Discharge Static Pressure		0.50		0.48		0.53
External Static Pressure		0.99		1.00		1.00
Motor Sheave						
Model / Diameter						
Bore						
Fan Sheave						
Model / Diameter						
Bore						
Belts						
Center Line Distance						
		·				

Motor Manufacturer / Frame					
Horsepower					
Motor rpm					
Phase					
Voltage					
Service Factor					
Rated Amperage					
Corrected for Voltage					
No Load Amperage					
Operating Amperage					
Brake Horsepower					

Job Name:	J. Milton Jeffro	ey Elementai	ry School Ve	entilation Surv	vey	
Tested By:	B Cooney / M	A DeZinno	November 1	16, 2020 (20	203J)	
Fan Number	RTU-28					
Serving	Room 28	Room 28				
Manufacturer	Trane					
Model Number	YCC048F3H0)BG				
Serial Number	R185KTD2H					
	Design	Test	Design	Test	Design	Test
Total cfm	N/A	1295				
Suction Static Pressure		-0.58				
Discharge Static Pressure		0.41				
External Static Pressure		0.99				
Motor Sheave						
Model / Diameter						
Bore						
Fan Sheave						
Model / Diameter						
Bore						
Belts						
Center Line Distance						
	·					
Motor Manufacturer / Frame						
Horsepower						
Motor rpm						
Phase						
Voltage						
Service Factor						
Rated Amperage						
Corrected for Voltage						
No Load Amperage						
Operating Amperage						
_						
Brake Horsepower						

Fan rpm

Job Name: J. Milton Jeffrey Elementary School Ventilation Survey

Tested By: B Cooney / M A DeZinno November 16, 2020 (20203J)

Tested By:		B Coone	ey/MAD	<u>DeZinno</u>	November	16, 2020	(20203J)			
Outlet	Room			"Ak"	Requ	iired	First	New	Fin	al
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
				1						
	Room 8 A									
1	8	SW	12x6	0.33		N/A	1052		1052	347
2	8	SW	12x6	0.33		N/A	956		956	315
3	8	SW	12x6	0.33		N/A	1123		1123	371
4	8	SW	12x6	0.33		N/A	621		621	205
5	8	SW	12x6	0.33		N/A	732		732	242
6	8	SW	12x6	0.33		N/A	1020		1020	337
7	8	SW	12x6	0.33		N/A	945		945	312
8	8	SW	12x6	0.33	0	N/A	1060		1060	<u>350</u>
										2478
	Outside A	ir								
1	Room 8 AHU	oed	40x9	1.00	0	N/A	45		265	265
	Room 23 R	RTU								
1	RDG Total			1.00	0	N/A	1433		1433	1433
	Room 24 R	RTU								
1	RDG Total			1.00	0	N/A	1274		1274	1274
	Room 25 R	RTU								
1	RDG Total			1.00	0	N/A	1246		1246	1246
	Room 26 R	RTU								
1	RDG Total			1.00	0	N/A	1259		1259	1259
	Room 27 R	RTU								
1	RDG Total			1.00	0	N/A	1310		1310	1310
	Room 28 R	RTU								
1	RDG Total			1.00	0	N/A	1295		1295	1295

Job Name: J. Milton Jeffrey Elementary School Ventilation Survey

Tested By: B Cooney / M A DeZinno November 16, 2020 (20203J)

Tested By:		B Coon	ey/MAD		November		(20203J)			
Outlet	Room			"Ak"	Requ	ired	First	New	Fin	al
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
	Art Room	UV		<u> </u>						
1	Supply	UV	51.5x6	1.00	0	N/A	275		275	275
2	Outside Air	oed	49x10	1.00	0	N/A	55		55	55
	Library E	UV								
1	Supply	UV	42x9	1.00	0	N/A	535		535	535
2	Outside Air	oed	40x9	1.00	0	N/A	119		119	119
	Library W	UV								
1	Supply	UV	42x9	1.00	0	N/A	552		552	552
2	Outside Air	oed	40x9	1.00	0	N/A	107		107	107
_	0 445744 7 747		.0.15	1.00	Ů	1,111	107		107	10,
	Music Room	RIIV								
1	Supply	UV	42x9	1.00	0	N/A	647		647	647
2	Outside Air	oed	40x9	1.00	0	N/A	253		253	253
	o diside i in	000	TORS	1.00	o o	11/11	233		233	200
	Music Room A	A UV 1								
1	Supply	UV	42x9	1.00	0	N/A	619		619	619
2	Outside Air	oed	40x9	1.00	0	N/A	270		270	270
_	0 445744 7 741	000	.0.13	1.00	Ů	1,712	210			
	Music Room A	LIV 2								
1	Supply	UV	42x9	1.00	0	N/A	647		647	647
2	Outside Air	oed	40x9	1.00	0	N/A	253		253	253
_										
	D 2.1	18.7								
1	Room 2 U	1	12.0	1.00	0	NT/A	42.5		42.5	42.5
1	Supply	UV	42x9	1.00	0	N/A	435		435	435
2	Outside Air	oed	40x9	1.00	0	N/A	380		380	380
	D 2.7	IN 7								
1	Room 3 U		42.0	1.00		37/4	573		572	
1	Supply	UV	42x9	1.00	0	N/A	573		573	573
2	Outside Air	oed	40x9	1.00	0	N/A	109		109	109

J. Milton Jeffrey Elementary School Ventilation Survey
B Cooney / M A DeZinno November 16, 2020 (20203J) Job Name:

Tostad By

	B Coon	ey / M A D	eZinno N	November	16, 2020	(20203J)			
Room			"Ak"	Requi	ired	First	New	Fin	al
Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
Room 4 U	J V								
Supply	UV	51.5x6	1.00	0	N/A	630		630	630
Outside Air	oed	49x10	1.00	0	N/A	65		65	65
Doom (II	187								
		51 5v6	1.00	0	NT/A	570		570	570
									58
Outside Aii	oeu	49X10	1.00	U	IN/A	36		36	30
Room 10 U	U V								
		51.5x6	1.00	0	N/A	540		540	540
Outside Air	oed	49x10	1.00	0	N/A	105		105	105
		T		_					
									382
Outside Air	oed	49x10	1.00	0	N/A	92		92	92
Room 13 I	[] V								
		51.5x6	1.00	0	N/A	300		300	300
Outside Air	oed	49x10	1.00	0	N/A	58		58	58
		T							
***									533
Outside Air	oed	40x9	1.00	0	N/A	235		235	235
Room 16 I	IIV								
	1	42x9	1.00	0	N/A	538		538	538
Outside Air	oed	40x9	1.00	0	N/A	206		206	206
Room 17 U	UV								
Supply	UV	42x9	1.00	0	N/A	513		513	513
Outside Air	oed	40x9	1.00	0	N/A	170		170	170
	Room 4 U Supply Outside Air Room 6 U Supply Outside Air Room 10 U Supply Outside Air Room 12 U Supply Outside Air Room 13 U Supply Outside Air Room 15 U Supply Outside Air	Room 4 UV Supply UV Outside Air oed Room 10 UV Supply UV Outside Air oed Room 10 UV Supply UV Outside Air oed Room 12 UV Supply UV Outside Air oed Room 13 UV Supply UV Outside Air oed Room 13 UV Supply UV Outside Air oed Room 15 UV Supply UV Outside Air oed	Room NumberCodeSizeRoom 4 UVSupplyUV51.5x6Outside Airoed49x10Room 6 UVSupplyUV51.5x6Outside Airoed49x10Room 10 UVSupplyUV51.5x6Outside Airoed49x10Room 12 UVSupplyUV51.5x6Outside Airoed49x10Room 13 UVSupplyUV51.5x6Outside Airoed49x10Room 15 UVSupplyUV42x9Outside Airoed40x9Room 16 UVSupplyUV42x9Outside Airoed40x9Room 17 UVSupplyUV42x9Outside Airoed40x9	Room Number Code Size "Ak" Factor Room 4 UV Supply UV 51.5x6 1.00 Outside Air oed 49x10 1.00 Room 6 UV Supply UV 51.5x6 1.00 Outside Air oed 49x10 1.00 Room 10 UV Supply UV 51.5x6 1.00 Outside Air oed 49x10 1.00 Room 12 UV Supply UV 51.5x6 1.00 Outside Air oed 49x10 1.00 Room 13 UV Supply UV 51.5x6 1.00 Outside Air oed 49x10 1.00 Room 15 UV Supply UV 42x9 1.00 Outside Air oed 40x9 1.00 Room 16 UV Supply UV 42x9 1.00 Outside Air oed 40x9 1.00 Room 17 UV Supply UV 42x9	Room Number Code Size "Ak" Factor Requirement Room 4 UV Supply UV 51.5x6 1.00 0 Outside Air oed 49x10 1.00 0 Room 6 UV Supply UV 51.5x6 1.00 0 Outside Air oed 49x10 1.00 0 Room 10 UV Supply UV 51.5x6 1.00 0 Outside Air oed 49x10 1.00 0 Room 12 UV Supply UV 51.5x6 1.00 0 Outside Air oed 49x10 1.00 0 Room 13 UV Supply UV 51.5x6 1.00 0 Outside Air oed 49x10 1.00 0 Room 15 UV Supply UV 42x9 1.00 0 Outside Air oed 40x9 1.00<	Room Number Code Size Factor Factor fpm cfm	Room Number Code Size Factor Factor First Factor First Test	Room Number	Room Number Code Size Factor Factor First Factor Fa

Job Name: J. Milton Jeffrey Elementary School Ventilation Survey

Tested By: B Cooney / M A DeZinno November 16, 2020 (20203J)

Tested By:		B Coone	ey / M A D	DeZinno	November	16, 2020	(20203J)			
Outlet	Room			"Ak"	Requ	iired	First	New	Fin	al
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
	Room 18 U	JV		<u> </u>						
1	Supply	UV	42x9	1.00	0	N/A	511		511	511
2	Outside Air	oed	40x9	1.00	0	N/A	253		253	253
	D 10.1	TX Z		1						
1	Room 19 U		12.0	1.00	0	37/4	544		5.4.4	5.4.4
1	Supply	UV	42x9	1.00	0	N/A	544		544	544
2	Outside Air	oed	40x9	1.00	0	N/A	203		203	203
	D 40.1	18.7								
1	Room 20 U	_	12.0	1.00	0	3.1/4	277		277	277
1	Supply	UV	42x9	1.00	0	N/A	377		377	377
2	Outside Air	oed	40x9	1.00	0	N/A	92		92	92
	Room 21 U	187								
1	Supply	UV	42x9	1.00	0	N/A	484		484	484
2	Outside Air	oed	42x9 40x9	1.00	0	N/A N/A	308		308	308
2	Outside Aii	ocu	4027	1.00	U	IN/A	300		308	300
	Room 22 U	īV								
1	Supply	UV	42x9	1.00	0	N/A	367		367	367
2	Outside Air	oed	40x9	1.00	0	N/A	152		152	152
	Cafeiteria ı	ınit								
1	cafe	SW	30x8	1.20	0	N/A	120		120	144
2	cafe	SW	30x8	1.20	0	N/A	138		138	166
3	cafe	SW	30x8	1.20		N/A	124		124	311
4	cafe	SW	30x8	1.20	0	N/A	172		172	<u>206</u>
										827
	Outside A	ir								
1	cafe unit	oed	16x16	1.78	0	N/A	45		460	819

Job Name: J. Milton Jeffrey Elementary School Ventilation Survey

Tested By: B Cooney / M A DeZinno November 16, 2020 (20203J)

Tested By:		B Coone	ey/MAD	eZinno	November	16, 2020	(20203J)			
Outlet	Room			"Ak"	Requ	iired	First	New	Fin	al
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
	Teachers Loun	ge Unit								
1	office / copy	SD	2408	1.20	0	N/A	200		200	240
2	social work	SD	2406	1.20	0	N/A	50		50	60
3	counselor	SD	2406	1.20	0	N/A	68		68	311
4	lounge	SD	2408	1.20	0	N/A	206		206	<u>247</u>
										858
	Outside A	ir								
1	teacher unit	oed	24x14	2.33	0	N/A	69		69	161
	Gym Uni	it								
1	gym	SW	24x12	1.44	0	N/A	744		744	1071
2	gym	SW	24x12	1.44	0	N/A	979		979	1410
3	gym	SW	24x12	1.44	0	N/A	368		368	<u>530</u>
										3011
	Outside A	ir								
1	gym unit	oed	42x18	5.25	0	N/A	145		145	761

TRAVERSE SUMMARY TEST SHEET

Job Name: J. Milton Jeffrey Elementary School Ventilation Survey
Tested By: B Cooney / M A DeZinno November 16, 2020 (20203J)

Tested By:		B Cooney /	M A DeZi	nno No	vember 16, 2	2020 (2020	J S J)		
System	Zone /	Height /			Des	sign	Tes	st	Static
No.	Room	Dia.	Width	Area	Velocity	cfm	Velocity	cfm	Pressure
RTU-23	OA	10	9	0.6	424	265	447	279	100%
RTU-24	OA	10	9	0.6	424	265	424	265	100%
RTU-25	OA	10	9	0.6	424	265	427	267	66%
RTU-26	OA	10	9	0.6	424	265	434	271	100%
RTU-27	OA	10	9	0.6	424	265	442	276	66%
K1U-2/	UA	10	9	0.0	424	203	442	2/0	00%
RTU-28	OA	10	9	0.6	424	265	427	267	100%
10 20	071	10		0.0	121	203	127	201	1007

Environmental Testing & Balancing, Inc.

154 STATE STREET SUITE 204 NORTH HAVEN, CT 06473 (203) 234-2089 FAX (203) 234-2147

CERTIFIED TESTING AND BALANCING REPORT

September 3, 2020	
J. Milton Jeffrey Elementary School	
Ventilation Survey	
331 Copse Road	
Madison	
Connecticut	
Colliers	
	J. Milton Jeffrey Elementary School Ventilation Survey 331 Copse Road Madison Connecticut

The data presented in this report is a record of the system measurements and final adjustments that have been obtained in accordance with the current edition of the NEBB Procedural Standards for Testing, Adjusting and Balancing of Environmental Systems. Any variance from design quantities which exceed NEBB or project tolerances are noted in the Test-Adjust-Balance report Remarks.

Submitted and Certified by: NEBB Professional John E. Burgess



TABLE OF CONTENTS

Sheet Title	Page Numbers	Page Numbers			
Instrument Calibration Sheet					
Glossary / Notes (two pages)					
General Fans					
Fan Unit Test Sheets	1	-	3		
Grille Test Sheets	4	-	7		
Traverse Summary Test Sheet			8		

Environmental Testing & Balancing, Inc.

Instrument Calibration Sheet

Date Calibrated	Instrument	Model #	Serial #	Manufacturer
Air Test Equipment				
November 2019	Air Data Multimeter	ADM860	M01616	Shortridge
April 2020	Digital Anemometer	RVA801	A00142	Alnor
April 2020	Digital Ampmeter	324	33230041WS	Fluke
February 2020	Pocket Laser Tach	PTL200	1940830	Monarch
Hydronics Test Equipn	nent			
February 2020	Hydrodata Multimeter	HDM250	W14102	Shortridge

Glossary

Abbreviation	Meaning	Abbreviation	Meaning
" W.G.	(measured in) Inches Water Gauge	LWT	Leaving Water Temperature
A/C	Air Changes per Hour	MA	Mixed Air
AHU	Air Handling Unit	MAU, MUA	Make-Up Air Unit
AMPS	Amperages	Max	Maximum
BHP	Brake Horsepower	MBH	Thousand BTUs per Hour
BTU	British Thermal Unit	Min	Minimum
CD	Ceiling Diffuser	N/A	Not Available, Not Accessible
CEF	Ceiling Exhaust Fan	No.	Number
CF for DDC	BMS Correction Factor	OA	Outside Air
CFM	Cubic Feet per Minute	OBD	Opposed Blade Damper
СН	Chiller	OD	Outside Diameter
CHWC, CC	Chilled Water Coil, Cooling Coil	OED	Open End Duct
CS	Circuit Setter	PSI	Pounds per Square Inch
СТ	Cooling Tower	RA	Return Air
CV	Constant Volume	RCP	Radiant Ceiling Panel
dB	Decibel	Req'd	Required
Dia	Diameter	RG	Return Grille
dP, DP	Differential Pressure	RGD(s)	Register(s), Grille(s), Diffuser(s)
EADB	Entering Air Dry Bulb	RHC	Reheat Coil
EAWB	Entering Air Wet Bulb	Rm Press	Room Pressure
EF	Exhaust Fan	RP	Radiant Panel
EG	Exhaust Grille	RPM	Revolutions per Minute
ER	Exhaust Register	RTU	Roof Top Unit
EWT	Entering Water Temperatrue	SA	Supply Air
EX / EXH	Exhaust	SD	Supply Diffuser
F	Fahrenheit	SL	Slot
FLA	Full Load Amperage	SNRKL	Snorkel
FCU	Fan Coil Unit	SP	Static Pressure
FPM	Feet per Minute	TADBF	Total Air Delivered by Fan
GPM	Gallons per Minute	TF	Thermafuser
HP	Horsepower	VAV	Variable Air Volume
HWC, HC	Hot Water Coil, Heating Coil	VFD	Variable Frequency Drive
НХ	Heat Exchanger		
kW	Kilowatt		
LADB	Leaving Air Dry Bulb		
LAWB	Leaving Air Wet Bulb		
LD	Linear Diffuser		

Notes

Measuring with Flow Hood (referencing Air Outlet Test Sheets and Grille, Register & Diffuser Test Sheets):

Registers, diffusers and grilles are read directly in cfm. (Report program indicates 1.00 in Ak Factor column.)

Measuring in Velocity (referencing Air Outlet Test Sheets and Grille, Register & Diffuser Test Sheets):

Ak Factor indicates actual area of registers, following multipying the Ak by the area equals the actual free area; therefore cfm is calculated and based on this factor (fpm x Ak).

Codes (referencing Air Outlet Test Sheets and Grille, Register & Diffuser Test Sheets):

If codes are not listed here, please reference design drawings.

Job Name: J. Milton Jeffrey Elementary School Ventilation Survey

Design

2500

Total cfm

Tested By: B Cooney / P Ouellette / M A DeZinno September 3, 2020 (20203J)

Fan Number	Rm 8 AHU	RTU-23	RTU-24
Serving	Room 8	Room 23	Room 24
Manufacturer	Trane	Trane	Trane
Model Number	BCVCO36C1	YCC048F3H0BG	YCC048F3H0BG
Serial Number	Т07Н59198	R082L602H	R0532TN2H

Test

2478

Design

N/A

Design

N/A

Test

1274

Test

1433

		<u> </u>	·
Suction Static Pressure	-0.50	-0.47	-0.5
Discharge Static Pressure	0.18	0.41	0.5
External Static Pressure	0.68	0.88	1.0
Motor Sheave			
Model / Diameter			
Bore			
Fan Sheave			
Model / Diameter			
Bore			
Belts			
Center Line Distance			
•	<u>'</u>	1	
Motor Manufacturer / Frame			
Horsepower			
Motor rpm			
Phase			
Voltage			
Service Factor			
Rated Amperage			
Corrected for Voltage			
No Load Amperage			
I suga			
Operating Amperage			
operating ramperage			
Brake Horsepower			
Fan rpm			

Job Name: J. Milton Jeffrey Elementary School Ventilation Survey

Design

N/A

Total cfm

Tested By: B Cooney / P Ouellette / M A DeZinno September 3, 2020 (20203J)

Fan Number	RTU-25	RTU-26	RTU-27
Serving	Room 25	Room 26	Room 27
Manufacturer	Trane	Trane	Trane
Model Number	YCC048F3H0BG	YCC048F3H0BG	YCC048F3H0BG
Serial Number	R06KYE72H	R0812992H	R07457K2H

Test

1246

Design

N/A

Design

N/A

Test

1310

Test

1259

Suction Static Pressure	-0.49	-0.52	-0.47
Discharge Static Pressure	0.50	0.48	0.53
External Static Pressure	0.99	1.00	1.00
Motor Sheave			
Model / Diameter			
Bore			
Fan Sheave			
Model / Diameter			
Bore			
Belts			
Center Line Distance			
1		,	
Motor Manufacturer / Frame			
Horsepower			
Motor rpm			
Phase			
Voltage			
8			
Service Factor			
Rated Amperage			
Corrected for Voltage			
No Load Amperage			
Operating Amperage			
operating ramperage			
Brake Horsepower			
Fan rpm			
I un I pin			

Job Name:	J. Milton Jeffro	ey Elementai	y School Ve	ntilation Sur	vey	
Tested By:	B Cooney / P Ouellette / M A DeZinno September 3, 2020 (20203J)					
Fan Number	RTU-28					
Serving	Room 28					
Manufacturer	Trane					
Model Number	YCC048F3H0BG					
Serial Number	R185KTD2H					
	Design	Test	Design	Test	Design	Test
Total cfm	N/A	1295				
Suction Static Pressure		-0.58				
Discharge Static Pressure		0.41				
External Static Pressure		0.99				
Motor Sheave						
Model / Diameter						
Bore						
Fan Sheave						
Model / Diameter						
Bore						
Belts						
Center Line Distance						
	·					
Motor Manufacturer / Frame						
Horsepower						
Motor rpm						
Phase						
Voltage						
Service Factor						
Rated Amperage						
Corrected for Voltage						
No Load Amperage						
Operating Amperage						
Brake Horsepower						

Fan rpm

Job Name: J. Milton Jeffrey Elementary School Ventilation Survey

Outlet	Doom	Decom	y / 1 Ouc	"Ak"			First	New	Fin	
Number	Room Number	Codo	Size	II Ii	Requ		Test	l li	1	cfm
Number	Number	Code	Size	Factor	fpm	cfm	1 est	Req'd	fpm	cim
	Room 8 A	TTTT								
1	8 8	SW	12x6	0.33	0	N/A	1052	0	1052	347
2	8	SW	12x6	0.33	0	N/A N/A	956	0	956	315
3	8	SW	12x6	0.33	0	N/A N/A	1123	0	1123	371
4	8	SW	12x6	0.33	0	N/A N/A	621	0	621	205
5	8	SW	12x6	0.33	0	N/A N/A	732	0	732	242
6	8	SW	12x6	0.33	0	N/A	1020	0	1020	337
7	8	SW	12x6	0.33	0	N/A	945	0	945	312
8	8	SW	12x6	0.33	0	N/A	1060	0	1060	350
0	0	SW	1280	0.33	U	IN/A	1000	0	1000	2478
										24/8
	Outside A	in								
1	Room 8 AHU	oed	40x9	1.00	0	N/A	45		265	265
1	Room 8 Arro	ocu	4023	1.00	U	11/71	43		203	203
	Room 23 R	TI								
1	RDG Total			1.00	0	N/A	1433		1433	1433
1	RDG Total			1.00	0	11/71	1433		1733	1433
	Room 24 R	TII								
1	RDG Total			1.00	0	N/A	1274		1274	1274
1	TOG TOWN			1.00		14/11	12/1		1271	1271
	Room 25 R	TU								
1	RDG Total			1.00	0	N/A	1246		1246	1246
1	100 1001			1.00	V	11/11	1210		12.10	12.10
	Room 26 R	RTU								
1	RDG Total			1.00	0	N/A	1259		1259	1259
	Room 27 R	TU								
1	RDG Total			1.00	0	N/A	1310		1310	1310
										-2-0
	Room 28 R	TU								
1	RDG Total			1.00	0	N/A	1295		1295	1295

Job Name: J. Milton Jeffrey Elementary School Ventilation Survey

Outlet Room				"Ak"	Required		First	New	Final	
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
Tullibei	Tumber	Couc	SIZC	Tactor	трш	CIII	1 CSt	Kcq u	трш	CIIII
	Art Room	IIV								
1	Supply	UV	51.5x6	1.00	0	N/A	275		275	275
2	Outside Air	oed	49x10	1.00	0	N/A	55		55	55
	O diside 1 in	oca	15/110	1.00	U	1771				
	Library E	UV								
1	Supply	UV	42x9	1.00	0	N/A	535		535	535
2	Outside Air	oed	40x9	1.00	0	N/A	119		119	119
	Library W	UV								
1	Supply	UV	42x9	1.00	0	N/A	552		552	552
2	Outside Air	oed	40x9	1.00	0	N/A	107		107	107
1	Music Room		12-0	1.00	0	NI/A	(17		(47	(17
1 2	Supply	UV	42x9	1.00	0	N/A	647		647	647
2	Outside Air	oed	40x9	1.00	U	N/A	253		253	253
	Music Room A	UV 1								
1	Supply	UV	42x9	1.00	0	N/A	619		619	619
2	Outside Air	oed	40x9	1.00	0	N/A	270		270	270
	Music Room A	IIV 2								
1	Supply	UV	42x9	1.00	0	N/A	647		647	647
2	Outside Air	oed	40x9	1.00	0	N/A	253		253	253
	Room 2 U	J V								
1	Supply	UV	42x9	1.00	0	N/A	435		435	435
2	Outside Air	oed	40x9	1.00	0	N/A	380		380	380
	Room 3 U	IV								
1	Supply	UV	42x9	1.00	0	N/A	573		573	573
2	Outside Air	oed	40x9	1.00	0	N/A	109		109	109
					-					

Job Name: J. Milton Jeffrey Elementary School Ventilation Survey

Room Number		1	"T A I- "T	13					
Number			"Ak"	Required		First	New	Fin	
1 (41111001	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
Room 4 U	IV								
	1	51 5x6	1 00	0	N/A	630		630	630
***									6:
Outside 7 III	ocu	IJATO	1.00	V	11/11	0.5		03	
Room 6 U	V								
Supply	UV	51.5x6	1.00	0	N/A	570		570	570
Outside Air	oed	49x10	1.00	0	N/A	58		58	58
D 10.1	18.7								
	1	£1.5C	1 00		NT/A	540		540	E 44
***									540
Outside Air	oea	49X10	1.00	U	N/A	105		103	105
Room 12 U] V								
Supply	UV	51.5x6	1.00	0	N/A	382		382	382
Outside Air	oed	49x10	1.00	0	N/A	92		92	92
Room 13 I	IV								
	1	51.5x6	1.00	0	N/A	300		300	300
Outside Air	oed	49x10	1.00	0	N/A	58		58	58
D 15 I	187								
	1	12v0	1.00	0	N/A	533		533	533
117									23:
Room 16 U	JV								
Supply	UV	42x9	1.00	0	N/A	538		538	538
Outside Air	oed	40x9	1.00	0	N/A	206		206	200
Room 17 U	JV								
Supply	UV	42x9	1.00	0	N/A	513		513	51.
Outside Air	oed	40x9	1.00	0	N/A	170		170	170
	Room 6 U Supply Outside Air Room 10 U Supply Outside Air Room 12 U Supply Outside Air Room 13 U Supply Outside Air Room 15 U Supply Outside Air	Supply UV Outside Air oed Room 6 UV Supply UV Outside Air oed Room 10 UV Supply UV Outside Air oed Room 12 UV Supply UV Outside Air oed Room 13 UV Supply UV Outside Air oed Room 15 UV Supply UV Outside Air oed	Supply UV 51.5x6 Outside Air oed 49x10 Room 6 UV Supply UV 51.5x6 Outside Air oed 49x10 Room 10 UV Supply UV 51.5x6 Outside Air oed 49x10 Room 12 UV Supply UV 51.5x6 Outside Air oed 49x10 Room 13 UV Supply UV 51.5x6 Outside Air oed 49x10 Room 13 UV Supply UV 51.5x6 Outside Air oed 49x10 Room 15 UV Supply UV 42x9 Outside Air oed 40x9 Room 16 UV Supply UV 42x9 Outside Air oed 40x9 Room 16 UV Supply UV 42x9 Outside Air oed 40x9	Supply	Supply	Supply	Supply	Supply	Supply

Job Name: J. Milton Jeffrey Elementary School Ventilation Survey

Outlet Room		B Cooney / P O	JII Out	"Ak"	Required		First New	Final		
Number	Number	Code	Size	II li	fpm	cfm	Test			efm
Number	Number	Code	Size	Factor	ıpm	cim	rest	Req'd	fpm	cim
	Room 18	1187								
1			120	1.00	0	NI/A	£11		511	511
1	Supply	UV	42x9	1.00	0	N/A	511		511	511
2	Outside Air	oed	40x9	1.00	0	N/A	253		253	253
	Room 19	IIV								
1	Supply	UV	42x9	1.00	0	N/A	544		544	544
2	Outside Air	oed	40x9	1.00	0	N/A	203		203	203
	o distac 1111	000	1011)	1.00	v	11/11	203		203	203
	Room 20	IIV								
1	Supply	UV	42x9	1.00	0	N/A	377		377	377
2	Outside Air	oed	40x9	1.00	0	N/A	92		92	92
	Outside 7 iii	oca	1010	1.00	0	11/11	72		72	
	Room 21	IIV								
1	Supply	UV	42x9	1.00	0	N/A	484		484	484
2	Outside Air	oed	40x9	1.00	ERR	N/A	308		308	308
	Outside 7111	oca	10/10	1.00	Eith	1071	300		300	300
	Room 22	II V								
1	Supply	UV	42x9	1.00	0	N/A	367		367	367
2	Outside Air	oed	40x9	1.00	0	N/A	152		152	152

TRAVERSE SUMMARY TEST SHEET

Job Name: J. Milton Jeffrey Elementary School Ventilation Survey

System	Zone /	Height /			Des		Te		Static
No.	Room	Dia.	Width	Area	Velocity	cfm	Velocity	cfm	Pressure
RTU-23	OA	10	9	0.6	424	265	447	279	100%
RTU-24	OA	10	9	0.6	424	265	424	265	100%
RTU-25	OA	10	9	0.6	424	265	427	267	66%
10 23		10		0.0	121	200	1.27	201	0070
RTU-26	OA	10	9	0.6	424	265	434	271	100%
K10-20	OA	10	9	0.0	424	203	434	2/1	10070
DTII 27	0.4	10	0	0.6	424	265	442	276	660/
RTU-27	OA	10	9	0.6	424	203	442	276	66%
DELL 20		10	0	0.6	40.4	265	427	2.67	1000/
RTU-28	OA	10	9	0.6	424	265	427	267	100%

Environmental Testing & Balancing, Inc.

154 STATE STREET SUITE 204 NORTH HAVEN, CT 06473 (203) 234-2089 FAX (203) 234-2147

CERTIFIED TESTING AND BALANCING REPORT

September 3, 2020	
Town Campus Learning Center	
Ventilation Survey	
10 Campus Drive	
Madison	
Connecticut	
Colliers	
	Town Campus Learning Center Ventilation Survey 10 Campus Drive Madison Connecticut

The data presented in this report is a record of the system measurements and final adjustments that have been obtained in accordance with the current edition of the NEBB Procedural Standards for Testing, Adjusting and Balancing of Environmental Systems. Any variance from design quantities which exceed NEBB or project tolerances are noted in the Test-Adjust-Balance report Remarks.

Submitted and Certified by: NEBB Professional John E. Burgess



TABLE OF CONTENTS

Sheet Title	Page Numbers
Instrument Calibration Sheet	
Glossary / Notes (two pages)	
Remarks	1
General Fans	
Fan Unit Test Sheets	2 - 6
Grille Test Sheets	7 - 8
Traverse Summary Test Sheet	9

Environmental Testing & Balancing, Inc.

Instrument Calibration Sheet

Date Calibrated	Instrument	Model #	Serial #	Manufacturer
Air Test Equipment				
November 2019	Air Data Multimeter	ADM860	M01616	Shortridge
April 2020	Digital Anemometer	RVA801	A00142	Alnor
April 2020	Digital Ampmeter	324	33230041WS	Fluke
February 2020	Pocket Laser Tach	PTL200	1940830	Monarch
Hydronics Test Equipn	nent			
February 2020	Hydrodata Multimeter	HDM250	W14102	Shortridge

Glossary

Abbreviation	Meaning	Abbreviation	Meaning
" W.G.	(measured in) Inches Water Gauge	LWT	Leaving Water Temperature
A/C	Air Changes per Hour	MA	Mixed Air
AHU	Air Handling Unit	MAU, MUA	Make-Up Air Unit
AMPS	Amperages	Max	Maximum
BHP	Brake Horsepower	MBH	Thousand BTUs per Hour
BTU	British Thermal Unit	Min	Minimum
CD	Ceiling Diffuser	N/A	Not Available, Not Accessible
CEF	Ceiling Exhaust Fan	No.	Number
CF for DDC	BMS Correction Factor	OA	Outside Air
CFM	Cubic Feet per Minute	OBD	Opposed Blade Damper
СН	Chiller	OD	Outside Diameter
CHWC, CC	Chilled Water Coil, Cooling Coil	OED	Open End Duct
CS	Circuit Setter	PSI	Pounds per Square Inch
СТ	Cooling Tower	RA	Return Air
CV	Constant Volume	RCP	Radiant Ceiling Panel
dB	Decibel	Req'd	Required
Dia	Diameter	RG	Return Grille
dP, DP	Differential Pressure	RGD(s)	Register(s), Grille(s), Diffuser(s)
EADB	Entering Air Dry Bulb	RHC	Reheat Coil
EAWB	Entering Air Wet Bulb	Rm Press	Room Pressure
EF	Exhaust Fan	RP	Radiant Panel
EG	Exhaust Grille	RPM	Revolutions per Minute
ER	Exhaust Register	RTU	Roof Top Unit
EWT	Entering Water Temperatrue	SA	Supply Air
EX / EXH	Exhaust	SD	Supply Diffuser
F	Fahrenheit	SL	Slot
FLA	Full Load Amperage	SNRKL	Snorkel
FCU	Fan Coil Unit	SP	Static Pressure
FPM	Feet per Minute	TADBF	Total Air Delivered by Fan
GPM	Gallons per Minute	TF	Thermafuser
HP	Horsepower	VAV	Variable Air Volume
HWC, HC	Hot Water Coil, Heating Coil	VFD	Variable Frequency Drive
НХ	Heat Exchanger		
kW	Kilowatt		
LADB	Leaving Air Dry Bulb		
LAWB	Leaving Air Wet Bulb		
LD	Linear Diffuser		

Notes

Measuring with Flow Hood (referencing Air Outlet Test Sheets and Grille, Register & Diffuser Test Sheets):

Registers, diffusers and grilles are read directly in cfm. (Report program indicates 1.00 in Ak Factor column.)

Measuring in Velocity (referencing Air Outlet Test Sheets and Grille, Register & Diffuser Test Sheets):

Ak Factor indicates actual area of registers, following multipying the Ak by the area equals the actual free area; therefore cfm is calculated and based on this factor (fpm x Ak).

Codes (referencing Air Outlet Test Sheets and Grille, Register & Diffuser Test Sheets):

If codes are not listed here, please reference design drawings.

ENVIRONMENTAL TESTING & BALANCING, INC.

Town Campus Learning Center Ventilation Survey

Remarks

September 3, 2020

General Note:

All outside airs set to full open.

R194PW32H

Test

Design

FAN TEST SHEET

Job Name: **Town Campus Learning Center Ventilation Survey Tested By:** B Cooney / P Ouellette / M A DeZinno September 3, 2020 (20203TC)

R193XXW2H

Design

Serial Number

Fan Number	RTU-Rm 1	RTU-Rm 2	RTU-Rm 3
Serving	Room 1, Corridor	Room 2, Corridor	Room 3, Corridor
Manufacturer	Trane	Trane	Trane
Model Number	YCC048F3H0BG	YCC048F3H0BG	YCC048F3H0BG

Test

R194KJ42H

Test

Design

Total cfm	N/A	1230	N/A	1320	N/A	1244
Suction Static Pressure		-0.03		-0.06		-0.06
Discharge Static Pressure	37/1	0.40	27/1	0.28	37/1	0.27
External Static Pressure	N/A	0.43	N/A	0.34	N/A	0.33
Motor Sheave						
Model / Diameter						
Bore						
Fan Sheave						
Model / Diameter						
Bore						
Belts						
Center Line Distance						
Motor Manufacturer / Frame						
Horsepower						
Motor rpm						
Phase						
Voltage						
Service Factor						
Rated Amperage						
Corrected for Voltage						
No Load Amperage						
•						
Operating Amperage						
Brake Horsepower						
Fan rpm						

FAN TEST SHEET

Job Name: Town Campus Learning Center Ventilation Survey

Design

N/A

Total cfm

Tested By: B Cooney / P Ouellette / M A DeZinno September 3, 2020 (20203TC)

Fan Number	RTU-Rm 4	RTU-Rm 5	RTU-Rm 6
Serving	Room 3, Corridor	Room 3, Corridor	Room 6, Corridor
Manufacturer	Trane	Trane	Trane
Model Number	YCC048F3H0BG	YCC048F3H0BG	YCC048F3H0BG
Serial Number	R1935PG2H	R083MOA2H	R1845HK2H

Test

986

Design

N/A

Design

N/A

Test

1118

Test

1140

Suction Static Pressure		-0.04		-0.04		-0.04
Discharge Static Pressure		0.34		0.37		0.30
External Static Pressure	N/A	0.38	N/A	0.41	N/A	0.34
Motor Sheave						
Model / Diameter						
Bore						
Fan Sheave						
Model / Diameter						
Bore						
Belts						
Center Line Distance						
Motor Manufacturer / Frame						
Horsepower						
Motor rpm						
Phase						
Voltage						
Service Factor						
Rated Amperage						
Corrected for Voltage						
No Load Amperage						
Operating Amperage						
Brake Horsepower						
Fan rpm						
			'		1	

FAN TEST SHEET

Town Campus Learning Center Ventilation Survey Job Name:

Design

Tested By: B Cooney / P Ouellette / M A DeZinno September 3, 2020 (20203TC)

Fan Number	RTU-Rm 7	RTU-Rm 8	RTU-Rm 9
Serving	Room 7, Corridor	Room 8, Corridor	Room 9, Corridor
Manufacturer	Trane	Trane	Trane
Model Number	YCC048F3H0BG	YCC048F3H0BG	YCC048F3H0BG
Serial Number	R194KLW2H	R193YMM2H	R193SMR2H

Test

Design

Design

Test

Test

Total cfm	N/A	1134	N/A	1266	N/A	1134
G (G (B		0.04		0.04		0.04
Suction Static Pressure		-0.04		-0.04		-0.06
Discharge Static Pressure		0.42		0.24		0.16
External Static Pressure	N/A	0.46	N/A	0.28	N/A	0.22
Motor Sheave						
Model / Diameter						
Bore						
Fan Sheave						
Model / Diameter						
Bore						
Belts						
Center Line Distance						
Motor Manufacturer / Frame						
Horsepower						
Motor rpm						
Phase						
Voltage						
8						
Service Factor			I_			
Rated Amperage						
Corrected for Voltage						
No Load Amperage						
1 8						
Operating Amperage						
o Formund company						
Brake Horsepower						
*						

R194K8X2H

N/A

Test

1249

Design

Test

1280

FAN TEST SHEET

Job Name: Town Campus Learning Center Ventilation Survey

Tested By: B Cooney / P Ouellette / M A DeZinno September 3, 2020 (20203TC)

R19MAJ2H

Design

N/A

Serial Number

Total cfm

Fan Number	RTU-Rm 10	RTU-Rm 11	RTU-Rm 12
Serving	Room 10, Corridor	Rooms 11, 12 Corridor	Room 12, Corridor
Manufacturer	Trane	Trane	Trane
Model Number	YCC048F3H0BG	YCC048F3H0BG	YCC048F3H0BG

Test

1244

R1935UP2H

N/A

Design

Suction Static Pressure		-0.04		-0.07		-0.07
Discharge Static Pressure		0.25		0.23		0.27
External Static Pressure	N/A	0.29	N/A	0.30	N/A	0.34
Motor Sheave						
Model / Diameter						
Bore						
Fan Sheave						
Model / Diameter						
Bore						
Belts						
Center Line Distance						
Motor Manufacturer / Frame						
Horsepower						
Motor rpm						
Phase						
Voltage						
Service Factor						-
Rated Amperage						
Corrected for Voltage						
No Load Amperage						
Operating Amperage						
Brake Horsepower						
Fan rpm						

FAN TEST SHEET

Job Name:Town Campus Learning Center Ventilation SurveyTested By:B Cooney / P Ouellette / M A DeZinnoSeptember 3, 2020 (20203TC)

Fan Number	RTU-Rm 13	RTU-Server Rm	
Serving	Room 13, Corridor, Toilet	Server, Corridor, Toilet	
Manufacturer	Trane	Trane	
Model Number	YCC048F3H0BG	YCC048F3H0BG	
Serial Number	R193NMK2H	R1935WJ2H	

	Design	Test	Design	Test	Design	Test
Total cfm	N/A	835	N/A	814		
Suction Static Pressure		-0.11		-0.03		
Discharge Static Pressure		0.13		0.40		
External Static Pressure	N/A	0.24	N/A	0.43		
Motor Sheave						
Model / Diameter						
Bore						
Fan Sheave						
Model / Diameter						
Bore						
Belts						
Center Line Distance						
		·		·		
Motor Manufacturer / Frame						
Horsepower						
Motor rpm						
Phase						
Voltage						
5						
Service Factor			1			
Rated Amperage						
Corrected for Voltage						
No Load Amperage						
1 3						
Operating Amperage						
Brake Horsepower						
Fan rpm						
k						

Job Name: Town Campus Learning Center Ventilation Survey

Outlet Room		y / I Out				ber 3, 2020			
Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
RTII-Rm	1 1								
			1.00	0	N/A	1230		1230	1230
	1 2	I							
Total			1.00	0	N/A	1320		1320	1320
RTU-Rm	n 3								
Total			1.00	0	N/A	1244		1244	1244
RTU-Rm	ı 4								
Total			1.00	0	N/A	986		986	986
RTU-Rm	n 5								
Total			1.00	0	N/A	1140		1140	1140
RTU-Rm	ı 6								
Total			1.00	0	N/A	1118		1118	1118
RTU-Rm	n 7								
Total			1.00	0	N/A	1134		1134	1134
RTU-Rm	n 8								
Total			1.00	0	N/A	1266		1266	1266
RTU-Rm	19								
Total			1.00	0	N/A	1134		1134	1134
DTII D	10								
Total	10		1.00	0	N/A	1244		1244	1244
	RTU-Rn Total RTU-Rn Total	RTU-Rm 1 Total	Number Code Size	Number Code Size Factor	Number Code Size Factor fpm	Number Code Size Factor fpm cfm	Number Code Size Factor fpm cfm Test	Number Code Size Factor fpm cfm Test Req'd RTU-Rm 1	Number Code Size Factor fpm cfm Test Req'd fpm

Job Name: Town Campus Learning Center Ventilation Survey

Outlet	Room	b Cooney / r Oue		"Ak"	Requ		First	New	Fin	
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
Number	Number	Coue	Size	Factor	трш	CIII	rest	Keq u	Ipin	CIIII
	RTU-Rm	11								
1	Total	11		1.00	0	N/A	1280		1280	1280
1	Total			1.00	U	N/A	1280		1280	1280
	RTU-Rm	12								
1	Total	12		1.00	0	N/A	1249		1249	1249
1	Total			1.00	0	14/21	1247		1249	124)
	RTU-Rm	13	I							
1	Total			1.00	0	N/A	835		835	835
	RTU-Serve	r Rm								
1	Total			1.00	0	N/A	814		814	814

TRAVERSE SUMMARY TEST SHEET

Job Name: Town Campus Learning Center Ventilation Survey

Tested By:		B Cooney /	B Cooney / P Ouellette / M A DeZinno			ptember 3,			
System	Zone /	Height /			Des	sign	st	Static	
No.	Room	Dia.	Width	Area	Velocity	cfm	Velocity	cfm	Pressure
RTU	Room 1	5	10	0.3	0	N/A	652	226	N/A
RTU	Room 2	5	10	0.3	0	N/A	690	240	N/A
RTU	Room 3	5	10	0.3	0	N/A	675	234	N/A
RTU	Room 4	5	10	0.3	0	N/A	652	226	N/A
DELL	D 7		10	0.2	0	27/4	(52	226	27/4
RTU	Room 5	5	10	0.3	0	N/A	652	226	N/A
RTU	Room 6	5	10	0.3	0	N/A	599	208	N/A
KIU	Koom o	3	10	0.5	U	IN/A	399	200	1N/A
RTU	Room 7	5	10	0.3	0	N/A	632	219	N/A
1110	Ttoom /		10	0.5	- V	11/11	032	217	11/11
RTU	Room 8	5	10	0.3	0	N/A	633	220	N/A
RTU	Room 9	5	10	0.3	0	N/A	639	222	N/A
RTU	Room 10	5	10	0.3	0	N/A	649	225	N/A
RTU	Room 11	5	10	0.3	0	N/A	755	262	N/A
DTH	D 12		10	0.2		3.1/4	602	227	3.1/4
RTU	Room 12	5	10	0.3	0	N/A	683	237	N/A
RTU	Room 13	5	10	0.3	0	N/A	645	224	N/A
KIU	Room 13	3	10	0.5	0	IV/A	043	224	IN/A
RTU	Rm Server	5	10	0.3	0	N/A	622	216	N/A
						- ,,,,,			

Environmental Testing & Balancing, Inc.

154 STATE STREET SUITE 204 NORTH HAVEN, CT 06473 (203) 234-2089 FAX (203) 234-2147

CERTIFIED TESTING AND BALANCING REPORT

Date:	November 9, 2020	
Project:	Brown Middle School	
	Ventilation Survey	
Address:	980 Durham Road	
	Madison	
	Connecticut	
HVAC Contractor:	Colliers	

The data presented in this report is a record of the system measurements and final adjustments that have been obtained in accordance with the current edition of the NEBB Procedural Standards for Testing, Adjusting and Balancing of Environmental Systems. Any variance from design quantities which exceed NEBB or project tolerances are noted in the Test-Adjust-Balance report Remarks.

Submitted and Certified by: NEBB Professional John E. Burgess



TABLE OF CONTENTS

Sheet Title

Sheet Title	Page Numbers
Instrument Calibration Sheet	
Glossary / Notes (two pages)	
Remarks	1
AHU-1	1
Air Apparatus Test Sheet	2
Air Outlet Test Sheet	3
All Outlet Test Sheet AHU-2	3
	4
Air Apparatus Test Sheet Air Outlet Test Sheet	5
All Outlet Test Sheet AHU-3	,
Air Apparatus Test Sheet	6
Air Outlet Test Sheets	7 - 8
All Outlet Test Sheets AHU-4	/ - 0
Air Apparatus Test Sheet	9
Air Outlet Test Sheet	10
AHU-A1	10
Air Apparatus Test Sheet	11
Air Outlet Test Sheet	12
AHU-A2	12
Air Apparatus Test Sheet	13
Air Outlet Test Sheet	14
AHU-A3	
Air Apparatus Test Sheet	15
Air Outlet Test Sheet	16
AHU-A4	
Air Apparatus Test Sheet	17
Air Outlet Test Sheet	18
AHU-A5	
Air Apparatus Test Sheet	19
Air Outlet Test Sheet	20
AHU-A6	
Air Apparatus Test Sheet	21
Air Outlet Test Sheet	22
AHU-A7	
Air Apparatus Test Sheet	23
Air Outlet Test Sheets	24 - 26
AHU-A8	
Air Apparatus Test Sheet	27
Air Outlet Test Sheet	28

TABLE OF CONTENTS

Sheet Title	Page Numbers
AHU-A9	
Air Apparatus Test Sheet	29
Air Outlet Test Sheet	30
AHU-B1	
Air Apparatus Test Sheet	31
Air Outlet Test Sheet	32
AHU-B2	
Air Apparatus Test Sheet	33
Air Outlet Test Sheet	34
AHU-B3	
Air Apparatus Test Sheet	35
Air Outlet Test Sheet	36
AHU-B4	
Air Apparatus Test Sheet	37
Air Outlet Test Sheet	38
Traverse Summary Test Sheets	39 - 40

Environmental Testing & Balancing, Inc.

Instrument Calibration Sheet

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EX / EXH	Exhaust	SD	Supply Diffuser
F	Fahrenheit	SL	Slot
FCU	Fan Coil Unit	SNRKL	Snorkel
FLA	Full Load Amperage	SP	Static Pressure
FPM	Feet per Minute	TADBF	Total Air Delivered by Fan
GPM	Gallons per Minute	TF	Thermafuser
HP	Horsepower	V	Volt / Voltage
HWC, HC	Hot Water Coil, Heating Coil	VAV	Variable Air Volume
HX	Heat Exchanger	VFD	Variable Frequency Drive
kW	Kilowatt		
LADB	Leaving Air Dry Bulb		
LAWB	Leaving Air Wet Bulb		
LD	Linear Diffuser		

Notes

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If codes are not listed here, please reference design drawings.

ENVIRONMENTAL TESTING & BALANCING, INC.

Brown Middle School Ventilation Survey

Remarks

November 9, 2020

AHU-1

Design equals 10000 cfm whereas connected load is 11910 cfm.

AHU-2

VAV 05 - design is 660 cfm whereas connected load is 795 cfm

VAV 08 - design is 3130 cfm whereas connected load is 2280 cfm

AHU-3

VAV 02 - design is 1200 cfm whereas connected load is 1300 cfm

VAV 03 - design is 300 cfm whereas connected load is 300 cfm

VAV 034- design is 1400 cfm whereas connected load is 1575 cfm

AHU-7A

VAV 1 - diffuser in serving Room 208 is not installed

VAV-V5, VAV-V8 - unable to see on BMS

Gym Units

These units were slowed down by Installation Contractor for sound and vibration reasons, they are dispersing a minute amount of air.

AIR APPARATUS TEST SHEET

Job Name: Brown Middle School Ventilation Survey

Tested By: B Cooney / M A DeZinno November 9, 2020 (20203BM)

AHU-1 DESIGN DATA

Manufacturer =	AAON	Model No. = RN01630EB09EJH
Type =	RTU	Serial No. = 201206BNWM02790
Total Scheduled cfm =	6000	Total Grille cfm = 11910
Outside Air cfm =	1600	
Total Static Pressure =		External Static Pressure =
Fan rpm =		Brake Horsepower =

MOTOR DESIGN DATA

Horsepower =	Voltage =	Phase =	rpm =
	,		- F

AIR TEST DATA

Total cfm by Louver Scan =	6160	Total cfm by Grille Readings =	11736
Outside Air =	1692		

PRESSURE TEST DATA

Total Suction Static Pressure =	-0.36		
Total Discharge Static Pressure =	1.15		
Tota	al Static Pressure =	1.51	
External Suction Static Pressure =	-0.22		
External Discharge Static Pressure =	1.15		
Exte	ernal Static Pressure =	1.37	
DX Coil & Filter DP =	0.14		

MOTOR TEST DATA

Motor Manufacturer / Frame =				
Horsepower =	Phase =	Voltage =		
Full Load Amps =		FLA Corrected for Voltage =		
Motor rpm =		Service Factor =		
No Load Amps =	Operating Amps =			
Calculated Brake Horsepower =				

FAN TEST DATA

Motor Sheave Model / Dia. =		
Motor Sheave Bore =		
Fan Sheave Model / Dia. =		
Fan Sheave Bore =		Fan rpm =
Adjustable Sheave Dia. =		Center Line Distance =
Belts =		
Filters =		
Outside Air Setting =	30% Open	

AIR OUTLET TEST SHEET

Job Name: Brown Middle School Ventilation Survey

Tested By: B Cooney / M A DeZinno November 9, 2020 (20203BM)

Tested By:		B Coone	ey/MAI	,	November		(20203BN	1)		
Outlet	Room			"Ak"	Des	ign	First	New	Fin	al
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
1										
		AHU-1								
1	cafeteria	CD	2414	1.00	485	485	487	478	487	487
2	cafeteria	CD	2414	1.00	485	485	499	478	499	499
3	cafeteria	CD	2414	1.00	485	485	479	478	479	479
4	cafeteria	CD	2414	1.00	485	485	492	478	492	492
5	cafeteria	CD	2414	1.00	485	485	488	478	488	488
6	cafeteria	CD	2414	1.00	485	485	485	478	485	485
7	cafeteria	CD	2414	1.00	600	600	555	591	555	555
8	cafeteria	CD	2414	1.00	600	600	613	591	613	613
9	cafeteria	CD	2414	1.00	600	600	572	591	572	572
10	cafeteria	CD	2414	1.00	600	600	664	591	664	664
11	cafeteria	CD	2414	1.00	600	600	633	591	633	633
12	cafeteria	CD	2414	1.00	600	600	624	591	624	624
13	cafeteria	SD	2414	1.00	480	480	477	473	477	477
14	cafeteria	CD	2414	1.00	910	910	888	897	888	888
15	cafeteria	SD	2414	1.00	450	450	417	443	417	417
16	cafeteria	SD	2414	1.00	265	265	233	261	233	233
17	cafeteria	CD	2414	1.00	450	450	416	443	416	416
18	cafeteria	SD	2414	1.00	285	285	270	281	270	270
19	cafeteria	CD	2414	1.00	625	625	587	616	587	587
20	cafeteria	SD	2414	1.00	240	240	200	236	200	200
21	cafeteria	CD	2414	1.00	510	510	513	503	513	513
22	cafeteria	SD	2414	1.00	320	320	286	315	286	286
23	cafeteria	CD	2414	1.00	515	515	499	507	499	499
24	cafeteria	SD	2414	1.00	350	<u>350</u>	359	345	359	<u>359</u>
						11910				11736
										99%

AIR APPARATUS TEST SHEET

Job Name: Brown Middle School Ventilation Survey

Tested By: B Cooney / M A DeZinno November 9, 2020 (20203BM)

AHU-2 DESIGN DATA

Manufacturer =	AAON	Model No. =	RN04030EB09EJM
Type =	RTU	Serial No. =	201206BNWV02794
Total Scheduled cfm =	10000		
Outside Air cfm =	2500		
Total Static Pressure =		External Static P	ressure =
Fan rpm =		Brake Horsepow	er =

MOTOR DESIGN DATA

Horsepower =	voltage =	Phase =	rpm =
AIR TEST DATA			

Total cfm by Louver Scan =	9632
Outside Air =	2516

PRESSURE TEST DATA

Total Suction Static Pressure =	-0.79		
Total Discharge Static Pressure =	0.94		
Te	otal Static Pressure =	1.73	
External Suction Static Pressure =	-0.48		
External Discharge Static Pressure =	0.94		
E	xternal Static Pressure =	1.42	
DX Coil & Filter DP =	0.31		

MOTOR TEST DATA

Motor Manufacturer / Frame =						
Horsepower =	orsepower = Phase =		Voltage =			
Full Load Amps =		FLA Corrected for Voltage =				
Motor rpm =		Service Factor =				
No Load Amps =		Operating Amps =				
Calculated Brake Horsepower =						

FAN TEST DATA

Motor Sheave Model / Dia. =			
Motor Sheave Bore =			
Fan Sheave Model / Dia. =			
Fan Sheave Bore =		Fa	n rpm =
Adjustable Sheave Dia. =		Ce	nter Line Distance =
Belts =			
Filters =			
Outside Air Setting =	25% Open		
Static Control Setpoint =	1.14" w.g.		

AIR OUTLET TEST SHEET

Job Name: Brown Middle School Ventilation Survey

Tested By: B Cooney / M A DeZinno November 9, 2020 (20203BM)

Outlet	Room	D COOM	ey/MAL	"Ak"	November Des		First	New	Fin	
		Codo	Sizo			cfm		l li	1	efm
Number	Number	Code	Size	Factor	fpm	cim	Test	Req'd	fpm	cim
		AHU-2								
		AIIU-Z								
VA	V-05									-
1	537	C	24x24	1.00	75	75	70	75	70	70
2	538	С	24x24	1.00	275	275	268	274	268	268
3	539	С	24x24	1.00	145	145	155	145	155	155
4	541	С	24x24	1.00	150	150	154	150	154	154
5	542	С	24x24	1.00	150	<u>150</u>	146	150	146	<u>146</u>
						795				793
										100%
Box Type	Box Size		Flow Cor	rection Fact	tor for DD0	C	Design N	1inimum	Test Min	nimum
Exist	9						230			
		_								
VA	V-07									
1	285	С	24x24	1.00	510	510	554	519	554	554
2	285	С	24x24	1.00	490	490	522	498	522	522
3	285	С	24x24	1.00	480	480	462	488	462	462
4	285	C	24x24	1.00	480	<u>480</u>	455	488	455	<u>455</u>
						1960				1993
										102%
Box Type	Box Size		Flow Cor	rection Fact	tor for DDC	2	Design N	/Iinimum	Test Min	nimum
Exist	14		I	1 1			590			
	V-08									
1	544	C	24x24	1.00		390	450	426	450	450
2	544	C	24x24	1.00	380	380	461	415	461	461
3	544	C	24x24	1.00	375	375	382	409	382	382
4	544	C	24x24	1.00	380	380	399	415	399	399
5	544	C	24x24	1.00	375	375	407	409	407	407
6	544	C	24x24	1.00	380	<u>380</u>	390	415	390	<u>390</u>
						2280				2489
										109%
Box Type	Box Size		Flow Cor	rection Fact	tor for DDC	2	Design N	/Iinimum	Test Min	nimum
Exist	16		I	1 '	1		940		T	

AIR APPARATUS TEST SHEET

Job Name: **Brown Middle School Ventilation Survey**

Tested By: B Cooney / M A DeZinno November 9, 2020 (20203BM)

AHU-3 **DESIGN DATA**

Manufacturer =	AAON	Model No. =	RN00930EB09EJH
Type =	RTU	Serial No. =	201206ANWQ02822
Total Scheduled cfm =	3600		
Outside Air cfm =	900		
Total Static Pressure =		External Static P	ressure =
Fan rpm =		Brake Horsepow	er =

MOTOR DESIGN DATA

Horsepower =	Voltage =	Phase =	rpm =
AIR TEST DATA			

AIR TEST DATA

Total cfm by Louver Scan =	3430	
Outside Air =	955	

PRESSURE TEST DATA

Total Suction Static Pressure =	-0.19		
Total Discharge Static Pressure =	0.87		
Total	al Static Pressure =	1.06	
External Suction Static Pressure =	-0.10		
External Discharge Static Pressure =	0.87		
Ext	ernal Static Pressure =	0.97	
DX Coil & Filter DP =	0.09		

MOTOR TEST DATA

Motor Manufacturer / Frame =						
Horsepower =	Phase =		Voltage =			
Full Load Amps =		FLA Corrected for Voltage =				
Motor rpm =	Motor rpm =		Service Factor =			
No Load Amps =		Operating Amps =				
Calculated Brake Horsepower	=					

FAN TEST DATA

Motor Sheave Model / Dia. =			
Motor Sheave Bore =			
Fan Sheave Model / Dia. =			
Fan Sheave Bore =		I	San rpm =
Adjustable Sheave Dia. =		(Center Line Distance =
Belts =			
Filters =			
Outside Air Setting =	20% Open		
Static Control Setpoint =	1.50" w.g.		

AIR OUTLET TEST SHEET

Job Name: Brown Middle School Ventilation Survey

Tested By: B Cooney / M A DeZinno November 9, 2020 (20203BM)

Tested By:		B Coon	ey / M A I		November	9, 2020	(20203BN	1)		
Outlet	Room			"Ak"	Des	ign	First	New	Fin	al
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
		AHU-3								
VA	V-01									
1	548	CD	2408	1.00	250	250	255	263	255	255
2	533	CD	2406	1.00	130	130	143	137	143	143
3	532	CD	2410	1.00	280	<u>280</u>	297	295	297	<u>297</u>
						660				695
										105%
Box Type	Box Size		Flow Cor	rection Fac	tor for DD0	2	Design N	/Iinimum	Test Mi	nimum
Exist	9				<u> </u>		230			
		_								
VA	V-02									
1	530	CD	2410	1.00	325	325	322	312	322	322
2	530	CD	2410	1.00	325	325	310	312	310	310
3	530	CD	2410	1.00		325	300	312	300	300
4	530	CD	2410	1.00	325	<u>325</u>	315	312	315	<u>315</u>
						1300				1247
										96%
Box Type	Box Size		Flow Cor	rection Fac	tor for DD0	2	Design N	/Iinimum	Test Mi	nimum
Exist	12						360			
VA	V-03	1								
1	529	CD	2410	1.00	315	315	268		268	268
										85%
Box Type	Box Size		Flow Cor	rection Fac	tor for DD0		Design N	/Iinimum	Test Mi	
Exist	6						100			
			1	1						

AIR OUTLET TEST SHEET

Job Name: Brown Middle School Ventilation Survey

Tested By: B Cooney / M A DeZinno November 9, 2020 (20203BM)

Tested By:		B Coon	ey / M A I		November	9, 2020	(20203BN	1)		
Outlet	Room			"Ak"	Des	ign	First	New	Fin	nal
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
VA	AV-04									
1	525	CD	2410	1.00	325	325	302	313	302	302
2	525	CD	2410	1.00	325	325	309	313	309	309
3	525	CD	2410	1.00	325	325	291	313	291	291
4	525	CD	2410	1.00	325	325	328	313	328	328
5	526	CD	2410	1.00	275	<u>275</u>	286	265	286	<u>286</u>
						1575				1516
										96%
Box Type	Box Size		Flow Cor	rection Fac	tor for DD0	2	Design N	1inimum	Test Mi	nimum
Exist	12						420			
VA	AV-06	1								
1	524	CD	12x8	1.00	250	250	214	231	214	214
2	524	CD	2408	1.00		250		231	255	255
3	524	CD	2408	1.00		250		231	223	<u>223</u>
3	324	CD	2400	1.00	230	750		231	223	692
						730				92%
Box Type	Box Size		Flow Cor	rection Fac	tor for DD0	7	Design N		Test Mi	
Exist	9		110W COL	icction rac	tol lol DD		225	AIIIIIIIIIIIII	1 CSt IVII	IIIIIIIIIII
LAISt							223			

AIR APPARATUS TEST SHEET

Job Name: Brown Middle School Ventilation Survey

Tested By: B Cooney / M A DeZinno November 9, 2020 (20203BM)

AHU-4 DESIGN DATA

Manufacturer =	AAON	Model No. = RN02630EB09EJK
Type =	RTU	Serial No. = 201206BNWS02795
Total Scheduled cfm =	10000	Total Grille cfm = 9690
Outside Air cfm =	2600	
Total Static Pressure =		External Static Pressure =
Fan rpm =		Brake Horsepower =

MOTOR DESIGN DATA

Horsepower =	Voltage =	Phase =	rpm =
	,		- F

AIR TEST DATA

Total cfm by Louver Scan =	10543	Total cfm by Grille Readings =	10066
Outside Air =	2712		

PRESSURE TEST DATA

Total Suction Static Pressure =	-1.26		
Total Discharge Static Pressure =	0.38		
Total So	tatic Pressure =	1.64	
External Suction Static Pressure =	-1.10		
External Discharge Static Pressure =	0.38		
Externa	al Static Pressure =	1.48	
DX Coil & Filter DP =	0.16		

MOTOR TEST DATA

Motor Manufacturer / Frame =					
Horsepower = Phase =		Voltage =			
Full Load Amps =		FLA Corrected for Voltage =			
Motor rpm =		Service Factor =			
No Load Amps =		Operating Amps =			
Calculated Brake Horsepower =					

FAN TEST DATA

Motor Sheave Model / Dia. =		
Motor Sheave Bore =		
Fan Sheave Model / Dia. =		
Fan Sheave Bore =		Fan rpm =
Adjustable Sheave Dia. =		Center Line Distance =
Belts =		
Filters =		
Outside Air Setting =	25% Open	

AIR OUTLET TEST SHEET

Job Name: Brown Middle School Ventilation Survey

Tested By: B Cooney / M A DeZinno November 9, 2020 (20203BM)

Tested By:		B Coone	ey/MAD	eZinno	November	9, 2020	(20203BN	1)		
Outlet	Room			"Ak"	Des	ign	First	New	Fin	al
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
		AHU-4								
1	auditorium	CD	18x18	1.00	1070	1070	1084	1112	1084	1084
2	auditorium	CD	18x18	1.00	1070	1070	1110	1112	1110	1110
3	auditorium	CD	18x18	1.00	1070	1070	1140	1112	1140	1140
4	auditorium	CD	12x12	1.00	270	270	286	280	286	286
5	auditorium	CD	12x12	1.00	270	270	265	280	265	265
6	auditorium	CD	12x12	1.00	270	270	298	280	298	298
7	auditorium	CD	12x12	1.00	270	270	274	280	274	274
8	auditorium	CD	12x12	1.00	270	270	275	280	275	275
9	auditorium	CD	12x12	1.00	270	270	266	280	266	266
10	auditorium	CD	12x12	1.00	270	270	298	280	298	298
11	auditorium	CD	12x12	1.00	270	270	288	280	288	288
12	auditorium	CD	12x12	1.00	270	270	255	280	255	255
13	auditorium	CD	12x12	1.00	270	270	271	280	271	271
14	auditorium	CD	12x12	1.00	270	270	288	280	288	288
15	auditorium	CD	12x12	1.00	270	270	290	280	290	290
16	auditorium	CD	12x12	1.00	270	270	297	280	297	297
17	auditorium	CD	12x12	1.00	270	270	277	280	277	277
18	auditorium	CD	12x12	1.00	270	270	270	280	270	270
19	auditorium	CD	12x12	1.00	270	270	266	280	266	266
20	auditorium	CD	12x12	1.00	270	270	288	280	288	288
21	auditorium	CD	12x12	1.00	270	270	245	280	245	245
22	auditorium	CD	12x12	1.00	270	270	277	280	277	277
23	auditorium	CD	12x12	1.00	270	270	291	280	291	291
24	auditorium	CD	12x12	1.00	270	270	270	280	270	270
25	auditorium	CD	12x12	1.00	270	270	288	280	288	288
26	auditorium	CD	12x12	1.00	270	270	299	280	299	299
27	auditorium	CD	12x12	1.00	270	270	310	280	310	<u>310</u>
						9690				10066
										104%

AIR APPARATUS TEST SHEET

Job Name: Brown Middle School Ventilation Survey

Tested By: B Cooney / M A DeZinno November 9, 2020 (20203BM)

AHU-A1 DESIGN DATA

Manufacturer =	McQuay	Model No. = CAH012FDAC
Type =	AHU	Serial No. = FBOU040100109
Total Scheduled cfm =	6500	Total Grille cfm = 5950
Outside Air cfm =	1500	
Total Static Pressure =		External Static Pressure =
Fan rpm =		Brake Horsepower =

MOTOR DESIGN DATA

Horsepower =	Voltage =	Phase =	rpm =
--------------	-----------	---------	-------

AIR TEST DATA

Total cfm by Traverse =	5995	Total cfm by Grille Readings =	5404
Outside Air =	1573		

PRESSURE TEST DATA

Total Suction Static Pressure =	-1.50		
Total Discharge Static Pressure =	0.80		
Tota	al Static Pressure =	2.30	
External Suction Static Pressure =	-0.65		
External Discharge Static Pressure =	0.80		
Exte	ernal Static Pressure =	1.45	
DX Coil & Filters DP =	0.85		

MOTOR TEST DATA

Motor Manufacturer / Frame =				
Horsepower =	Phase =	Voltage =		
Full Load Amps =		FLA Corrected for Voltage =		
Motor rpm =		Service Factor =		
No Load Amps =		Operating Amps =		
Calculated Brake Horsepo	wer =			

FAN TEST DATA

Motor Sheave Model / Dia. =						
Motor Sheave Bore =						
Fan Sheave Model / Dia. =						
Fan Sheave Bore =			Fan rpm =			
Adjustable Sheave Dia. =			Center Line Distance =			
Belts =						
Filters =						
Outside Air Setting =	20% Open					

Job Name: Brown Middle School Ventilation Survey

Tested By:		B Coone	ey / M A D		November	9, 2020	(20203BN	1)		
Outlet	Room			"Ak"	Des	ign	First	New	Fin	ıal
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
					,					
		AHU-A	1							
1	217	В	18x18	1.00	1000	1000		908	854	854
2	corr	В	9x9	1.00	100	100		91	123	123
3	218	В	18x18	1.00	1200	1200	1027	1090	1027	1027
4	240	В	18x18	1.00	900	900	673	817	673	673
5	219	В	18x18	1.00	1200	1200		1090	1073	1073
6	257	В	6x6	1.00	50	50		45	56	56
7	239	В	9x9	1.00	100	100	76	91	76	76
8	corr	В	9x9	1.00	100	100	73	91	73	73
9	238	В	9x9	1.00	100	100	185	91	185	185
10	220	В	18x18	1.00	1200	<u>1200</u>		1090	1264	<u>1264</u>
						5950				5404
										91%

Job Name: Brown Middle School Ventilation Survey

Tested By: B Cooney / M A DeZinno November 9, 2020 (20203BM)

AHU-A2 ____ DESIGN DATA

Manufacturer =	McQuay	Model No. = CAH014FDAC
Type =	AHU	Serial No. = FBOU040100110
Total Scheduled cfm =	5000	Total Grille cfm = 6500
Outside Air cfm =	1500	
Total Static Pressure =		External Static Pressure =
Fan rpm =		Brake Horsepower =

MOTOR DESIGN DATA

Horsepower =	Voltage =	Phase =	rpm =
	,		- F

AIR TEST DATA

Total cfm by Traverse =	4328	Total cfm by Grille Readings =	4243
Outside Air =	1428		

PRESSURE TEST DATA

Total Suction Static Pressure =	-1.14		
Total Discharge Static Pressure =	0.38		
Tot	al Static Pressure =	1.52	
External Suction Static Pressure =	-0.44		
External Discharge Static Pressure =	0.38		
Ext	ernal Static Pressure =	0.82	
DX Coil & Filters DP =	0.85		

MOTOR TEST DATA

Motor Manufacturer / Frame =					
Horsepower = Phase =		Voltage =			
Full Load Amps =		FLA Corrected for Voltage =			
Motor rpm =	Motor rpm =				
No Load Amps =	Operating Amps =				
Calculated Brake Horsepower =					

Motor Sheave Model / Dia. =						
Motor Sheave Bore =						
Fan Sheave Model / Dia. =						
Fan Sheave Bore =	Fan Sheave Bore = Fan rpm =					
Adjustable Sheave Dia. =			Center Line Distance =			
Belts =						
Filters =						
Outside Air Setting =	30% Open					

Job Name: Brown Middle School Ventilation Survey

Tested By:		B Coone	ey / M A D		November	9, 2020	(20203BN	<u>1) </u>		
Outlet	Room			"Ak"	Des	ign	First	New	Fin	al
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
		AHU-A	2							
1	107	В	18x18	1.00	1100	1100	705	718	705	705
2	132	В	15x15	1.00	450	450	330	294	330	330
3	corr	В	9x9	1.00	100	100	32	65	32	32
4	106	В	15x15	1.00	750	750	482	490	482	482
5	106	В	15x15	1.00	750	750	491	490	491	491
6	132	В	12x12	1.00	450	450	318	294	318	318
7	108	В	18x18	1.00	1100	1100	713	718	713	713
8	131	В	12x12	1.00	500	500	293	326	293	293
9	109	В	18x18	1.00	1100	1100	771	718	771	771
10	130	В	9x9	1.00	100	100	66	65	66	66
11	corr	В	9x9	1.00	100	<u>100</u>	42	65	42	42
						6500				4243
										65%
									+	
1				1			ı			

Job Name: Brown Middle School Ventilation Survey

Tested By: B Cooney / M A DeZinno November 9, 2020 (20203BM)

AHU-A3 DESIGN DATA

Manufacturer =	McQuay	Model No. = OAH021FDAC
Type =	RTU	Serial No. = FBOU040100108
Total Scheduled cfm =	5000	Total Grille cfm = 6000
Outside Air cfm =	1500	
Total Static Pressure =		External Static Pressure =
Fan rpm =		Brake Horsepower =

MOTOR DESIGN DATA

Horsepower =	Voltage =	Phase =	rpm =
	,		- F

AIR TEST DATA

Total cfm by Louver Scan =	5021	Total cfm by Grille Readings =	5535
Outside Air =	1552		

PRESSURE TEST DATA

Total Suction Static Pressure =	-1.26	
Total Discharge Static Pressure =	0.70	
	Total Static Pressure =	1.96
External Suction Static Pressure =	-0.13	
External Discharge Static Pressure	= 0.70	
	External Static Pressure =	0.83
Cooling Coil DP =	0.84	
Pre Filters DP =	0.29	

MOTOR TEST DATA

Motor Manufacturer / Frame =					
Horsepower =	Phase =	Voltage =			
Full Load Amps =		FLA Corrected for Voltage =			
Motor rpm =	Service Factor =				
No Load Amps =		Operating Amps =			
Calculated Brake Horsepower =					

Motor Sheave Model / Dia. =		
Motor Sheave Bore =		
Fan Sheave Model / Dia. =		
Fan Sheave Bore =		Fan rpm =
Adjustable Sheave Dia. =		Center Line Distance =
Belts =		
Filters =		
Outside Air Setting =	25% Open	

Job Name: Brown Middle School Ventilation Survey

	7				Design		First New	Final		
Outlet Number		Code	Size	II I		$\overline{}$				
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
		A TITL A	<u> </u>							
		AHU-A	<u>3</u>							
1	221	В	18x18	1.00	1200	1200	1126	1107	1126	1136
2	222	В	18x18	1.00	1200 1200	1200	1136 1113	1107 1107	1136 1113	1113
3	223	В	18x18	1.00	1200	1200	1048	1107	1048	1048
4	224	В	18x18	1.00		1200	1159	1107	1159	1159
5	225	В	18x18	1.00	1200	1200 1200	1079	1107	1079	1139 1079
3	223	Б	10110	1.00	1200	6000	1079	1107	1079	5535
						0000				92%
										7270

Job Name: Brown Middle School Ventilation Survey

Tested By: B Cooney / M A DeZinno November 9, 2020 (20203BM)

AHU-A4 _____ DESIGN DATA

Manufacturer =	McQuay	Model No. = CAH012FDAC
Type =	AHU	Serial No. = FBOU040100111
Total Scheduled cfm =	5000	Total Grille cfm = 4950
Outside Air cfm =	1500	
Total Static Pressure =		External Static Pressure =
Fan rpm =		Brake Horsepower =

MOTOR DESIGN DATA

Horsepower =	Voltage =	Phase =	rpm =
--------------	-----------	---------	-------

AIR TEST DATA

Total cfm by Traverse =	5016	Total cfm by Grille Readings =	4340
Outside Air =	1520	Return Air =	

PRESSURE TEST DATA

Total Suction Static Pressure =	-1.45		
Total Discharge Static Pressure =	0.25		
Tot	tal Static Pressure =	1.70	
External Suction Static Pressure =	-0.27		
External Discharge Static Pressure =	0.25		
Ext	ternal Static Pressure =	0.52	
DX Coil & Filters DP =	1.18		

MOTOR TEST DATA

Motor Manufacturer / Frame =					
Horsepower =	Phase =	Voltage =			
Full Load Amps =		FLA Corrected for Voltage =			
Motor rpm =	Service Factor =				
No Load Amps =		Operating Amps =			
Calculated Brake Horsepower =					

Motor Sheave Model / Dia. =		
Motor Sheave Bore =		
Fan Sheave Model / Dia. =		
Fan Sheave Bore =		Fan rpm =
Adjustable Sheave Dia. =		Center Line Distance =
Belts =		
Filters =		
Outside Air Setting =	45% Open	

Job Name: Brown Middle School Ventilation Survey

Outlet	Room	B Cooney / M A D		"Ak"	Design		First		Tr:	Final	
ll l		C. 1.	G.					New	1		
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm	
		AHU-A	1								
<u>L</u>		AIIU-A	<u> </u>								
1	128	В	12x12	1.00	400	400	362	351	362	362	
2	129	В	6x6	1.00	50	50	81	44	81	81	
3	129-A	В	9x9	1.00	100	100	92	88	92	92	
4	corr	В	9x9	1.00	100	100	138	88	138	138	
5	110	В	18x18	1.00	1100	1100	990	964	990	990	
6	111	В	18x18	1.00	1100	1100	885	964	885	885	
7	127	В	12x12	1.00	450	450	404	395	404	404	
8	127	В	12x12	1.00	450	450	415	395	415	415	
9	corr	В	9x9	1.00	100	100	128	88	128	128	
10	112	В	18x18	1.00	1100	<u>1100</u>	845	964	845	<u>845</u>	
						4950				4340	
										88%	

Job Name: Brown Middle School Ventilation Survey

Tested By: B Cooney / M A DeZinno November 9, 2020 (20203BM)

AHU-A5 DESIGN DATA

Manufacturer =	McQuay	Model No. = OAH006FDAC
Type =	RTU	Serial No. = FBOU040100086
Total Scheduled cfm =	3200	Total Grille cfm = 3200
Outside Air cfm =	1600	
Total Static Pressure =		External Static Pressure =
Fan rpm =		Brake Horsepower =

MOTOR DESIGN DATA

Horsepower =	Voltage =	Phase =	rpm =
--------------	-----------	---------	-------

AIR TEST DATA

Total cfm by Louver Scan =	3663	Total cfm by Grille Readings =	2975
Outside Air =	1700	Return Air =	

PRESSURE TEST DATA

Total Suction Static Pressure =	12.04		
Total Discharge Static Pressure =	0.57		
Т	otal Static Pressure =	-11.47	
External Suction Static Pressure =	-0.44		
External Discharge Static Pressure =	0.57		
E	xternal Static Pressure =	1.01	
Cooling Coil & Filter DP =	1.60		

MOTOR TEST DATA

Motor Manufacturer / Frame =						
Horsepower =	Phase =	Voltage =				
Full Load Amps =		FLA Corrected for Voltage =				
Motor rpm =		Service Factor =				
No Load Amps =	Operating Amps =					
Calculated Brake Horsepower =						

Motor Sheave Model / Dia. =			
Motor Sheave Bore =			
Fan Sheave Model / Dia. =			
Fan Sheave Bore =]	Fan rpm =
Adjustable Sheave Dia. =			Center Line Distance =
Belts =			
Filters =			
Outside Air Setting =	35% Open		

Job Name: Brown Middle School Ventilation Survey

Outlet	Room			"Ak"	Des	ign	First	New	Fin	al
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
Ivuilibei	Number	Couc	Size	ractor	трш	CIII	1 est	Key u	трш	CIII
		AHU-A	<u> </u>							
		AIIU-A	<u>, </u>							
1	226	В	12x12	1.00	450	450	424	418	424	424
2	212	В	6x6	1.00	50	50	56	46	56	56
3	226	В	12x12	1.00	450	450	420	418	420	420
4	Corr	В	6x6	1.00	50	50	69	46	69	69
5	230	В	18x18	1.00	900	900	749	837	749	749
6	230	В	18x18	1.00	900	900	849	837	849	849
7	171	В	9x9	1.00	100	100	117	93	117	117
8	233	В	9x9	1.00	125	125	91	116	91	91
9	235	В	6x6	1.00	50	50	96	46	96	96
10	232	В	9x9	1.00	125	<u>125</u>	104	116	104	<u>104</u>
						3200				2975
										93%

Job Name: Brown Middle School Ventilation Survey

Tested By: B Cooney / M A DeZinno November 9, 2020 (20203BM)

AHU-A6 DESIGN DATA

Manufacturer =	McQuay	Model No. =	CAH004FDAC
Type =	AHU	Serial No. =	FBOU040100103
Total Scheduled cfm =	2500		
Outside Air cfm =	300		
Total Static Pressure =		External Static P	ressure =
Fan rpm =		Brake Horsepowe	er =

MOTOR DESIGN DATA

Horsepower =	Voltage =	Phase =	rpm =
	,		- F

AIR TEST DATA

Total cfm by Traverse =	2560	Total cfm by Grille Readings =	2247
Outside Air =	310		

PRESSURE TEST DATA

Total Suction Static Pressure =	-1.71		
Total Discharge Static Pressure =	0.15		
Tota	al Static Pressure =	1.86	
External Suction Static Pressure =	-0.68		
External Discharge Static Pressure =	0.15		
Exte	ernal Static Pressure =	0.83	
DX Coil & Filters DP =	1.04		

MOTOR TEST DATA

Motor Manufacturer / Frame =						
Horsepower =	Phase =	Voltage =				
Full Load Amps =		FLA Corrected for Voltage =				
Motor rpm =		Service Factor =				
No Load Amps =	Operating Amps =					
Calculated Brake Horsepower =						

Motor Sheave Model / Dia. =		
Motor Sheave Bore =		
Fan Sheave Model / Dia. =		
Fan Sheave Bore =		Fan rpm =
Adjustable Sheave Dia. =		Center Line Distance =
Belts =		
Filters =		
Outside Air Setting =	58% Open	

Job Name: Brown Middle School Ventilation Survey

Tested By:		B Coon	ey/MAI		November	· 9, 2020	(20203BN	1)		
Outlet	Room			"Ak"	Des		First	New	Fir	
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
		AHU-A	6		ļ					
1	122	A	2406	1.00		125	75	0	75	75
2	122	A	2406	1.00		125		0	71	71
3	122	A	2406	1.00		125	70	0	70	70
4	122	A	2406	1.00		125	 	0	47	47
5	113	A	2408	1.00		150	 	0	83	83
6	113	A	2406	1.00		150		0	110	110
7	114	A	2408	1.00		175	117	0	117	117
8	116	A	2406	1.00		120		0	139	139
9	115	A	2408	1.00		250		0	172	172
10	115	A	2408	1.00		250		0	172	172
11	117	A	2406	1.00		100		0	82	82
12	118	A	2406	1.00	80	80		0	80	80
13	119	A	2406	1.00	80	80	109	0	109	109
14	120	A	2410	1.00	300	300	157	0	157	157
15	120	A	2410	1.00	300	300	161	0	161	161
16	corr	A	2408	1.00	0	N/A	183	0	183	183
17	corr	A	2408	1.00	0	N/A	194	0	194	194
18	corr	A	2408	1.00	0	N/A	125	0	125	125
19	corr	A	2408	1.00	0	N/A	100	0	100	<u>100</u>
										2247

Job Name: **Brown Middle School Ventilation Survey**

Tested By: B Cooney / M A DeZinno November 9, 2020 (20203BM)

AHU-A7 **DESIGN DATA**

Manufacturer =	McQuay	Model No. =	CAH014FDAC
Type =	AHU	Serial No. =	FBOU040100112
Total Scheduled cfm =	6800		
Outside Air cfm =	2000		
Total Static Pressure =		External Static P	ressure =
Fan rpm =		Brake Horsepow	er =

MOTOR DESIGN DATA

Horsepower =	Voltage =	Phase =	rpm =
AIR TEST DATA			

Total cfm by Traverse =	6325
Outside Air =	2000

PRESSURE TEST DATA

Total Suction Static Pressure =	-1.03	
Total Discharge Static Pressure =	0.25	
	1.28	
External Suction Static Pressure =	-0.13	
External Discharge Static Pressure	= 0.25	
	External Static Pressure =	0.38
DX Coil & Filters DP =	0.90	

MOTOR TEST DATA

Motor Manufacturer / Frame =						
Horsepower =	Phase =		Voltage =			
Full Load Amps =		FLA Corrected for Voltage =				
Motor rpm =	Motor rpm =			Service Factor =		
No Load Amps =			Operating Amps =			
Calculated Brake Horsepower =						

Motor Sheave Model / Dia. =			
Motor Sheave Bore =			
Fan Sheave Model / Dia. =			
Fan Sheave Bore =		Fan rpm =	
Adjustable Sheave Dia. =		Center Line Dist	ance =
Belts =			
Filters =			
Outside Air Setting =	35% Open		
Static Control Setpoint =	1.85" w.g.	<u> </u>	<u> </u>

Job Name: Brown Middle School Ventilation Survey

Outlet	Room		ey / MI A L	"Ak"	Des		First	New	Fin	====== al
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
Tullibei	rumber	Couc	SIZC	Tactor	Ipin	CIII	1 CSt	Requ	трш	CIIII
		AHU-A								
I										
V	AV 1									
1	209	В	12x12	1.00	400	400	262	251	262	262
2	208	В	12x12	1.00	75	75	1	47	1	1
3	210	В	12x12	1.00	200	<u>200</u>	160	125	160	<u>160</u>
						675				423
										63%
Box Type	Box Size		Flow Cor	rection Fac	tor for DDC	C	Design N	1inimum	Test Mir	nimum
VAV										
V	AV 2									
1	301	A	6x6	1.00	50	50	1	29	1	1
2	201	В	12x12	1.00	400	400	245	233	245	245
3	201	В	12x12	1.00	400	400	250	233	250	250 250
3	201		12X12	1.00	400	850	230	233	230	496
						030				58%
Box Type	Box Size		Flow Cor	rection Fac	tor for DDC	7	Design N	/linimum	Test Mir	
VAV	Bon Size		11011 001	rection i de	101 101 111		DUSIGNI	THIRITIGHT.	100011111	
,,,,										
V	AV3									
1	201	В	12x12	1.00	400	400	267	274	267	267
2	201	В	12x12	1.00	400	400	281	274	281	281
_						800				548
										69%
Box Type	Box Size		Flow Cor	rection Fac	tor for DDC	2	Design N	1inimum	Test Mir	
VAV										
X 7	AV 4	1								
1	201	В	12x12	1.00	400	400	244	241	244	244
2	201	В	12x12	1.00	400	400	238	241	238	238
	201	Б	12812	1.00	400	800	236	241	236	482
						800				60%
Box Type	Box Size		Flow Cor	rection Fac	tor for DDC	7	Design N	/inimum	Test Mir	
VAV	DOV SITE		1 IOW CUL	rection rac	אלם זמו זמו		Design N	minitulli	1 031 19111	
VAV									T	

Job Name: Brown Middle School Ventilation Survey

Tested By:		D COOL	ey / M A L		November		(20203BN		E7.	
Outlet	Room		g:	"Ak"	Des		First	New	Fin	
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
VA	AV 5									
1	201	В	12x12	1.00	500	500	1	1	1	1
2	201	В	12x12	1.00	500	<u>500</u>	1	1	1	1
						1000				2
										0%
Box Type	Box Size		Flow Cor	rection Fac	tor for DD0	C	Design N	/Iinimum	Test Min	nimum
VAV										
•	A \$7.6									
	201	D	1212	1.00	500	500	267	202	267	267
1 2	201	B B	12x12 12x12	1.00	500 500	500 500	267 298	283 283	267 298	267
2	201	В	12X12	1.00	300	1000	298	283	298	<u>298</u> 565
						1000				57%
Box Type	Box Size		Flow Cor	rection Fac	tor for DD0	7	Design N	// Jinimum	Test Min	
VAV	BOX BIEC		1 10 W COI	rection i de	ioi ioi bbv	<u> </u>	Design	Timini din	T CSt IVIII	iiiiidiii
V.	AV 7									
1	204	A	9x9	1.00	125	125	77	76	77	77
2	205	A	9x9	1.00	100	<u>100</u>	59	60	59	<u>59</u>
						225				136
Box Type	Box Size		Flow Correction Factor for DDC Design Minimum Test M		Test Min	60% nimum				
VAV										
V	AV 8									
1	corr	A	6x6	1.00	75	75	60	0	60	60
2	206		6x6	1.00	0	N/A	74	0	74	74
3	207			1.00	0	N/A	1	0	1	<u>1</u>
										135
Box Type VAV	Box Size		Flow Cor	rection Fac	tor for DDO	C	Design N	Minimum	Test Min	nimum

Job Name: Brown Middle School Ventilation Survey

Tested By:		D COOM	ey / MI A L		November		(20203BN			
Outlet	Room			"Ak"	Des		First	New	Fin	
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
V.	AV 9									
1	301	В	12x12	1.00		400	229	233	229	229
2	201	В	12x12	1.00	400	400	220	233	220	220
3	201	В	12x12	1.00	400	<u>400</u>	251	233	251	<u>251</u>
						1200				700
										58%
Box Type	Box Size		Flow Cor	rection Fac	tor for DD0	2	Design N	Ainimum	Test Mi	nimum
VAV										
		1								
		1								

Job Name: Brown Middle School Ventilation Survey

Tested By: B Cooney / M A DeZinno November 9, 2020 (20203BM)

AHU-A8 _____ DESIGN DATA

Manufacturer =	McQuay	Model No. = OAH021FDAC
Type =	RTU	Serial No. = FBOU040100082
Total Scheduled cfm =	12000	Total Grille cfm = 12600
Outside Air cfm =	2000	
Total Static Pressure =		External Static Pressure =
Fan rpm =		Brake Horsepower =

MOTOR DESIGN DATA

Horsepower =	Voltage =	Phase =	rpm =
	,		- F

AIR TEST DATA

Total cfm by Traverse =	12059	Total cfm by Grille Readings =	11414
Outside Air =	2100		

PRESSURE TEST DATA

Total Suction Static Pressure =	-0.84		
Total Discharge Static Pressure =	0.71		
	Total Static Pressure =	1.55	
External Suction Static Pressure =	-0.27		
External Discharge Static Pressure =	= 0.67		
	External Static Pressure =	0.94	
Cooling Coil DP =	0.54		
Pre Filters DP =	0.11		

MOTOR TEST DATA

Motor Manufacturer / Frame =					
Horsepower =	Phase =		Voltage =		
Full Load Amps =		FLA Corrected for Voltage =			
Motor rpm =		Service Factor =			
No Load Amps =			Operating Amps =		
Calculated Brake Horsepower	=				

Motor Sheave Model / Dia. =		
Motor Sheave Bore =		
Fan Sheave Model / Dia. =		
Fan Sheave Bore =		Fan rpm =
Adjustable Sheave Dia. =		Center Line Distance =
Belts =		
Filters =		
Outside Air Setting =	35%	

Job Name: Brown Middle School Ventilation Survey

Outlet	Deam		ey / M A L	"Ak"	Dos		(20203DIV		T72	al
Outlet	Room	Code	Q:	II I	Des		First	New	Fin	
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
		A TITE A A	0							
		AHU-A	<u>8</u>							
1	203	D	24x14	1.68	714	1200	711	647	711	1194
2	203	D	24x14 24x14	1.68	714	1200	717	647	711 717	1205
3	203	D	24x14 24x14	1.68	714	1200	654	647	654	1099
4	203	D	24x14 24x14	1.68	714	1200	733	647	733	1231
5	203	D	24x14 24x14	1.68	714	1200	644	647	644	1082
6	203	D	24x14 24x14	1.68	714	1200	655	647	655	1100
7	203	D	24x14 24x14	1.68	714	1200	721	647	721	1211
8	203	D	24x14 24x14	1.68	714	1200	766	647	766	1211
9	203	D	18x18	1.00	1000	1000	766	906	766	766
10	203	D	18x18	1.00	1000	1000	622	906	622	622
11	203	D	18x18	1.00	1000	1000	616	906	616	616
11	203	D	10X10	1.00	1000	12600	010	900	010	11414
						12000				91%
										9170

Job Name: Brown Middle School Ventilation Survey

Tested By: B Cooney / M A DeZinno November 9, 2020 (20203BM)

AHU-A9 DESIGN DATA

Manufacturer =	McQuay	Model No. = CAH016FDDM
Type =	AHU	Serial No. = FBOU040
Total Scheduled cfm =	8000	Total Grille cfm = 8000
Outside Air cfm =	1000	
Total Static Pressure =		External Static Pressure =
Fan rpm =		Brake Horsepower =

MOTOR DESIGN DATA

Horsepower =	Voltage =	Phase =	rpm =
	,		- F

AIR TEST DATA

Total cfm by Traverse =	7164	Total cfm by Grille Readings =	6970
Outside Air =	1050		

PRESSURE TEST DATA

Total Suction Static Pressure =	-1.00		
Total Discharge Static Pressure =	0.57		
Tot	al Static Pressure =	1.57	
External Suction Static Pressure =	-0.30		
External Discharge Static Pressure =	0.57		
Ext	ernal Static Pressure =	0.87	
DX Coil & Filters DP =	0.70		

MOTOR TEST DATA

Motor Manufacturer / Frame =				
Horsepower =	Phase =	Voltage =		
Full Load Amps =		FLA Corrected for Voltage =		
Motor rpm =		Service Factor =		
No Load Amps =		Operating Amps =		
Calculated Brake Horsepower =				

Motor Sheave Model / Dia. =		
Motor Sheave Bore =		
Fan Sheave Model / Dia. =		
Fan Sheave Bore =		Fan rpm =
Adjustable Sheave Dia. =		Center Line Distance =
Belts =		
Filters =		
Outside Air Setting =	20% Open	

Job Name: Brown Middle School Ventilation Survey

Outlet	Room				Design First		First New		Final	
		Codo	C:				Test	15		
Number	Number	Code	Size	Factor	fpm	cfm	1 est	Req'd	fpm	cfm
		AHU-A	0							
<u> </u>		AIIU-A)			(a) 46	Hertz			
1	203	D	24x14	1.68	714	1200	534	622	534	897
2	203	D	24x14	1.68	714	1200	595	622	595	1000
3	203	D	24x14	1.68		1200	619	622	619	1040
4	203	D	24x14	1.68	714	1200	550	622	550	924
5	203	D	24x14	1.68	714	1200	631	622	631	1060
6	203	D	24x14	1.68	595	1000	612	519	612	1028
7	203	D	24x14	1.68	595	<u>1000</u>	608	519	608	1021
						8000				6970
										87%

Job Name: Brown Middle School Ventilation Survey

Tested By: B Cooney / M A DeZinno November 9, 2020 (20203BM)

AHU-B1 DESIGN DATA

Manufacturer =	McQuay	Model No. = OAH008FDAC
Type =	RTU	Serial No. = FBOU040100104
Total Scheduled cfm =	3350	Total Grille cfm = 3350
Outside Air cfm =	1125	
Total Static Pressure =		External Static Pressure =
Fan rpm =		Brake Horsepower =

MOTOR DESIGN DATA

Horsepower =	Voltage =	Phase =	rpm =
	,		- F

AIR TEST DATA

Total cfm by Louver Scan =	3262	Total cfm by Grille Readings =	2807
Outside Air =	1169	Return Air =	

PRESSURE TEST DATA

Total Suction Static Pressure =	-0.84	
Total Discharge Static Pressure =	0.71	
	Total Static Pressure =	1.55
External Suction Static Pressure =	-0.20	
External Discharge Static Pressure	= 0.71	
	External Static Pressure =	0.91
Cooling Coil DP =	0.46	
Pre Filters DP =	0.18	

MOTOR TEST DATA

Motor Manufacturer / Frame =				
Horsepower =	Phase =	Voltage =		
Full Load Amps =		FLA Corrected for Voltage =		
Motor rpm =		Service Factor =		
No Load Amps =		Operating Amps =		
Calculated Brake Horsepower =				

Motor Sheave Model / Dia. =			
Motor Sheave Bore =			
Fan Sheave Model / Dia. =			
Fan Sheave Bore =		Fan rpm =	
Adjustable Sheave Dia. =		Center Line I	Distance =
Belts =			
Filters =			
Outside Air Setting =	25% Open		

Job Name: Brown Middle School Ventilation Survey

Tested By:		B Coon	<u>ey / M A I</u>		November	9, 2020	(20203BN	<u>(I)</u>		
Outlet	Room			"Ak"	Des	ign	First	New	Fin	al
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
					1					
		AHU-B	1		<u> </u>					
1	305	В	9x9	1.00	 	225	193	189	193	193
2	305	В	9x9	1.00		225	208	189	208	208
3	305	В	9x9	1.00	 	225	201	189	201	201
4	305	В	9x9	1.00	+	225	176	189	176	176
5	306	В	9x9	1.00		225	188	189	188	188
6	306	В	9x9	1.00	+	225	205	189	205	205
7	306	В	9x9	1.00	+	225	197	189	197	197
8	306	В	9x9	1.00		225	200	189	200	200
9	307	В	9x9	1.00		275	203	230	203	203
10	307	В	9x9	1.00		275	197	230	197	197
11	307	В	9x9	1.00	+	275	232	230	232	232
12	322 corr	В	9x9	1.00	225	225	196	189	196	196
13	322	В	9x9	1.00	250	250	202	209	202	202
14	322	В	9x9	1.00	250	<u>250</u>	209	209	209	<u>209</u>
						3350				2807
										84%

Job Name: Brown Middle School Ventilation Survey

Tested By: B Cooney / M A DeZinno November 9, 2020 (20203BM)

AHU-B2 DESIGN DATA

Manufacturer =	McQuay	Model No. = OAH008FDAC
Type =	RTU	Serial No. = FBOU040100106
Total Scheduled cfm =	3350	Total Grille cfm = 3350
Outside Air cfm =	1125	
Total Static Pressure =		External Static Pressure =
Fan rpm =		Brake Horsepower =

MOTOR DESIGN DATA

Horsepower =	Voltage =	Phase =	rpm =
	,		- F

AIR TEST DATA

Total cfm by Louver Scan =	3360	Total cfm by Grille Readings =	3302
Outside Air =	1204		

PRESSURE TEST DATA

Total Suction Static Pressure =	-1.02	
Total Discharge Static Pressure =	0.67	
	Total Static Pressure =	1.69
External Suction Static Pressure =	-0.10	
External Discharge Static Pressure	= 0.67	
	External Static Pressure =	0.77
Cooling Coil DP =	0.70	
Pre Filters DP =	0.22	

MOTOR TEST DATA

Motor Manufacturer / Frame =				
Horsepower =	Phase =	Voltage =		
Full Load Amps =		FLA Corrected for Voltage =		
Motor rpm =		Service Factor =		
No Load Amps =		Operating Amps =		
Calculated Brake Horsepower =				

Motor Sheave Model / Dia. =		
Motor Sheave Bore =		
Fan Sheave Model / Dia. =		
Fan Sheave Bore =		Fan rpm =
Adjustable Sheave Dia. =		Center Line Distance =
Belts =		
Filters =		
Outside Air Setting =	25% Open	

Job Name: Brown Middle School Ventilation Survey

Tested By:	D .	D COOLE	ey/MAI	.,	November		(20203BN		37 1	1
Outlet	Room		G:	"Ak"	Des		First	New	Fin	
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
		A LILL D								
[L		AHU-B2	<u> </u>							
1	322	В	9x9	1.00	250	250	219	246	219	219
2	322	В	9x9	1.00	250	250	240	246	240	240
3	322 Corr	В	9x9	1.00		225	252	222	252	252
4	308	В	9x9	1.00	275	275	254	271	254	254
5	308	В	9x9	1.00	275	275	279	271	279	279
6	308	В	9x9	1.00	275	275	261	271	261	261
7	309	В	9x9	1.00	225	225	220	222	220	220
8	309	В	9x9	1.00	225	225	216	222	216	216
9	309	В	9x9	1.00	225	225	219	222	219	219
10	309	В	9x9	1.00	225	225	208	222	208	208
11	310	В	9x9	1.00	225	225	225	222	225	225
12	310	В	9x9	1.00	225	225	226	222	226	226
13	310	В	9x9	1.00	225	225	243	222	243	243
14	310	В	9x9	1.00	225	<u>225</u>	240	222	240	240
						3350				3302
										99%

Job Name: Brown Middle School Ventilation Survey

Tested By: B Cooney / M A DeZinno November 9, 2020 (20203BM)

AHU-B3 DESIGN DATA

Manufacturer =	McQuay	Model No. = OAH008FDAC
Type =	RTU	Serial No. = FBOU040100105
Total Scheduled cfm =	3350	Total Grille cfm = 3350
Outside Air cfm =	1125	
Total Static Pressure =		External Static Pressure =
Fan rpm =		Brake Horsepower =

MOTOR DESIGN DATA

Horsepower =	Voltage =	Phase =	rpm =
1			1

AIR TEST DATA

Total cfm by Louver Scan =	3185	Total cfm by Grille Readings =	3178
Outside Air =	1190		

PRESSURE TEST DATA

Total Suction Static Pressure =	-0.88	
Total Discharge Static Pressure =	0.77	
	Total Static Pressure =	1.65
External Suction Static Pressure =	-0.25	
External Discharge Static Pressure	= 0.77	
	External Static Pressure =	1.02
Cooling Coil DP =	0.48	
Pre Filters DP =	0.15	

MOTOR TEST DATA

Motor Manufacturer / Frame =					
Horsepower =	Phase =		Voltage =		
Full Load Amps =		FLA Corrected for Voltage =			
Motor rpm =		Service Factor =			
No Load Amps =		Operating Amps =			
Calculated Brake Horsepower	=				

Motor Sheave Model / Dia. =		
Motor Sheave Bore =		
Fan Sheave Model / Dia. =		
Fan Sheave Bore =		Fan rpm =
Adjustable Sheave Dia. =		Center Line Distance =
Belts =		
Filters =		
Outside Air Setting =	25% Open	

Job Name: Brown Middle School Ventilation Survey

Tested By:		B Coon	<u>ey / M A D</u>		November	· 9, 2020	(20203BN	1)		
Outlet	Room			"Ak"	Des	ign	First	New	Fin	al
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
		AHU-B	3							
1	303	В	9x9	1.00	225	225	194	213	194	194
2	303	В	9x9	1.00	225	225	225	213	225	225
3	303	В	9x9	1.00		225	204	213	204	204
4	303	В	9x9	1.00	+	225	217	213	217	217
5	corr	В	9x9	1.00		200	225	190	225	225
6	304	В	9x9	1.00	+	225	201	213	201	201
7	304	В	9x9	1.00		225	201	213	201	201
8	304	В	9x9	1.00		225	207	213	207	207
9	304	В	9x9	1.00		225	209	213	209	209
10	321	В	9x9	1.00		250	286	237	286	286
11	320	В	9x9	1.00	50	50	81	47	81	81
12	319	В	9x9	1.00		50	79	47	79	79
13	314	В	9x9	1.00	250	250	213	237	213	213
14	314	В	9x9	1.00	250	250	212	237	212	212
15	314	В	9x9	1.00	250	250	205	237	205	205
16	314	В	9x9	1.00	250	<u>250</u>	219	237	219	<u>219</u>
						3350				3178
										95%

Job Name: Brown Middle School Ventilation Survey

Tested By: B Cooney / M A DeZinno November 9, 2020 (20203BM)

AHU-B4	DESIGN DATA

Manufacturer =	McQuay	Model No. = OAH008FDAC
Type =	RTU	Serial No. = FBOU040100101
Total Scheduled cfm =	3350	Total Grille cfm = 3350
Outside Air cfm =	1125	
Total Static Pressure =		External Static Pressure =
Fan rpm =		Brake Horsepower =

MOTOR DESIGN DATA

Horsepower =	Voltage =	Phase =	rpm =
--------------	-----------	---------	-------

AIR TEST DATA

Total cfm by Louver Scan =	3325	Total cfm by Grille Readings =	3287
Outside Air =	1134	Return Air =	

PRESSURE TEST DATA

Total Suction Static Pressure =	-0.76	
Total Discharge Static Pressure =	0.68	
	Total Static Pressure =	1.44
External Suction Static Pressure =	-0.07	
External Discharge Static Pressure	= 0.68	
	External Static Pressure =	0.75
Cooling Coil DP =	0.53	
Pre Filters DP =	0.16	

MOTOR TEST DATA

Motor Manufacturer / Frame =						
Horsepower =	Phase =		Voltage =			
Full Load Amps =			FLA Corrected for Voltage =			
Motor rpm =	Motor rpm =			Service Factor =		
No Load Amps =		Operating Amps =				
Calculated Brake Horsepower	=					

Motor Sheave Model / Dia. =		
Motor Sheave Bore =		
Fan Sheave Model / Dia. =		
Fan Sheave Bore =		Fan rpm =
Adjustable Sheave Dia. =		Center Line Distance =
Belts =		
Filters =		
Outside Air Setting =	30% Open	

Job Name: Brown Middle School Ventilation Survey

Tested By:	B Cooney / M A DeZinno			November	9, 2020	(20203BN	1)			
Outlet	Room			"Ak"	Des	ign	First	New	Fin	ıal
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
		AHU-B	4							
1	313	В	9x9	1.00		250	233	245	233	233
2	313	В	9x9	1.00		250	231	245	231	231
3	313	В	9x9	1.00		250	215	245	215	215
4	313	В	9x9	1.00		250	221	245	221	221
5	315	В	9x9	1.00		50	57	49	57	57
6	316	В	9x9	1.00		50	54	49	54	54
7	321	В	9x9	1.00		250	245	245	245	245
8	311	В	9x9	1.00		225	251	221	251	251
9	311	В	9x9	1.00		225	251	221	251	251
10	311	В	9x9	1.00		225	241	221	241	241
11	311	В	9x9	1.00		225	245	221	245	245
12	Corr	В	9x9	1.00		200	226	196	226	226
13	312	В	9x9	1.00		225	217	221	217	217
14	312	В	9x9	1.00		225	215	221	215	215
15	312	В	9x9	1.00		225	210	221	210	210
16	312	В	9x9	1.00	225	225	175	221	175	<u>175</u>
						3350				3287
										98%
		-								

TRAVERSE SUMMARY TEST SHEET

Job Name: Brown Middle School Ventilation Survey

Tested By:									
System	Zone /	Height /			Des		Tes		Static
No.	Room	Dia.	Width	Area	Velocity	cfm	Velocity	cfm	Pressure
AHU-A1	OA Duct	30	24	5.0	1300	6500	1199	5995	-0.48
AIIU-AI	OA Minimum	30	24	5.0	300	1500	315	1573	-0.48
	OA Millillium	30	24	3.0	300	1300	313	13/3	20% Open
									2070 Open
AHU-A2	OA Duct	16	36	4.0	1250	5000	1082	4328	-0.38
	OA Minimum	16	36	4.0	375	1500	357	1428	-0.04
									30% Open
AHU-A3	OA Louver	38	42	11.1	451	5000	453	5021	0.70
	OA Minimum	38	42	11.1	135	1500	140	1552	25% Open
AHU-A4	OA Duct	16	36	4.0	1250	5000	1254	5016	-0.41
	OA Minimum	16	36	4.0	375	1500	380	1520	-0.04
									45% Open
AHU-A5	OA Louver	48	14	4.7	771	3600	785	3663	0.57
AIIO-A3	OA Minimum	48	14	4.7	343	1600	364	1700	
	OA Willimum	40	14	4.7	343	1000	304	1700	3370 Open
AHU-A6	OA Duct	12	12	1.0	2500	2500	2560	2560	-1.45
	OA Minimum	12	12	1.0	300	300	310	310	-0.05
									58% Open
AHU-A7	OA Duct	30	30	6.3	1088	6800	1012	6325	60 Hz, -1.65
11110 111	OA Minimum	12	12	1.0	2000	2000	2000	2000	-0.05
		12	12	1.0	2000	2000	2000	2000	35% Open
AIIII AO	04.1	2.4	7.6	17.0	((0)	12000	(72	12050	0.67
AHU-A8	OA Louver OA Minimum	34	76 76	17.9	669	12000	672	12059	0.67
	OA Minimum	34	/6	17.9	111	2000	117	2100	35% Open
AHU-A9	OA Duct	24	36	6.0	1333	8000	1194	7164	46 Hz, -1.01
	OA Minimum	24	36	6.0	167	1000	175	1050	-0.03
									20% Open
AHU-B1	OA Louver	36	28	7.0	479	3350	466	3262	0.71
AHO-DI	OA Louvel OA Minimum	36	28	7.0	161	1125	167	1169	
	OA WIIIIIIIIIII	30	20	7.0	101	1123	107	1109	2370 Open

TRAVERSE SUMMARY TEST SHEET

Job Name: Brown Middle School Ventilation Survey

Tested By:		B Cooney /	M A DEZI	IIIO INO	<u>vember 9, 20</u>			1	
System	Zone /	Height /			Des		Te		Static
No.	Room	Dia.	Width	Area	Velocity	cfm	Velocity	cfm	Pressure
AHU-B2	OA Louver	36	28	7.0	479	3350	480	3360	0.67
	OA Minimum	36	28	7.0	161	1125	172	1204	35% Open
AHU-B3	OA Louver	36	28	7.0	479	3350	455	3185	0.77
	OA Minimum	36	28	7.0	161	1125	170	1190	25% Open
AHU-B4	OA Louver	36	28	7.0	479	3350	475	3325	0.68
	OA Minimum	36	28	7.0	161	1125	162	1134	25% Open
AHU-1	OA Louver	99	30	20.6	485	10000	467	9632	0.94
	OA Minimum	99	30	20.6	121	2500	122	2516	30% Open
AHU-2	OA Louver	28	60	11.7	514	6000	528	6160	1.15
	OA Minimum	28	60	11.7	137	1600	145	1692	30% Open
AHU-3	OA Louver	22	50	7.6	1047	8000	449	3430	0.87
	OA Minimum	22	50	7.6	471	3600	125	955	20% Open
AHU-4	OA Louver	98	28	19.1	525	10000	552	10519	0.38
	OA Minimum	98	28	19.1	105	2000	142	2706	25% Open
Gym Unit 1	Supply	32	36	8.0	0	N/A	193	1544	-0.02
	OA Minimum	60	12	5.0	0	N/A	62	310	-0.004
									15% Open
Gym Unit 2	Supply	32	36	8.0	0	N/A	140	1120	-0.02
	OA Minimum	60	12	5.0	0	N/A	45	225	-0.004
									15% Open
Boys Lckr	OA Duct	40	15	4.2	0	N/A	383	1596	-0.28
	OA Minimum	40	15	4.2	0	N/A	70	292	-0.006
									15% Open
Girls Lckr	OA Duct	40	15	4.2	0	N/A	351	1463	-0.25
	OA Minimum	40	15	4.2	0	N/A	68	283	-0.005
									15% Open
									1

Environmental Testing & Balancing, Inc.

154 STATE STREET SUITE 204 NORTH HAVEN, CT 06473 (203) 234-2089 FAX (203) 234-2147

CERTIFIED TESTING AND BALANCING REPORT

Date:	September 3, 2020			
Project:	Brown Middle School			
	Ventilation Survey			
Address:	980 Durham Road			
	Madison			
	Connecticut			
HVAC Contractor:	Colliers			

The data presented in this report is a record of the system measurements and final adjustments that have been obtained in accordance with the current edition of the NEBB Procedural Standards for Testing, Adjusting and Balancing of Environmental Systems. Any variance from design quantities which exceed NEBB or project tolerances are noted in the Test-Adjust-Balance report Remarks.

Submitted and Certified by: NEBB Professional John E. Burgess



TABLE OF CONTENTS

Sheet Title

Sheet Title	Page Numbers
Instrument Calibration Sheet	
Glossary / Notes (two pages)	
Remarks	1
AHU-1	1
Air Apparatus Test Sheet	2
Air Outlet Test Sheet	3
All Outlet Test Sheet AHU-2	3
	4
Air Apparatus Test Sheet Air Outlet Test Sheet	5
All Outlet Test Sheet AHU-3	,
Air Apparatus Test Sheet	6
Air Outlet Test Sheets	7 - 8
All Outlet Test Sheets AHU-4	/ - 0
Air Apparatus Test Sheet	9
Air Outlet Test Sheet	10
AHU-A1	10
Air Apparatus Test Sheet	11
Air Outlet Test Sheet	12
AHU-A2	12
Air Apparatus Test Sheet	13
Air Outlet Test Sheet	14
AHU-A3	
Air Apparatus Test Sheet	15
Air Outlet Test Sheet	16
AHU-A4	
Air Apparatus Test Sheet	17
Air Outlet Test Sheet	18
AHU-A5	
Air Apparatus Test Sheet	19
Air Outlet Test Sheet	20
AHU-A6	
Air Apparatus Test Sheet	21
Air Outlet Test Sheet	22
AHU-A7	
Air Apparatus Test Sheet	23
Air Outlet Test Sheets	24 - 26
AHU-A8	
Air Apparatus Test Sheet	27
Air Outlet Test Sheet	28

TABLE OF CONTENTS

Sheet Title	Page Numbers
AHU-A9	
Air Apparatus Test Sheet	29
Air Outlet Test Sheet	30
AHU-B1	
Air Apparatus Test Sheet	31
Air Outlet Test Sheet	32
AHU-B2	
Air Apparatus Test Sheet	33
Air Outlet Test Sheet	34
AHU-B3	
Air Apparatus Test Sheet	35
Air Outlet Test Sheet	36
AHU-B4	
Air Apparatus Test Sheet	37
Air Outlet Test Sheet	38
Traverse Summary Test Sheets	39 - 40

Environmental Testing & Balancing, Inc.

Instrument Calibration Sheet

Date Calibrated	Instrument	Model #	Serial #	Manufacturer
Air Test Equipment				
November 2019	Air Data Multimeter	ADM860	M01616	Shortridge
April 2020	Digital Anemometer	RVA801	A00142	Alnor
April 2020	Digital Ampmeter	324	33230041WS	Fluke
February 2020	Pocket Laser Tach	PTL200	1940830	Monarch
Hydronics Test Equipn	nent			
February 2020	Hydrodata Multimeter	HDM250	W14102	Shortridge

Glossary

Abbreviation	Meaning	Abbreviation	Meaning
" W.G.	(measured in) Inches Water Gauge	LWT	Leaving Water Temperature
A/C	Air Changes per Hour	MA	Mixed Air
AHU	Air Handling Unit	MAU, MUA	Make-Up Air Unit
AMPS	Amperages	Max	Maximum
BHP	Brake Horsepower	MBH	Thousand BTUs per Hour
BTU	British Thermal Unit	Min	Minimum
CD	Ceiling Diffuser	N/A	Not Available, Not Accessible
CEF	Ceiling Exhaust Fan	No.	Number
CF for DDC	BMS Correction Factor	OA	Outside Air
CFM	Cubic Feet per Minute	OBD	Opposed Blade Damper
СН	Chiller	OD	Outside Diameter
CHWC, CC	Chilled Water Coil, Cooling Coil	OED	Open End Duct
CS	Circuit Setter	PSI	Pounds per Square Inch
СТ	Cooling Tower	RA	Return Air
CV	Constant Volume	RCP	Radiant Ceiling Panel
dB	Decibel	Req'd	Required
Dia	Diameter	RG	Return Grille
dP, DP	Differential Pressure	RGD(s)	Register(s), Grille(s), Diffuser(s)
EADB	Entering Air Dry Bulb	RHC	Reheat Coil
EAWB	Entering Air Wet Bulb	Rm Press	Room Pressure
EF	Exhaust Fan	RP	Radiant Panel
EG	Exhaust Grille	RPM	Revolutions per Minute
ER	Exhaust Register	RTU	Roof Top Unit
EWT	Entering Water Temperatrue	SA	Supply Air
EX / EXH	Exhaust	SD	Supply Diffuser
F	Fahrenheit	SL	Slot
FLA	Full Load Amperage	SNRKL	Snorkel
FCU	Fan Coil Unit	SP	Static Pressure
FPM	Feet per Minute	TADBF	Total Air Delivered by Fan
GPM	Gallons per Minute	TF	Thermafuser
HP	Horsepower	VAV	Variable Air Volume
HWC, HC	Hot Water Coil, Heating Coil	VFD	Variable Frequency Drive
HX	Heat Exchanger		
kW	Kilowatt		
LADB	Leaving Air Dry Bulb		
LAWB	Leaving Air Wet Bulb		
LD	Linear Diffuser		

Notes

Measuring with Flow Hood (referencing Air Outlet Test Sheets and Grille, Register & Diffuser Test Sheets):

Registers, diffusers and grilles are read directly in cfm. (Report program indicates 1.00 in Ak Factor column.)

Measuring in Velocity (referencing Air Outlet Test Sheets and Grille, Register & Diffuser Test Sheets):

Ak Factor indicates actual area of registers, following multipying the Ak by the area equals the actual free area; therefore cfm is calculated and based on this factor (fpm x Ak).

Codes (referencing Air Outlet Test Sheets and Grille, Register & Diffuser Test Sheets):

If codes are not listed here, please reference design drawings.

ENVIRONMENTAL TESTING & BALANCING, INC.

Brown Middle School Ventilation Survey

Remarks

September 3, 2020

AHU-1

Design equals 10000 cfm whereas connected load is 11910 cfm.

AHU-2

VAV 05 - design is 660 cfm whereas connected load is 795 cfm

VAV 08 - design is 3130 cfm whereas connected load is 2280 cfm

AHU-3

VAV 02 - design is 1200 cfm whereas connected load is 1300 cfm

VAV 03 - design is 300 cfm whereas connected load is 300 cfm

VAV 034- design is 1400 cfm whereas connected load is 1575 cfm

AHU-7A

VAV 1 - diffuser in serving Room 208 is not installed

VAV-V5, VAV-V8 - unable to see on BMS

Job Name: Brown Middle School Ventilation Survey

Tested By: B Cooney / P Ouellette / M A DeZinno September 3, 2020 (20203BM)

AHU-1 DESIGN DATA

Manufacturer =	AAON	Model No. = RN01630EB09EJH
Type =	RTU	Serial No. = 201206BNWM02790
Total Scheduled cfm =	6000	Total Grille cfm = 11910
Outside Air cfm =	1600	
Total Static Pressure =		External Static Pressure =
Fan rpm =		Brake Horsepower =

MOTOR DESIGN DATA

Horsepower =	Voltage =	Phase =	rpm =
	,		- F

AIR TEST DATA

Total cfm by Louver Scan =	6160	Total cfm by Grille Readings =	11736
Outside Air =	1692		

PRESSURE TEST DATA

Total Suction Static Pressure =	-0.36		
Total Discharge Static Pressure =	1.15		
Tota	al Static Pressure =	1.51	
External Suction Static Pressure =	-0.22		
External Discharge Static Pressure =	1.15		
Exte	ernal Static Pressure =	1.37	
DX Coil & Filter DP =	0.14		

MOTOR TEST DATA

Motor Manufacturer / Frame =					
Horsepower =	Phase =		Voltage =		
Full Load Amps =			FLA Corrected for Voltage =		
Motor rpm =		Service Factor =			
No Load Amps =			Operating Amps =		
Calculated Brake Horsepower	=				

Motor Sheave Model / Dia. =		
Motor Sheave Bore =		
Fan Sheave Model / Dia. =		
Fan Sheave Bore =		Fan rpm =
Adjustable Sheave Dia. =		Center Line Distance =
Belts =		
Filters =		
Outside Air Setting =	30% Open	

Job Name: Brown Middle School Ventilation Survey

Tested By:		B Coone	ey / P Oue	llette / M A			ber 3, 202	0 (20203	BM)	
Outlet	Room			"Ak"	Des	ign	First	New	Fin	al
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
		AHU-1		,						
1	cafeteria	CD	2414	1.00	485	485	487	478	487	487
2	cafeteria	CD	2414	1.00	485	485	499	478	499	499
3	cafeteria	CD	2414	1.00	485	485	479	478	479	479
4	cafeteria	CD	2414	1.00	485	485	492	478	492	492
5	cafeteria	CD	2414	1.00	485	485	488	478	488	488
6	cafeteria	CD	2414	1.00	485	485	485	478	485	485
7	cafeteria	CD	2414	1.00	600	600	555	591	555	555
8	cafeteria	CD	2414	1.00	600	600	613	591	613	613
9	cafeteria	CD	2414	1.00	600	600	572	591	572	572
10	cafeteria	CD	2414	1.00	600	600	664	591	664	664
11	cafeteria	CD	2414	1.00	600	600	633	591	633	633
12	cafeteria	CD	2414	1.00	600	600	624	591	624	624
13	cafeteria	SD	2414	1.00	480	480	477	473	477	477
14	cafeteria	CD	2414	1.00	910	910	888	897	888	888
15	cafeteria	SD	2414	1.00	450	450	417	443	417	417
16	cafeteria	SD	2414	1.00	265	265	233	261	233	233
17	cafeteria	CD	2414	1.00	450	450	416	443	416	416
18	cafeteria	SD	2414	1.00	285	285	270	281	270	270
19	cafeteria	CD	2414	1.00	625	625	587	616	587	587
20	cafeteria	SD	2414	1.00	240	240	200	236	200	200
21	cafeteria	CD	2414	1.00	510	510	513	503	513	513
22	cafeteria	SD	2414	1.00	320	320	286	315	286	286
23	cafeteria	CD	2414	1.00	515	515	499	507	499	499
24	cafeteria	SD	2414	1.00	350	<u>350</u>	359	345	359	<u>359</u>
						11910				11736
										99%

Job Name: Brown Middle School Ventilation Survey

Tested By: B Cooney / P Ouellette / M A DeZinno September 3, 2020 (20203BM)

AHU-2 DESIGN DATA

Manufacturer =	AAON	Model No. =	RN04030EB09EJM
Type =	RTU	Serial No. =	201206BNWV02794
Total Scheduled cfm =	10000		
Outside Air cfm =	2500		
Total Static Pressure =		External Static P	ressure =
Fan rpm =		Brake Horsepow	er =

MOTOR DESIGN DATA

Horsepower =	Voltage =	Phase =	rpm =
AIR TEST DATA			
Total cfm by Louver Scan =	9632		

Total cfm by Louver Scan =	9632
Outside Air =	2516

PRESSURE TEST DATA

Total Suction Static Pressure =	-0.79		
Total Discharge Static Pressure =	0.94		
To	otal Static Pressure =	1.73	
External Suction Static Pressure =	-0.48		
External Discharge Static Pressure =	0.94		
Ex	xternal Static Pressure =	1.42	
DX Coil & Filter DP =	0.31		

MOTOR TEST DATA

Motor Manufacturer / Frame =				
Horsepower =	Phase =	Voltage =		
Full Load Amps =		FLA Corrected for Voltage =		
Motor rpm =		Service Factor =		
No Load Amps = Operating Amps =				
Calculated Brake Horsepower =				

Motor Sheave Model / Dia. =			
Motor Sheave Bore =			
Fan Sheave Model / Dia. =			
Fan Sheave Bore =		Fan rpm =	
Adjustable Sheave Dia. =		Center Line Distance =	
Belts =			
Filters =			
Outside Air Setting =	25% Open		
Static Control Setpoint =	1.14" w.g.		

Job Name: Brown Middle School Ventilation Survey

Tested By:		D COOR	ey / P Oue	llette / M A			ber 3, 2020			
Outlet	Room		g:	"Ak"	Des		First	New	Fin	
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
		AHU-2								
Įl		AIIU-2								
VA	V-05	1								
1	537	C	24x24	1.00	75	75	70	75	70	70
2	538	С	24x24	1.00	275	275	268	274	268	268
3	539	С	24x24	1.00	145	145	155	145	155	155
4	541	С	24x24	1.00	150	150	154	150	154	154
5	542	С	24x24	1.00	150	<u>150</u>	146	150	146	<u>146</u>
						795				793
										100%
Box Type	Box Size		Flow Cor	rection Fact	or for DDO	C	Design N	1inimum	Test Min	nimum
Exist	9						230			
VA	V-07									
1	285	С	24x24	1.00	510	510	554	519	554	554
2	285	C	24x24	1.00	490	490	522	498	522	522
3	285	C	24x24	1.00	480	480	462	488	462	462
4	285	C	24x24	1.00	480	<u>480</u>	455	488	455	<u>455</u>
						1960				1993
										102%
Box Type	Box Size		Flow Cor	rection Fact	or for DDO	C	Design N	1inimum	Test Min	nimum
Exist	14						590			
VA	V-08									
1	544	С	24x24	1.00	390	390	450	426	450	450
2	544	С	24x24	1.00	380	380	461	415	461	461
3	544	С	24x24	1.00	375	375	382	409	382	382
4	544	С	24x24	1.00	380	380	399	415	399	399
5	544	С	24x24	1.00	375	375	407	409	407	407
6	544	С	24x24	1.00	380	<u>380</u>	390	415	390	<u>390</u>
						2280				2489
										109%
Box Type	Box Size		Flow Cor	rection Fact	or for DDC	2	Design N	/Iinimum	Test Min	nimum
Exist	16						940			

Job Name: Brown Middle School Ventilation Survey

Tested By: B Cooney / P Ouellette / M A DeZinno September 3, 2020 (20203BM)

AHU-3 DESIGN DATA

Manufacturer =	AAON	Model No. =	RN00930EB09EJH
Type =	RTU	Serial No. =	201206ANWQ02822
Total Scheduled cfm =	3600		
Outside Air cfm =	900		
Total Static Pressure =		External Static P	ressure =
Fan rpm =		Brake Horsepow	er =

MOTOR DESIGN DATA

Horsepower =	Voltage =		Phase =	rpm =
AIR TEST DATA				
Total cfm by Louver Scan =		3430		

Total cfm by Louver Scan =	3430	
Outside Air =	955	

PRESSURE TEST DATA

Total Suction Static Pressure =	-0.19		
Total Discharge Static Pressure =	0.87		
Total	al Static Pressure =	1.06	
External Suction Static Pressure =	-0.10		
External Discharge Static Pressure =	0.87		
Ext	ernal Static Pressure =	0.97	
DX Coil & Filter DP =	0.09		

MOTOR TEST DATA

Motor Manufacturer / Frame =							
Horsepower =	Phase =	Voltage =					
Full Load Amps =		FLA Corrected for Voltage =					
Motor rpm =	Motor rpm =						
No Load Amps =		Operating Amps =					
Calculated Brake Horsepower =							

Motor Sheave Model / Dia. =			
Motor Sheave Bore =			
Fan Sheave Model / Dia. =			
Fan Sheave Bore =		I	San rpm =
Adjustable Sheave Dia. =		(Center Line Distance =
Belts =			
Filters =			
Outside Air Setting =	20% Open		
Static Control Setpoint =	1.50" w.g.		

Job Name: Brown Middle School Ventilation Survey

Tested By:		R Coon	ey / P Oue	llette / MI A			ber 3, 202			
Outlet	Room			"Ak"	Des	ign	First	New	Fin	al
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
		AHU-3								
VA	V-01									
1	548	CD	2408	1.00	250	250	255	263	255	255
2	533	CD	2406	1.00	130	130	143	137	143	143
3	532	CD	2410	1.00	280	<u>280</u>	297	295	297	<u>297</u>
						660				695
										105%
Box Type	Box Size		Flow Cor	rection Fact	or for DD0	\Box	Design N	/Iinimum	Test Mi	nimum
Exist	9						230			
VA	V-02									
1	530	CD	2410	1.00	325	325	322	312	322	322
2	530	CD	2410	1.00	325	325	310	312	310	310
3	530	CD	2410	1.00	325	325	300	312	300	300
4	530	CD	2410	1.00	325	<u>325</u>	315	312	315	315
	330	CD	2410	1.00	323	1300	313	312	313	1247
						1300				96%
Box Type	Box Size		Flow Cor	rection Fact	or for DD(7	Design N		Test Min	
	12		Flow Col	raci	טו וטו וטו			/IIIIIIIIIIIIIII	1 est IVIII	IIIIIuIII
Exist	12						360			
T 7.4	X7.02	1								
	V-03		2410	1.00	215	215	2.60		260	260
1	529	CD	2410	1.00	315	315	268		268	268
D	- a.				2 55	~				85%
Box Type	Box Size		Flow Cor	rection Fact	or for DDO	<i>)</i>		/Iinimum	Test Mi	nımum
Exist	6		Т				100			

Job Name: Brown Middle School Ventilation Survey

Tested By:		B Coone	ey / P Oue	llette / M A			ber 3, 202			
Outlet	Room			"Ak"	Des	ign	First	New	Fir	ıal
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
VA	V-04									
1	525	CD	2410	1.00	325	325	302	313	302	302
2	525	CD	2410	1.00	325	325	309	313	309	309
3	525	CD	2410	1.00	325	325	291	313	291	291
4	525	CD	2410	1.00	325	325	328	313	328	328
5	526	CD	2410	1.00	275	<u>275</u>	286	265	286	286
						1575				1516
										96%
Box Type	Box Size		Flow Cor	rection Fact	or for DD0	2	Design N	1inimum	Test Mi	
Exist	12						420			
VA	V-06									
1	524	CD	12x8	1.00	250	250	214	231	214	214
2	524	CD	2408	1.00	250	250	255	231	255	255
3	524	CD	2408	1.00	250	250 250	223	231	223	<u>223</u>
3	324	СБ	2400	1.00	230	750	223	231	223	692
						730				92%
Box Type	Box Size		Flow Cor	rection Fact	or for DD(7	Design N		Test Mi	
Exist	9		Tiow Con	icciion raci	ילעל זטו זט.		225	111111111111111	1 CSt IVII	IIIIIuiii
EXIST	<u> </u>						223			

Job Name: Brown Middle School Ventilation Survey

Tested By: B Cooney / P Ouellette / M A DeZinno September 3, 2020 (20203BM)

AHU-4 DESIGN DATA

Manufacturer =	AAON	Model No. = RN02630EB09EJK
Type =	RTU	Serial No. = 201206BNWS02795
Total Scheduled cfm =	10000	Total Grille cfm = 9690
Outside Air cfm =	2600	
Total Static Pressure =		External Static Pressure =
Fan rpm =		Brake Horsepower =

MOTOR DESIGN DATA

Horsepower =	Voltage =	Phase =	rpm =
	,		- F

AIR TEST DATA

Total cfm by Louver Scan =	10543	Total cfm by Grille Readings =	10066
Outside Air =	2712		

PRESSURE TEST DATA

Total Suction Static Pressure =	-1.26		
Total Discharge Static Pressure =	0.38		
Total So	tatic Pressure =	1.64	
External Suction Static Pressure =	-1.10		
External Discharge Static Pressure =	0.38		
Externa	al Static Pressure =	1.48	
DX Coil & Filter DP =	0.16		

MOTOR TEST DATA

Motor Manufacturer / Frame =							
Horsepower =	Phase =		Voltage =				
Full Load Amps =		FLA Corrected for Voltage =					
Motor rpm =	Motor rpm =			Service Factor =			
No Load Amps =	No Load Amps =						
Calculated Brake Horsepower	=						

Motor Sheave Model / Dia. =		
Motor Sheave Bore =		
Fan Sheave Model / Dia. =		
Fan Sheave Bore =		Fan rpm =
Adjustable Sheave Dia. =		Center Line Distance =
Belts =		
Filters =		
Outside Air Setting =	25% Open	

Job Name: Brown Middle School Ventilation Survey

Tested By:		B Coone	ey / P Oue	llette / M A	DeZinno	Septem	ber 3, 202	0 (20203	BM)	
Outlet	Room			"Ak"	Des	ign	First	New	Fin	al
Number	Number	Code	Size	Factor	fpm	cfm	Test	Reg'd	fpm	cfm
		AHU-4								
1	auditorium	CD	18x18	1.00	1070	1070	1084	1112	1084	1084
2	auditorium	CD	18x18	1.00	1070	1070	1110	1112	1110	1110
3	auditorium	CD	18x18	1.00	1070	1070	1140	1112	1140	1140
4	auditorium	CD	12x12	1.00	270	270	286	280	286	286
5	auditorium	CD	12x12	1.00	270	270	265	280	265	265
6	auditorium	CD	12x12	1.00	270	270	298	280	298	298
7	auditorium	CD	12x12	1.00	270	270	274	280	274	274
8	auditorium	CD	12x12	1.00	270	270	275	280	275	275
9	auditorium	CD	12x12	1.00	270	270	266	280	266	266
10	auditorium	CD	12x12	1.00	270	270	298	280	298	298
11	auditorium	CD	12x12	1.00	270	270	288	280	288	288
12	auditorium	CD	12x12	1.00	270	270	255	280	255	255
13	auditorium	CD	12x12	1.00	270	270	271	280	271	271
14	auditorium	CD	12x12	1.00	270	270	288	280	288	288
15	auditorium	CD	12x12	1.00	270	270	290	280	290	290
16	auditorium	CD	12x12	1.00	270	270	297	280	297	297
17	auditorium	CD	12x12	1.00	270	270	277	280	277	277
18	auditorium	CD	12x12	1.00	270	270	270	280	270	270
19	auditorium	CD	12x12	1.00	270	270	266	280	266	266
20	auditorium	CD	12x12	1.00	270	270	288	280	288	288
21	auditorium	CD	12x12	1.00	270	270	245	280	245	245
22	auditorium	CD	12x12	1.00	270	270	277	280	277	277
23	auditorium	CD	12x12	1.00	270	270	291	280	291	291
24	auditorium	CD	12x12	1.00	270	270	270	280	270	270
25	auditorium	CD	12x12	1.00	270	270	288	280	288	288
26	auditorium	CD	12x12	1.00	270	270	299	280	299	299
27	auditorium	CD	12x12	1.00	270	270	310	280	310	<u>310</u>
						9690				10066
										104%

Job Name: Brown Middle School Ventilation Survey

Tested By: B Cooney / P Ouellette / M A DeZinno September 3, 2020 (20203BM)

AHU-A1 ____ DESIGN DATA

Manufacturer =	McQuay	Model No. = CAH012FDAC
Type =	AHU	Serial No. = FBOU040100109
Total Scheduled cfm =	6500	Total Grille cfm = 5950
Outside Air cfm =	1500	
Total Static Pressure =		External Static Pressure =
Fan rpm =		Brake Horsepower =

MOTOR DESIGN DATA

Horsepower =	Voltage =	Phase =	rpm =
	,		- F

AIR TEST DATA

Total cfm by Traverse =	5995	Total cfm by Grille Readings =	5404
Outside Air =	1573		

PRESSURE TEST DATA

Total Suction Static Pressure =	-1.50		
Total Discharge Static Pressure =	0.80		
Tota	al Static Pressure =	2.30	
External Suction Static Pressure =	-0.65		
External Discharge Static Pressure =	0.80		
Exte	ernal Static Pressure =	1.45	
DX Coil & Filters DP =	0.85		

MOTOR TEST DATA

Motor Manufacturer / Frame =						
Horsepower =	Phase =	Voltage =				
Full Load Amps =		FLA Corrected for Voltage =				
Motor rpm =		Service Factor =				
No Load Amps =	Operating Amps =					
Calculated Brake Horsepower =						

Motor Sheave Model / Dia. =		
Motor Sheave Bore =		
Fan Sheave Model / Dia. =		
Fan Sheave Bore =		Fan rpm =
Adjustable Sheave Dia. =		Center Line Distance =
Belts =		
Filters =		
Outside Air Setting =	20% Open	

Job Name: Brown Middle School Ventilation Survey

0.,41.4	D			"Ak"			Einst			al
Outlet	Room		Q!		Des		First	New	Fin	
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
		ATTEL	<u> </u>							
		AHU-A	<u>l</u>							
1	217	D	1010	1.00	1000	1000	051	000	054	051
1	217	В	18x18 9x9	1.00	1000	1000	854 123	908	854	854
3	218	В		1.00		100 1200		91	123	123
4	240	B B	18x18 18x18	1.00	1200 900	900	1027	1090 817	1027 673	1027
5	219	В	18x18	1.00	1200	1200	673 1073	1090	1073	673 1073
	257	В		1.00	50	50	56	45	56	
7	237	+	6x6 9x9					-		56
8		В		1.00	100	100	76	91	76	76
	corr	В	9x9	1.00	100	100	73	91	73	73
9 10	238	В	9x9	1.00	100	100	185	91	185	185
10	220	В	18x18	1.00	1200	<u>1200</u>	1264	1090	1264	<u>1264</u>
						5950				5404
										91%

Job Name: Brown Middle School Ventilation Survey

Tested By: B Cooney / P Ouellette / M A DeZinno September 3, 2020 (20203BM)

AHU-A2 DESIGN DATA

Manufacturer =	McQuay	Model No. = CAH014FDAC
Type =	AHU	Serial No. = FBOU040100110
Total Scheduled cfm =	5000	Total Grille cfm = 6500
Outside Air cfm =	1500	
Total Static Pressure =		External Static Pressure =
Fan rpm =		Brake Horsepower =

MOTOR DESIGN DATA

Horsepower =	Voltage =	Phase =	rpm =
	,		- F

AIR TEST DATA

Total cfm by Traverse =	4328	Total cfm by Grille Readings =	4243
Outside Air =	1428		

PRESSURE TEST DATA

Total Suction Static Pressure =	-1.14		
Total Discharge Static Pressure =	0.38		
Tota	al Static Pressure =	1.52	
External Suction Static Pressure =	-0.44		
External Discharge Static Pressure =	0.38		
Exte	ernal Static Pressure =	0.82	
DX Coil & Filters DP =	0.85		

MOTOR TEST DATA

Motor Manufacturer / Frame =				
Horsepower =	Phase =	Voltage =		
Full Load Amps =		FLA Corrected for Voltage =		
Motor rpm =		Service Factor =		
No Load Amps = Operating Amps =				
Calculated Brake Horsepower =				

Motor Sheave Model / Dia. =		
Motor Sheave Bore =		
Fan Sheave Model / Dia. =		
Fan Sheave Bore =		Fan rpm =
Adjustable Sheave Dia. =		Center Line Distance =
Belts =		
Filters =		
Outside Air Setting =	30% Open	

Job Name: Brown Middle School Ventilation Survey

Tested By:		B Coone	<u>ey / P Oue</u>	llette / M A	<u>DeZinno</u>	<u>Septem</u>	ber 3, 202	0 (20203		
Outlet	Room			"Ak"	Des	ign	First	New	Fin	al
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
					1					
		AHU-A	2							
1	107	В	18x18	1.00	1100	1100	705	718	705	705
2	132	В	15x15	1.00	450	450	330	294	330	330
3	corr	В	9x9	1.00	100	100	32	65	32	32
4	106	В	15x15	1.00	750	750	482	490	482	482
5	106	В	15x15	1.00	750	750	491	490	491	491
6	132	В	12x12	1.00	450	450	318	294	318	318
7	108	В	18x18	1.00	1100	1100	713	718	713	713
8	131	В	12x12	1.00	500	500	293	326	293	293
9	109	В	18x18	1.00	1100	1100	771	718	771	771
10	130	В	9x9	1.00	100	100	66	65	66	66
11	corr	В	9x9	1.00	100	<u>100</u>	42	65	42	42
						6500				4243
										65%
									+	

Job Name: Brown Middle School Ventilation Survey

Tested By: B Cooney / P Ouellette / M A DeZinno September 3, 2020 (20203BM)

AHU-A3 DESIGN DATA

Manufacturer =	McQuay	Model No. = OAH021FDAC
Type =	RTU	Serial No. = FBOU040100108
Total Scheduled cfm =	5000	Total Grille cfm = 6000
Outside Air cfm =	1500	
Total Static Pressure =		External Static Pressure =
Fan rpm =		Brake Horsepower =

MOTOR DESIGN DATA

Horsepower =	Voltage =	Phase =	rpm =
--------------	-----------	---------	-------

AIR TEST DATA

Total cfm by Louver Scan =	5021	Total cfm by Grille Readings =	5535
Outside Air =	1552		

PRESSURE TEST DATA

Total Suction Static Pressure =	-1.26	
Total Discharge Static Pressure =	0.70	
	Total Static Pressure =	1.96
External Suction Static Pressure =	-0.13	
External Discharge Static Pressure	= 0.70	
	External Static Pressure =	0.83
Cooling Coil DP =	0.84	
Pre Filters DP =	0.29	

MOTOR TEST DATA

Motor Manufacturer / Frame =				
Horsepower =	Phase =	Voltage =		
Full Load Amps =		FLA Corrected for Voltage =		
Motor rpm =		Service Factor =		
No Load Amps = Operating Amps =				
Calculated Brake Horsepower =				

Motor Sheave Model / Dia. =		
Motor Sheave Bore =		
Fan Sheave Model / Dia. =		
Fan Sheave Bore =		Fan rpm =
Adjustable Sheave Dia. =		Center Line Distance =
Belts =		
Filters =		
Outside Air Setting =	25% Open	

Job Name: Brown Middle School Ventilation Survey

Tested By:		B Coone	ey / P Oue	llette / M A			ber 3, 202	0 (20203	<u> </u>	
Outlet	Room			"Ak"	Des	ign	First	New	Fin	al
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
		AHU-A	3							
,										
1	221	В	18x18	1.00	1200	1200	1136	1107	1136	1136
2	222	В	18x18	1.00	1200	1200	1113	1107	1113	1113
3	223	В	18x18	1.00	1200	1200	1048	1107	1048	1048
4	224	В	18x18	1.00	1200	1200	1159	1107	1159	1159
5	225	В	18x18	1.00	1200	<u>1200</u>	1079	1107	1079	<u>1079</u>
						6000				5535
										92%

Job Name: Brown Middle School Ventilation Survey

Tested By: B Cooney / P Ouellette / M A DeZinno September 3, 2020 (20203BM)

AHU-A4 DESIGN DATA

Manufacturer =	McQuay	Model No. = CAH012FDAC
Type =	AHU	Serial No. = FBOU040100111
Total Scheduled cfm =	5000	Total Grille cfm = 4950
Outside Air cfm =	1500	
Total Static Pressure =		External Static Pressure =
Fan rpm =		Brake Horsepower =

MOTOR DESIGN DATA

Horsepower =	Voltage =	Phase =	rpm =
--------------	-----------	---------	-------

AIR TEST DATA

Total cfm by Traverse =	5016	Total cfm by Grille Readings =	4340
Outside Air =	1520	Return Air =	

PRESSURE TEST DATA

Total Suction Static Pressure =	-1.45		
Total Discharge Static Pressure =	0.25		
Total :	Static Pressure =	1.70	
External Suction Static Pressure =	-0.27		
External Discharge Static Pressure =	0.25		
Exteri	nal Static Pressure =	0.52	
DX Coil & Filters DP =	1.18		

MOTOR TEST DATA

Motor Manufacturer / Frame =					
Horsepower =	Phase =	Voltage =			
Full Load Amps =		FLA Corrected for Voltage =			
Motor rpm =		Service Factor =			
No Load Amps =		Operating Amps =			
Calculated Brake Horsepower =					

Motor Sheave Model / Dia. =		
Motor Sheave Bore =		
Fan Sheave Model / Dia. =		
Fan Sheave Bore =		Fan rpm =
Adjustable Sheave Dia. =		Center Line Distance =
Belts =		
Filters =		
Outside Air Setting =	45% Open	

Job Name: Brown Middle School Ventilation Survey

Tested By:		B Coon	ey / P Oue	llette / M A	DeZinno	Septem	ber 3, 2020	0 (20203	BM)	
Outlet	Room			"Ak"	Des	ign	First	New	Fin	al
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
					1					
		AHU-A	4							
1	128	В	12x12	1.00	400	400	362	351	362	362
2	129	В	6x6	1.00	50	50	81	44	81	81
3	129-A	В	9x9	1.00	100	100	92	88	92	92
4	corr	В	9x9	1.00	100	100	138	88	138	138
5	110	В	18x18	1.00	1100	1100	990	964	990	990
6	111	В	18x18	1.00	1100	1100	885	964	885	885
7	127	В	12x12	1.00	450	450	404	395	404	404
8	127	В	12x12	1.00	450	450	415	395	415	415
9	corr	В	9x9	1.00	100	100	128	88	128	128
10	112	В	18x18	1.00	1100	<u>1100</u>	845	964	845	845
						4950				4340
										88%

Job Name: Brown Middle School Ventilation Survey

Tested By: B Cooney / P Ouellette / M A DeZinno September 3, 2020 (20203BM)

AHU-A5 DESIGN DATA

Manufacturer =	McQuay	Model No. = OAH006FDAC
Type =	RTU	Serial No. = FBOU040100086
Total Scheduled cfm =	3200	Total Grille cfm = 3200
Outside Air cfm =	1600	
Total Static Pressure =		External Static Pressure =
Fan rpm =		Brake Horsepower =

MOTOR DESIGN DATA

Horsepower =	Voltage =	Phase =	rpm =
	,		- F

AIR TEST DATA

Total cfm by Louver Scan =	3663	Total cfm by Grille Readings =	2975
Outside Air =	1700	Return Air =	

PRESSURE TEST DATA

Total Suction Static Pressure =	12.04		
Total Discharge Static Pressure =	0.57		
To	otal Static Pressure =	-11.47	
External Suction Static Pressure =	-0.44		
External Discharge Static Pressure =	0.57		
Ex	xternal Static Pressure =	1.01	
Cooling Coil & Filter DP =	1.60		

MOTOR TEST DATA

Motor Manufacturer / Fra	me =			
Horsepower =	Phase =	Voltage =		
Full Load Amps =		FLA Corrected for Voltage =		
Motor rpm =		Service Factor =		
No Load Amps = Operating Amps =				
Calculated Brake Horsepo	wer =			

Motor Sheave Model / Dia. =			
Motor Sheave Bore =			
Fan Sheave Model / Dia. =			
Fan Sheave Bore =]	Fan rpm =
Adjustable Sheave Dia. =			Center Line Distance =
Belts =			
Filters =			
Outside Air Setting =	35% Open		

Job Name: Brown Middle School Ventilation Survey

Outlet	Room		JII Ouc	"Ak"	Des		First	New	Fin	al .
Number	Room Number	Codo	Size				l I	l li		
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
		ATTT	<u> </u>							
		AHU-A	<u> </u>							
1	226	В	12x12	1.00	450	450	424	418	424	424
2	212	В	6x6	1.00	50	50	56	418	56	56
3	226	В	12x12	1.00	450	450	420	418	420	420
4	Corr	В	6x6	1.00	50	50	69	46	69	69
5	230	В	18x18	1.00	900	900	749	837	749	749
6	230	В	18x18	1.00	900	900	849	837	849	849
7	171	В	9x9	1.00	100	100	117	93	117	117
8	233	В	9x9	1.00	125	125	91	116	91	91
9	235	В	6x6	1.00	50	50	96	46	96	96
10	232	В	9x9	1.00	125	125	104	116	104	<u>104</u>
10	232	Б	JAJ	1.00	123	3200	104	110	104	2975
						3200				93%

Job Name: Brown Middle School Ventilation Survey

Tested By: B Cooney / P Ouellette / M A DeZinno September 3, 2020 (20203BM)

AHU-A6 _____ DESIGN DATA

Manufacturer =	McQuay	Model No. =	CAH004FDAC
Type =	AHU	Serial No. =	FBOU040100103
Total Scheduled cfm =	2500		
Outside Air cfm =	300		
Total Static Pressure =		External Static P	ressure =
Fan rpm =		Brake Horsepow	er =

MOTOR DESIGN DATA

Horsepower =	Voltage =	Phase =	rpm =
	,		- F

AIR TEST DATA

Total cfm by Traverse =	2560	Total cfm by Grille Readings =	2247
Outside Air =	310		

PRESSURE TEST DATA

Total Suction Static Pressure =	-1.71		
Total Discharge Static Pressure =	0.15		
Total	l Static Pressure =	1.86	
External Suction Static Pressure =	-0.68		
External Discharge Static Pressure =	0.15		
Exte	rnal Static Pressure =	0.83	
DX Coil & Filters DP =	1.04		

MOTOR TEST DATA

Motor Manufacturer / Frame =						
Horsepower =	Phase =	Voltage =				
Full Load Amps =		FLA Corrected for Voltage =				
Motor rpm =		Service Factor =				
No Load Amps = Operating Amps =						
Calculated Brake Horsepower =						

Motor Sheave Model / Dia. =		
Motor Sheave Bore =		
Fan Sheave Model / Dia. =		
Fan Sheave Bore =		Fan rpm =
Adjustable Sheave Dia. =		Center Line Distance =
Belts =		
Filters =		
Outside Air Setting =	58% Open	

Job Name: Brown Middle School Ventilation Survey

Outlet	Room		, i ouc	"Ak"			First	New Final		ıal
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
Tuilibei	Number	Couc	SIZC	Tactor	трш	CIII	1686	Key u	трш	CIII
		AHU-A	6							
		1								
1	122	A	2406	1.00	125	125	75	0	75	75
2	122	A	2406	1.00	125	125	71	0	71	71
3	122	A	2406	1.00	125	125	70	0	70	70
4	122	A	2406	1.00	125	125	47	0	47	47
5	113	A	2408	1.00	150	150	83	0	83	83
6	113	A	2406	1.00	150	150	110	0	110	110
7	114	A	2408	1.00	175	175	117	0	117	117
8	116	A	2406	1.00	120	120	139	0	139	139
9	115	A	2408	1.00	250	250	172	0	172	172
10	115	A	2408	1.00	250	250	172	0	172	172
11	117	A	2406	1.00	100	100	82	0	82	82
12	118	A	2406	1.00	80	80	80	0	80	80
13	119	A	2406	1.00	80	80	109	0	109	109
14	120	A	2410	1.00	300	300	157	0	157	157
15	120	A	2410	1.00	300	300	161	0	161	161
16	corr	A	2408	1.00	0	N/A	183	0	183	183
17	corr	A	2408	1.00	0	N/A	194	0	194	194
18	corr	A	2408	1.00	0	N/A	125	0	125	125
19	corr	A	2408	1.00	0	N/A	100	0	100	<u>100</u>
										2247

Job Name: **Brown Middle School Ventilation Survey**

B Cooney / P Ouellette / M A DeZinno September 3, 2020 (20203BM) **Tested By:**

AHU-A7 **DESIGN DATA**

Manufacturer =	McQuay	Model No. =	CAH014FDAC
Type =	AHU	Serial No. =	FBOU040100112
Total Scheduled cfm =	6800		
Outside Air cfm =	2000		
Total Static Pressure =		External Static P	ressure =
Fan rpm =		Brake Horsepowe	er =

MOTOR DESIGN DATA

Horsepower =	Voltage =	Phase =	rpm =
AIR TEST DATA			
Total cfm by Traverse =	6325		

Total cfm by Traverse =	6325	
Outside Air =	2000	

PRESSURE TEST DATA

Total Suction Static Pressure =	-1.03		
Total Discharge Static Pressure =	0.25		
,	Total Static Pressure =	1.28	
External Suction Static Pressure =	-0.13		
External Discharge Static Pressure =	= 0.25		
	External Static Pressure =	0.38	
DX Coil & Filters DP =	0.90		

MOTOR TEST DATA

Motor Manufacturer / Frame =					
Horsepower =	Phase =	Voltage =			
Full Load Amps =		FLA Corrected for Voltage =			
Motor rpm =	Motor rpm =		Service Factor =		
No Load Amps =		Operating Amps =			
Calculated Brake Horsepower =					

Motor Sheave Model / Dia. =			
Motor Sheave Bore =			
Fan Sheave Model / Dia. =			
Fan Sheave Bore =			Fan rpm =
Adjustable Sheave Dia. =			Center Line Distance =
Belts =			
Filters =			
Outside Air Setting =	35% Open		
Static Control Setpoint =	1.85" w.g.	·	

Job Name: Brown Middle School Ventilation Survey

Tested By:		B Coone	ey / P Oue	llette / M A	DeZinno	Septem	ber 3, 202	0 (20203		
Outlet	Room			"Ak"	Des	ign	First	New	Fin	al
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
		AHU-A	7							
		1								
V	AV 1									
1	209	В	12x12	1.00	400	400	262	251	262	262
2	208	В	12x12	1.00	75	75	1	47	1	1
3	210	В	12x12	1.00	200	<u>200</u>	160	125	160	<u>160</u>
						675				423
										63%
Box Type	Box Size		Flow Cor	rection Fact	or for DDO	2	Design N	/Iinimum	Test Mi	nimum
VAV				T T					T	
V	AV 2									
1	301	A	6x6	1.00	50	50	1	29	1	1
2	201	В	12x12	1.00	400	400	245	233	245	245
3	201	В	12x12	1.00	400	<u>400</u>	250	233	250	<u>250</u>
						850				496
										58%
Box Type	Box Size		Flow Cor	rection Fact	or for DD0	C	Design N	/Iinimum	Test Mi	nimum
VAV										
V	AV3									
1	201	В	12x12	1.00	400	400	267	274	267	267
2	201	В	12x12	1.00	400	<u>400</u>	281	274	281	<u>281</u>
						800				548
										69%
Box Type	Box Size		Flow Cor	rection Fact	or for DD	2	Design N	1 Inimum	Test Mi	nimum
VAV										
V	AV 4									
1	201	В	12x12	1.00	400	400	244	241	244	244
2	201	В	12x12	1.00	400	<u>400</u>	238	241	238	<u>238</u>
						800				482
										60%
Box Type	Box Size		Flow Cor	rection Fact	or for DD	2	Design N	/linimum	Test Mi	nimum
VAV										

Job Name: Brown Middle School Ventilation Survey

D -			,, , , , ,	ъ	Septem				- 1
Room			"Ak"			First	New	Fina	
Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
AV 5									
201	В	12x12	1.00	500	500	1	1	1	1
201	В	12x12	1.00	500	<u>500</u>	1	1	1	1
					1000				2
									0%
Box Size		Flow Cor	rection Fact	or for DDC	C	Design N	1inimum	Test Mir	nimum
AV 6									
201	В	12x12	1.00	500	500	267	283	267	267
201	В	12x12	1.00	500	<u>500</u>	298	283	298	<u> 298</u>
					1000				565
									57%
Box Size		Flow Cor	rection Fact	or for DDC	C	Design N	1inimum	Test Mir	nimum
AV 7									
204	A	9x9	1.00	125	125	77	76	77	77
205	A	9x9	1.00	100	<u>100</u>	59	60	59	<u>59</u>
					225				136
									60%
Box Size		Flow Cor	rection Fact	or for DDC		Design M	Iinimum	Test Mir	nimum
AV 8									
corr	A	6x6	1.00	75	75	60	0	60	60
206		6x6			N/A	74		74	74
207			1.00	0	N/A	1	0	1	<u>1</u>
									135
Box Size		Flow Cor	rection Fact	or for DDC	C	Design M	Iinimum	Test Mir	nimum
	Number 201 201 Box Size AV 6 201 201 Box Size AV 7 204 205 Box Size AV 8 corr 206 207	Number Code	Number Code Size AV 5	Number Code Size Factor AV 5 301 B 12x12 1.00 201 B 12x12 1.00 Box Size Flow Correction Fact AV 6 301 B 12x12 1.00 Box Size Flow Correction Fact AV 7 304 A 9x9 1.00 Box Size Flow Correction Fact AV 8 300 300 300 AV 8 300 300 300 300 AV 8 300 300 300 300 300 300 AV 8 300	Number Code Size Factor fpm	Number Code Size Factor fpm cfm	Number	Number	Number Code Size Factor Test Test Req'd Test Te

Job Name: Brown Middle School Ventilation Survey

Tested by:	D	D COOM	cy / 1 Ouc	Hette / IVI A			Der 3, 202			
Outlet	Room			"Ak"		sign	First	New	Fin	
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
V	AV 9									
1	301	В	12x12	1.00	400	400	229	233	229	229
2	201	В	12x12	1.00	400	400	220	233	220	220
3	201	В	12x12	1.00	400	<u>400</u>	251	233	251	<u>251</u>
						1200				700
										58%
Box Type	Box Size		Flow Cor	rection Fact	tor for DD	C	Design N	1inimum	Test Mi	nimum
VAV										

Job Name: Brown Middle School Ventilation Survey

Tested By: B Cooney / P Ouellette / M A DeZinno September 3, 2020 (20203BM)

AHU-A8	DESIGN DATA

Manufacturer =	McQuay	Model No. = OAH021FDAC
Type =	RTU	Serial No. = FBOU040100082
Total Scheduled cfm =	12000	Total Grille cfm = 12600
Outside Air cfm =	2000	
Total Static Pressure =		External Static Pressure =
Fan rpm =		Brake Horsepower =

MOTOR DESIGN DATA

Horsepower =	Voltage =	Phase =	rpm =
	,		- F

AIR TEST DATA

Total cfm by Traverse =	12059	Total cfm by Grille Readings =	11414
Outside Air =	2100		

PRESSURE TEST DATA

Total Suction Static Pressure =	-0.84		
Total Discharge Static Pressure =	0.71		
	Total Static Pressure =	1.55	
External Suction Static Pressure =	-0.27		
External Discharge Static Pressure	= 0.67		
	External Static Pressure =	0.94	
Cooling Coil DP =	0.54		
Pre Filters DP =	0.11		

MOTOR TEST DATA

Motor Manufacturer / Frame =				
Horsepower =	Phase =	Voltage =		
Full Load Amps =		FLA Corrected for Voltage =		
Motor rpm =		Service Factor =		
No Load Amps =		Operating Amps =		
Calculated Brake Horsepower =				

Motor Sheave Model / Dia. =			
Motor Sheave Bore =			
Fan Sheave Model / Dia. =			
Fan Sheave Bore =		Fan rpm	=
Adjustable Sheave Dia. =		Center L	ine Distance =
Belts =			
Filters =			
Outside Air Setting =	35%		

Job Name: Brown Middle School Ventilation Survey

Tested By:		B Coon	ey / P Oue	llette / M A	DeZinno	Septem	ber 3, 2020	0 (20203	BM)	
Outlet	Room			"Ak"	Des	ign	First	New	Fin	al
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
					,					
		AHU-A	8							
1	203	D	24x14	1.68	714	1200	711	647	711	1194
2	203	D	24x14	1.68	714	1200	717	647	717	1205
3	203	D	24x14	1.68	714	1200	654	647	654	1099
4	203	D	24x14	1.68	714	1200	733	647	733	1231
5	203	D	24x14	1.68	714	1200	644	647	644	1082
6	203	D	24x14	1.68	714	1200	655	647	655	1100
7	203	D	24x14	1.68	714	1200	721	647	721	1211
8	203	D	24x14	1.68	714	1200	766	647	766	1287
9	203	D	18x18	1.00	1000	1000	766	906	766	766
10	203	D	18x18	1.00	1000	1000	622	906	622	622
11	203	D	18x18	1.00	1000	<u>1000</u>	616	906	616	<u>616</u>
						12600				11414
										91%

Job Name: Brown Middle School Ventilation Survey

Tested By: B Cooney / P Ouellette / M A DeZinno September 3, 2020 (20203BM)

AHU-A9 _____ DESIGN DATA

Manufacturer =	McQuay	Model No. = CAH016FDDM
Type =	AHU	Serial No. = FBOU040
Total Scheduled cfm =	8000	Total Grille cfm = 8000
Outside Air cfm =	1000	
Total Static Pressure =		External Static Pressure =
Fan rpm =		Brake Horsepower =

MOTOR DESIGN DATA

Horsepower =	Voltage =	Phase =	rpm =
	,		- F

AIR TEST DATA

Total cfm by Traverse =	7164	Total cfm by Grille Readings =	6970
Outside Air =	1050		

PRESSURE TEST DATA

Total Suction Static Pressure =	-1.00		
Total Discharge Static Pressure =	0.57		
To	otal Static Pressure =	1.57	
External Suction Static Pressure =	-0.30		
External Discharge Static Pressure =	0.57		
Ex	xternal Static Pressure =	0.87	
DX Coil & Filters DP =	0.70		

MOTOR TEST DATA

Motor Manufacturer / Frame =				
Horsepower =	Phase =	Voltage =		
Full Load Amps =		FLA Corrected for Voltage =		
Motor rpm =		Service Factor =		
No Load Amps =		Operating Amps =		
Calculated Brake Horsepower =				

Motor Sheave Model / Dia. =		
Motor Sheave Bore =		
Fan Sheave Model / Dia. =		
Fan Sheave Bore =		Fan rpm =
Adjustable Sheave Dia. =		Center Line Distance =
Belts =		
Filters =		
Outside Air Setting =	20% Open	

Job Name: Brown Middle School Ventilation Survey

Tested By:	B Cooney / P Ouellette / M A									
Outlet	Room			"Ak"	Des		First	New	Fin	ıal
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
		AHU-A	9							
						@ 46	Hertz			
1	203	D	24x14	1.68	714	1200	534	622	534	897
2	203	D	24x14	1.68	714	1200	595	622	595	1000
3	203	D	24x14	1.68	714	1200	619	622	619	1040
4	203	D	24x14	1.68	714	1200	550	622	550	924
5	203	D	24x14	1.68	714	1200	631	622	631	1060
6	203	D	24x14	1.68	595	1000	612	519	612	1028
7	203	D	24x14	1.68	595	<u>1000</u>	608	519	608	<u>1021</u>
						8000				6970
										87%

Job Name: Brown Middle School Ventilation Survey

Tested By: B Cooney / P Ouellette / M A DeZinno September 3, 2020 (20203BM)

AHU-B1	DESIGN DATA
ATTU-DI	DESIGN DATA

Manufacturer =	McQuay	Model No. = OAH008FDAC
Type =	RTU	Serial No. = FBOU040100104
Total Scheduled cfm =	3350	Total Grille cfm = 3350
Outside Air cfm =	1125	
Total Static Pressure =		External Static Pressure =
Fan rpm =		Brake Horsepower =

MOTOR DESIGN DATA

Horsepower =	Voltage =	Phase =	rpm =
	,		- F

AIR TEST DATA

Total cfm by Louver Scan =	3262	Total cfm by Grille Readings =	2807
Outside Air =	1169	Return Air =	

PRESSURE TEST DATA

Total Suction Static Pressure =	-0.84	
Total Discharge Static Pressure =	0.71	
	Total Static Pressure =	1.55
External Suction Static Pressure =	-0.20	
External Discharge Static Pressure	= 0.71	
	External Static Pressure =	0.91
Cooling Coil DP =	0.46	
Pre Filters DP =	0.18	

MOTOR TEST DATA

Motor Manufacturer / Frame =					
Horsepower =	Phase =		Voltage =		
Full Load Amps =		FLA Corrected for Voltage =			
Motor rpm =		Service Factor =			
No Load Amps =			Operating Amps =		
Calculated Brake Horsepower	=				

Motor Sheave Model / Dia. =		
Motor Sheave Bore =		
Fan Sheave Model / Dia. =		
Fan Sheave Bore =		Fan rpm =
Adjustable Sheave Dia. =		Center Line Distance =
Belts =		
Filters =		
Outside Air Setting =	25% Open	

Job Name: Brown Middle School Ventilation Survey

Tested By:										
Outlet	Room			"Ak"	Des	ign	First	New	Fir	ıal
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
		AHU-B	1							
1	305	В	9x9	1.00	225	225	193	189	193	193
2	305	В	9x9	1.00	225	225	208	189	208	208
3	305	В	9x9	1.00	225	225	201	189	201	201
4	305	В	9x9	1.00	225	225	176	189	176	176
5	306	В	9x9	1.00	225	225	188	189	188	188
6	306	В	9x9	1.00	225	225	205	189	205	205
7	306	В	9x9	1.00	225	225	197	189	197	197
8	306	В	9x9	1.00	225	225	200	189	200	200
9	307	В	9x9	1.00	275	275	203	230	203	203
10	307	В	9x9	1.00	275	275	197	230	197	197
11	307	В	9x9	1.00	275	275	232	230	232	232
12	322 corr	В	9x9	1.00	225	225	196	189	196	196
13	322	В	9x9	1.00	250	250	202	209	202	202
14	322	В	9x9	1.00	250	<u>250</u>	209	209	209	<u>209</u>
						3350				2807
										84%

Job Name: Brown Middle School Ventilation Survey

Tested By: B Cooney / P Ouellette / M A DeZinno September 3, 2020 (20203BM)

AHU-B2 DESIGN DATA

Manufacturer =	McQuay	Model No. = OAH008FDAC
Type =	RTU	Serial No. = FBOU040100106
Total Scheduled cfm =	3350	Total Grille cfm = 3350
Outside Air cfm =	1125	
Total Static Pressure =		External Static Pressure =
Fan rpm =		Brake Horsepower =

MOTOR DESIGN DATA

Horsepower =	Voltage =	Phase =	rpm =
	,		- F

AIR TEST DATA

Total cfm by Louver Scan =	3360	Total cfm by Grille Readings =	3302
Outside Air =	1204		

PRESSURE TEST DATA

Total Suction Static Pressure =	-1.02	
Total Discharge Static Pressure =	0.67	
	Total Static Pressure =	1.69
External Suction Static Pressure =	-0.10	
External Discharge Static Pressure	= 0.67	
	External Static Pressure =	0.77
Cooling Coil DP =	0.70	
Pre Filters DP =	0.22	

MOTOR TEST DATA

Motor Manufacturer / Frame =					
Horsepower =	Phase =		Voltage =		
Full Load Amps =		FLA Corrected for Voltage =			
Motor rpm =		Service Factor =			
No Load Amps =			Operating Amps =		
Calculated Brake Horsepower	=				

Motor Sheave Model / Dia. =						
Motor Sheave Bore =						
Fan Sheave Model / Dia. =						
Fan Sheave Bore =			Fan rpm =			
Adjustable Sheave Dia. =			Center Line Distance =			
Belts =						
Filters =						
Outside Air Setting =	25% Open					

Job Name: Brown Middle School Ventilation Survey

Tested By:					<u>DeZinno</u>	<u>Septem</u>	ber 3, 202	0 (20203	<u> </u>	
Outlet	Room			"Ak"	Des	ign	First	New	Fin	al
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
		AHU-B2	2							
1	322	В	9x9	1.00	250	250	219	246	219	219
2	322	В	9x9	1.00	250	250	240	246	240	240
3	322 Corr	В	9x9	1.00	225	225	252	222	252	252
4	308	В	9x9	1.00	275	275	254	271	254	254
5	308	В	9x9	1.00	275	275	279	271	279	279
6	308	В	9x9	1.00	275	275	261	271	261	261
7	309	В	9x9	1.00	225	225	220	222	220	220
8	309	В	9x9	1.00	225	225	216	222	216	216
9	309	В	9x9	1.00	225	225	219	222	219	219
10	309	В	9x9	1.00	225	225	208	222	208	208
11	310	В	9x9	1.00	225	225	225	222	225	225
12	310	В	9x9	1.00	225	225	226	222	226	226
13	310	В	9x9	1.00	225	225	243	222	243	243
14	310	В	9x9	1.00	225	<u>225</u>	240	222	240	<u>240</u>
						3350				3302
										99%
1		1	1	1 1					I	l l

Job Name: Brown Middle School Ventilation Survey

Tested By: B Cooney / P Ouellette / M A DeZinno September 3, 2020 (20203BM)

AHU-B3 DESIGN DATA

Manufacturer =	McQuay	Model No. = OAH008FDAC
Type =	RTU	Serial No. = FBOU040100105
Total Scheduled cfm =	3350	Total Grille cfm = 3350
Outside Air cfm =	1125	
Total Static Pressure =		External Static Pressure =
Fan rpm =		Brake Horsepower =

MOTOR DESIGN DATA

Horsepower =	Voltage =	Phase =	rpm =
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AIR TEST DATA

Total cfm by Louver Scan =	3185	Total cfm by Grille Readings =	3178
Outside Air =	1190		

PRESSURE TEST DATA

Total Suction Static Pressure =	-0.88	
Total Discharge Static Pressure =	0.77	
	Total Static Pressure =	1.65
External Suction Static Pressure =	-0.25	
External Discharge Static Pressure	= 0.77	
	External Static Pressure =	1.02
Cooling Coil DP =	0.48	
Pre Filters DP =	0.15	

MOTOR TEST DATA

Motor Manufacturer / Frame =						
Horsepower =	Phase =		Voltage =			
Full Load Amps =		FLA Corrected for Voltage =				
Motor rpm =			Service Factor =			
No Load Amps = Operating Amps =						
Calculated Brake Horsepower	=					

Motor Sheave Model / Dia. =						
Motor Sheave Bore =						
Fan Sheave Model / Dia. =						
Fan Sheave Bore =			Fan rpm =			
Adjustable Sheave Dia. =			Center Line Distance =			
Belts =						
Filters =						
Outside Air Setting =	25% Open					

Job Name: Brown Middle School Ventilation Survey

Tested By:					<u>DeZinno</u>	Septem	ber 3, 202	0 (20203	BM)	
Outlet	Room			"Ak"	Des	ign	First	New	Fin	al
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
		AHU-B	3							
1	303	В	9x9	1.00	225	225	194	213	194	194
2	303	В	9x9	1.00	225	225	225	213	225	225
3	303	В	9x9	1.00	225	225	204	213	204	204
4	303	В	9x9	1.00	225	225	217	213	217	217
5	corr	В	9x9	1.00	200	200	225	190	225	225
6	304	В	9x9	1.00	225	225	201	213	201	201
7	304	В	9x9	1.00	225	225	201	213	201	201
8	304	В	9x9	1.00	225	225	207	213	207	207
9	304	В	9x9	1.00	225	225	209	213	209	209
10	321	В	9x9	1.00	250	250	286	237	286	286
11	320	В	9x9	1.00	50	50	81	47	81	81
12	319	В	9x9	1.00	50	50	79	47	79	79
13	314	В	9x9	1.00	250	250	213	237	213	213
14	314	В	9x9	1.00	250	250	212	237	212	212
15	314	В	9x9	1.00	250	250	205	237	205	205
16	314	В	9x9	1.00	250	<u>250</u>	219	237	219	<u>219</u>
						3350				3178
										95%

Job Name: Brown Middle School Ventilation Survey

Tested By: B Cooney / P Ouellette / M A DeZinno September 3, 2020 (20203BM)

AHU-B4	DESIGN DATA

Manufacturer =	McQuay	Model No. = OAH008FDAC
Type =	RTU	Serial No. = FBOU040100101
Total Scheduled cfm =	3350	Total Grille cfm = 3350
Outside Air cfm =	1125	
Total Static Pressure =		External Static Pressure =
Fan rpm =		Brake Horsepower =

MOTOR DESIGN DATA

Horsepower =	Voltage =	Phase =	rpm =
	,		- F

AIR TEST DATA

Total cfm by Louver Scan =	3325	Total cfm by Grille Readings =	3287
Outside Air =	1134	Return Air =	

PRESSURE TEST DATA

Total Suction Static Pressure =	-0.76		
Total Discharge Static Pressure =	0.68		
	Total Static Pressure =	1.44	
External Suction Static Pressure =	-0.07		
External Discharge Static Pressure =	= 0.68		
	External Static Pressure =	0.75	
Cooling Coil DP =	0.53		
Pre Filters DP =	0.16		

MOTOR TEST DATA

Motor Manufacturer / Frame =							
Horsepower =	Phase =	Voltage =					
Full Load Amps =	FLA Corrected for Voltage =						
Motor rpm =	Service Factor =						
No Load Amps =		Operating Amps =					
Calculated Brake Horsepower =							

Motor Sheave Model / Dia. =		
Motor Sheave Bore =		
Fan Sheave Model / Dia. =		
Fan Sheave Bore =		Fan rpm =
Adjustable Sheave Dia. =		Center Line Distance =
Belts =		
Filters =		
Outside Air Setting =	30% Open	

Job Name: Brown Middle School Ventilation Survey

Tested By:		<u>DeZinno</u>	Septem	ber 3, 202	0 (20203	BBM)				
Outlet	Room			"Ak"	Des			New		
Number	Number	Code	Size	Factor	fpm	cfm	Test	Req'd	fpm	cfm
		AHU-B	1							
1	313	В	9x9	1.00	250	250	233	245	233	233
2	313	В	9x9	1.00	250	250	231	245	231	231
3	313	В	9x9	1.00	250	250	215	245	215	215
4	313	В	9x9	1.00	250	250	221	245	221	221
5	315	В	9x9	1.00	50	50	57	49	57	57
6	316	В	9x9	1.00	50	50	54	49	54	54
7	321	В	9x9	1.00	250	250	245	245	245	245
8	311	В	9x9	1.00	225	225	251	221	251	251
9	311	В	9x9	1.00	225	225	251	221	251	251
10	311	В	9x9	1.00	225	225	241	221	241	241
11	311	В	9x9	1.00	225	225	245	221	245	245
12	Corr	В	9x9	1.00	200	200	226	196	226	226
13	312	В	9x9	1.00	225	225	217	221	217	217
14	312	В	9x9	1.00	225	225	215	221	215	215
15	312	В	9x9	1.00	225	225	210	221	210	210
16	312	В	9x9	1.00	225	<u>225</u>	175	221	175	<u>175</u>
						3350				3287
										98%

TRAVERSE SUMMARY TEST SHEET

Job Name: Brown Middle School Ventilation Survey

Tested By:		B Cooney / P Ouellette / M A DeZinno September 3, 2020 (20203BM		<u>03BM)</u>					
System	Zone /	Height /			Des	sign	Те	Test	
No.	Room	Dia.	Width	Area	Velocity	cfm	Velocity	cfm	Pressure
AHU-A1	OA Duct	30	24	5.0	1300	6500	1199	5995	-0.48
	OA Minimum	30	24	5.0	300	1500	315	1573	-0.03
									20% Open
AHU-A2	OA Duct	16	36	4.0	1250	5000	1082	4328	-0.38
	OA Minimum	16	36	4.0	375	1500	357	1428	-0.04
									30% Open
AHU-A3	OA Louver	38	42	11.1	451	5000	453	5021	0.70
	OA Minimum	38	42	11.1	135	1500	140	1552	25% Open
AHU-A4	OA Duct	16	36	4.0	1250	5000	1254	5016	-0.41
71110 711	OA Minimum	16	36	4.0	375	1500	380	1520	-0.04
									45% Open
AHU-A5	OA Louver	48	14	4.7	771	3600	785	3663	0.57
AIIO-A3	OA Minimum	48	14	4.7	343	1600	364	1700	35% Open
AHU-A6	OA Duct	12	12	1.0	2500	2500	2560	2560	-1.45
	OA Minimum	12	12	1.0	300	300	310	310	-0.05
									58% Open
AHU-A7	OA Duct	30	30	6.3	1088	6800	1012	6325	60 Hz, -1.65
	OA Minimum	12	12	1.0	2000	2000	2000	2000	-0.05
									35% Open
AHU-A8	OA Louver	34	76	17.9	669	12000	672	12059	0.67
	OA Minimum	34	76	17.9	111	2000	117	2100	35% Open
AHU-A9	OA Duct	24	36	6.0	1333	8000	1194	7164	46 Hz, -1.01
71110-717	OA Minimum	24	36	6.0	167	1000	175	1050	-0.03
	O/Y ivinimium	2-1	30	0.0	107	1000	175	1030	20% Open
AIIII D1	OAI	26	20	7.0	470	2250	466	2262	0.71
AHU-B1	OA Louver OA Minimum	36 36	28 28	7.0	479 161	3350 1125	466 167	3262 1169	0.71 25% Open
		30	20	7.0	101	1123	107	1107	2070 Open
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TRAVERSE SUMMARY TEST SHEET

Job Name: Brown Middle School Ventilation Survey

Tested By:	1	B Cooney / P Ouellette / M A DeZinno September 3,							
System	Zone /	Height /			Des		Те		Static
No.	Room	Dia.	Width	Area	Velocity	cfm	Velocity	cfm	Pressure
AHU-B2	OA Louver	36	28	7.0	479	3350	480	3360	0.67
	OA Minimum	36	28	7.0	161	1125	172	1204	35% Open
AHU-B3	OA Louver	36	28	7.0	479	3350	455	3185	0.77
	OA Minimum	36	28	7.0	161	1125	170	1190	25% Open
AHU-B4	OA Louver	36	28	7.0	479	3350	475	3325	0.68
	OA Minimum	36	28	7.0	161	1125	162	1134	25% Open
AHU-1	OA Louver	99	30	20.6	485	10000	467	9632	0.94
	OA Minimum	99	30	20.6	121	2500	122	2516	30% Open
									•
AHU-2	OA Louver	28	60	11.7	514	6000	528	6160	1.15
	OA Minimum	28	60	11.7	137	1600	145	1692	30% Open
									•
AHU-3	OA Louver	22	50	7.6	1047	8000	449	3430	0.87
	OA Minimum	22	50	7.6	471	3600	125	955	20% Open
									•
AHU-4	OA Louver	98	28	19.1	525	10000	552	10519	0.38
	OA Minimum	98	28	19.1	105	2000	142	2706	25% Open
1	I	1					1		I