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
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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.
  - 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.
  - 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.

- 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.
  - 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:**
  - 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 hi-lo 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.

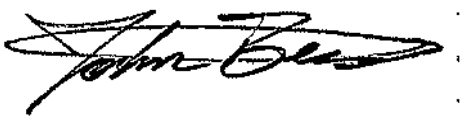
154 STATE STREET SUITE 204
NORTH HAVEN, CT 06473
(203) 234-2089 FAX (203) 234-2147

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



Environmental Testing & Balancing, Inc.
Registration No. 2968

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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 Equipment				
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
CH	Chiller	OD	Outside Diameter
CHWC, CC	Chilled Water Coil, Cooling Coil	OED	Open End Duct
CS	Circuit Setter	PSI	Pounds per Square Inch
CT	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.

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

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 Pressure =**	
Fan rpm =		**Brake Horsepower =**	

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 =			**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%		
Static Control Setpoint =			

AIR OUTLET TEST SHEET

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

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

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design fpm	Design cfm	First Test	New Req'd	Final fpm	Final 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	200	339	209	207	207
						800				835
										104%
Box Type	Box Size	Flow Correction Factor for DDC					Design Minimum		Test Minimum	
VAV	10	1.95					480		486	
VAV-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 Correction Factor for DDC					Design Minimum		Test Minimum	
VAV	8	0.68					250		261	
VAV-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
						440				428
										97%
Box Type	Box Size	Flow Correction Factor for DDC					Design Minimum		Test Minimum	
VAV	8	0.92					250		256	

AIR OUTLET TEST SHEET

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

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

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design fpm	Design cfm	First Test	New Req'd	Final fpm	Final cfm
VAV-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
						440				451
										103%
Box Type	Box Size	Flow Correction Factor for DDC					Design Minimum		Test Minimum	
VAV	8	0.76					250		242	
VAV-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	165	281	166	171	171
						530				533
										101%
Box Type	Box Size	Flow Correction Factor for DDC					Design Minimum		Test Minimum	
VAV	8	9.41					480		498	
VAV-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	110	238	108	131	131
						560				550
										98%
Box Type	Box Size	Flow Correction Factor for DDC					Design Minimum		Test Minimum	
VAV	8	4.89					440		445	
VAV-V2038										
1	2007	SD	16x16	1.00	600	600	766	494	515	515
2	2007	SD	16x16	1.00	600	600	704	494	473	473
						1200				988
										82%
Box Type	Box Size	Flow Correction Factor for DDC					Design Minimum		Test Minimum	
VAV	10	1.24					450		469	

AIR OUTLET TEST SHEET

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

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

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design fpm	Design cfm	First Test	New Req'd	Final fpm	Final 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	200	185	178	185	185
						1100				981
										89%
Box Type	Box Size	Flow Correction Factor for DDC					Design Minimum		Test Minimum	
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 Correction Factor for DDC					Design Minimum		Test Minimum	
VAV	10	0.79					450		461	
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 Correction Factor for DDC					Design Minimum		Test Minimum	
VAV	10	1.22					480		476	

AIR OUTLET TEST SHEET

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

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

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design fpm	Design cfm	First Test	New Req'd	Final fpm	Final 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	300	187	246	246	246
						1200				984
										82%
Box Type	Box Size	Flow Correction Factor for DDC					Design Minimum		Test Minimum	
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
										91%
Box Type	Box Size	Flow Correction Factor for DDC					Design Minimum		Test Minimum	
VAV	10	0.84					540		552	
VAV-V3035										
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	110	135	112	96	96
						560				569
										102%
Box Type	Box Size	Flow Correction Factor for DDC					Design Minimum		Test Minimum	
VAV	8	3.31					200		210	

AIR OUTLET TEST SHEET

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

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

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design fpm	Design cfm	First Test	New Req'd	Final fpm	Final 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	200	145	196	263	263
						1100				1079
										98%
Box Type	Box Size	Flow Correction Factor for DDC					Design Minimum		Test Minimum	
VAV	10	4.03					440		450	
VAV-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	110	238	108	131	131
						560				550
										98%
Box Type	Box Size	Flow Correction Factor for DDC					Design Minimum		Test Minimum	
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	200	347	209	259	259
						1100				1148
										104%
Box Type	Box Size	Flow Correction Factor for DDC					Design Minimum		Test Minimum	
VAV	8	1.44					500		493	

AIR OUTLET TEST SHEET

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

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

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design fpm	Design cfm	First Test	New Req'd	Final fpm	Final cfm
VAV-V3039										
1	300	SD	14x14	1.00	500	500	404	540	404	404
2	300	SL	48x2sl	1.00	200	200	256	216	256	256
3	300	SL	48x2sl	1.00	200	200	235	216	235	235
4	300	SL	48x2sl	1.00	200	200	292	216	292	292
						1100				1187
										108%
Box Type	Box Size	Flow Correction Factor for DDC					Design Minimum		Test Minimum	
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)

RTU-2 **DESIGN DATA**

Manufacturer =	York	**Model No. =**	YPAL060CYC46BBAX
Type =		**Serial No. =**	RKLM004234
Total Scheduled cfm =	20990		
Outside Air cfm =	4435		
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 =	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	
Total Static Pressure =		2.47
External Suction Static Pressure =	-0.66	
External Discharge Static Pressure =	1.05	
External 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 Bore =		**Fan rpm =**	
Adjustable Sheave Dia. =		**Center Line Distance =**	
Belts =			
Filters =			
Outside Air Setting =	20%		
Static Control Setpoint =			

AIR OUTLET TEST SHEET

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

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

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design fpm	Design cfm	First Test	New Req'd	Final fpm	Final cfm
	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	170	190	177	173	173
						560				582
										104%
Box Type	Box Size	Flow Correction Factor for DDC					Design Minimum		Test Minimum	
VAV	8	4.08					250		249	
VAV-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	200	250	196	250	250
						1100				1076
										98%
Box Type	Box Size	Flow Correction Factor for DDC					Design Minimum		Test Minimum	
VAV	10	15.27					700		700	

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 Pressure =**	
Fan rpm =		**Brake Horsepower =**	

MOTOR DESIGN DATA

Horsepower =	**Voltage =**	**Phase =**	**rpm =**

AIR TEST DATA

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

AIR OUTLET TEST SHEET

Job Name: **Daniel Hand High School Ventilation Survey**
Tested By: **B Cooney / P Ouellette / M A DeZinno September 3, 2020 (20203DH)**

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design fpm	Design cfm	First Test	New Req'd	Final fpm	Final cfm
	RTU-4									
VAV-V1001										
1	lobby 1003	SD	16x16	1.00	600	600	804	714	804	804
2	lobby 1003	SD	16x16	1.00	600	600	624	714	624	624
						1200				1428
										119%
Box Type	Box Size	Flow Correction Factor for DDC					Design Minimum		Test Minimum	
VAV	10	0.75					480		500	
VAV-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	200	207	210	149	149
						1200				1261
										105%
Box Type	Box Size	Flow Correction Factor for DDC					Design Minimum		Test Minimum	
VAV	10	1.16					500		525	
VAV-V1019										
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	450	100	540	100	100
						1350				1621
										120%
Box Type	Box Size	Flow Correction Factor for DDC					Design Minimum		Test Minimum	
VAV	12						440		515	

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-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 Pressure =**	
Fan rpm =		**Brake Horsepower =**	

MOTOR DESIGN DATA

Horsepower =	**Voltage =**	**Phase =**	**rpm =**

AIR TEST DATA

Total cfm by Traverse =	19525
Outside Air =	5477

PRESSURE TEST DATA

Total Suction Static Pressure =	-1.53	
Total Discharge Static Pressure =	1.50	
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 =		**Fan rpm =**	
Adjustable Sheave Dia. =		**Center Line Distance =**	
Belts =			
Filters =			
Outside Air Setting =	15% Open		
Static Control Setpoint =			

AIR OUTLET TEST SHEET

Job Name: **Daniel Hand High School Ventilation Survey**
Tested By: **B Cooney / P Ouellette / M A DeZinno September 3, 2020 (20203DH)**

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design fpm	Design cfm	First Test	New Req'd	Final fpm	Final cfm
	RTU-5									
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	200	139	211	206	206
						1100				1159
										105%
Box Type	Box Size	Flow Correction Factor for DDC					Design Minimum		Test Minimum	
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	180	231	189	202	202
						780				820
										105%
Box Type	Box Size	Flow Correction Factor for DDC					Design Minimum		Test Minimum	
VAV	10	5.23					390		410	
VAV-V1014										
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	200	370	198	216	216
						1000				992
										99%
Box Type	Box Size	Flow Correction Factor for DDC					Design Minimum		Test Minimum	
VAV	10	1.31					500		510	

AIR OUTLET TEST SHEET

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

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

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design fpm	Design cfm	First Test	New Req'd	Final fpm	Final cfm
VAV-V1015										
1	120J	SD	12x12	1.00	300	300	442	313	340	340
2	120J	SD	12x12	1.00	400	400	480	417	369	369
3	120J	SD	12x12	1.00	300	300	402	313	309	309
4	120J	SD	12x12	1.00	300	300	438	313	337	337
5	120J	SD	12x12	1.00	400	400	472	417	363	363
6	120J	SD	12x12	1.00	300	300	480	313	369	369
						2000				2087
										104%
Box Type	Box Size	Flow Correction Factor for DDC					Design Minimum		Test Minimum	
VAV	14	1.11					500		513	
VAV-V2005										
1	233	SD	15x15	1.00	300	300	364	297	364	364
2	233	SD	15x15	1.00	400	400	385	395	385	385
3	233	SL	15x15	1.00	400	400	396	395	396	396
4	233	SL	15x15	1.00	300	300	307	297	307	307
5	233	SL	15x15	1.00	400	400	335	395	335	335
6	233	SL	15x15	1.00	300	300	289	297	289	289
						2100				2076
										99%
Box Type	Box Size	Flow Correction Factor for DDC					Design Minimum		Test Minimum	
VAV	14	1.50					700		700	
VAV-V3003										
1	333	SD	14x14	1.00	300	300	345	314	345	345
2	333	SD	14x14	1.00	400	400	390	418	390	390
3	333	SD	14x14	1.00	300	300	305	314	305	305
4	333	SD	14x14	1.00	400	400	433	418	433	433
5	333	SD	14x14	1.00	300	300	304	314	304	304
						1700				1777
										105%
Box Type	Box Size	Flow Correction Factor for DDC					Design Minimum		Test Minimum	
VAV	14	0.92					400		414	

AIR OUTLET TEST SHEET

Job Name: **Daniel Hand High School Ventilation Survey**
Tested By: **B Cooney / P Ouellette / M A DeZinno September 3, 2020 (20203DH)**

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design fpm	Design cfm	First Test	New Req'd	Final fpm	Final cfm
VAV-V3004										
1	boys	SD	12x12	1.00	300	300	314	290	314	314
2	girls	SD	12x12	1.00	300	300	265	290	265	265
						600				579
										97%
Box Type	Box Size	Flow Correction Factor for DDC					Design Minimum		Test Minimum	
VAV	8	2.25					300		307	
VAV-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	200	245	208	216	216
						1200				1247
										104%
Box Type	Box Size	Flow Correction Factor for DDC					Design Minimum		Test Minimum	
VAV	10	2.93					400		396	
VAV-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	200	298	198	242	242
						1100				1090
										99%
Box Type	Box Size	Flow Correction Factor for DDC					Design Minimum		Test Minimum	
VAV	10	1.08					480		497	

AIR OUTLET TEST SHEET

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

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

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design fpm	Design cfm	First Test	New Req'd	Final fpm	Final cfm
VAV-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	48x2sl	1.00	200	200	326	205	234	234
5	339	SL	48x2sl	1.00	200	200	319	205	230	230
						1100				1126
										102%
Box Type	Box Size	Flow Correction Factor for DDC					Design Minimum		Test Minimum	
VAV	10	0.94					400		422	
VAV-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	338	SL	48x2sl	1.00	165	165	147	173	131	131
4	338	SL	48x2sl	1.00	165	165	287	173	257	257
						1030				1080
										105%
Box Type	Box Size	Flow Correction Factor for DDC					Design Minimum		Test Minimum	
VAV	10	1.50					400		391	

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 Pressure =**	
Fan rpm =		**Brake Horsepower =**	

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 =**
Adjustable Sheave Dia. =	**Center Line Distance =**
Belts =	
Filters =	
Outside Air Setting =	20% Open
Static Control Setpoint =	

AIR OUTLET TEST SHEET

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

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

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design fpm	Design cfm	First Test	New Req'd	Final fpm	Final cfm
	RTU-6									
VAV-V1012										
1	128	SD	10x10	1.00	250	250	138	240	181	181
2	128	SD	10x10	1.00	250	250	149	240	195	195
3	128	SL	48x2sl	1.00	200	200	193	192	250	250
4	128	SL	48x2sl	1.00	200	200	173	192	225	225
5	128	SL	48x2sl	1.00	200	200	156	192	204	204
						1100				1055
										96%
Box Type	Box Size	Flow Correction Factor for DDC					Design Minimum		Test Minimum	
VAV	10	0.72					800		786	
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	625
						1200				1238
										103%
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
										103%
Box Type	Box Size	Flow Correction Factor for DDC					Design Minimum		Test Minimum	
VAV	6	3.37					100		100	

AIR OUTLET TEST SHEET

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

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

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design fpm	Design cfm	First Test	New Req'd	Final fpm	Final cfm
VAV-2010										
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	200	225	210	199	199
						1200				1258
										105%
Box Type	Box Size	Flow Correction Factor for DDC					Design Minimum		Test Minimum	
VAV	10	5.80					480		501	
VAV-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
						1440				1495
										104%
Box Type	Box Size	Flow Correction Factor for DDC					Design Minimum		Test Minimum	
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)

RTU-7 **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 Pressure =**	
Fan rpm =		**Brake Horsepower =**	

MOTOR DESIGN DATA

Horsepower =	**Voltage =**	**Phase =**	**rpm =**

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	
Total Static Pressure =		3.00
External Suction Static Pressure =	-1.38	
External Discharge Static Pressure =	1.02	
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 Pressure =**	
Fan rpm =		**Brake Horsepower =**	

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 Pressure =	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 Pressure =**	
Fan rpm =		**Brake Horsepower =**	

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	
Total Static Pressure =		2.60
External Suction Static Pressure =	-1.22	
External Discharge Static Pressure =	1.02	
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 / M A DeZinno September 3, 2020 (20203DH)

System No.	Zone / Room	Height / Dia.	Width	Area	Design		Test		Static Pressure
					Velocity	cfm	Velocity	cfm	
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
		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
		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
		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
		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
		76	80						
	OA	40	78	32.2	186	6000	1	32	
		76	80						

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)**

System No.	Zone / Room	Height / Dia.	Width	Area	Design		Test		Static Pressure
					Velocity	cfm	Velocity	cfm	
RTU-9	Supply	40	78	32.2	931	30000	805	25937	0.50
		76	80						
	OA	40	78	32.2	186	6000	190	6122	22%
		76	80						

Environmental Testing & Balancing, Inc.

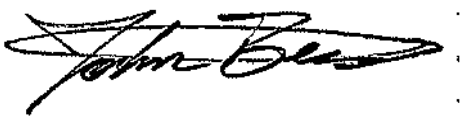
154 STATE STREET SUITE 204
NORTH HAVEN, CT 06473
(203) 234-2089 FAX (203) 234-2147

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



Environmental Testing & Balancing, Inc.
Registration No. 2968

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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 Equipment				
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
CH	Chiller	OD	Outside Diameter
CHWC, CC	Chilled Water Coil, Cooling Coil	OED	Open End Duct
CS	Circuit Setter	PSI	Pounds per Square Inch
CT	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.

AIR OUTLET TEST SHEET

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

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

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design		First Test	New Req'd	Final	
					fpm	cfm			fpm	cfm
	RTU-1									
1	princ/office			1.00	5100	5100	4260		4260	4260
										84%

AIR OUTLET TEST SHEET

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

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

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design		First Test	New Req'd	Final	
					fpm	cfm			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	N/A	1616	0	1616	1616
						11300				8489
										75%

AIR OUTLET TEST SHEET

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

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

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design		First Test	New Req'd	Final	
					fpm	cfm			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%

AIR OUTLET TEST SHEET

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

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

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design fpm	Design cfm	First Test	New Req'd	Final fpm	Final cfm
	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
						9160				8628
										94%

AIR OUTLET TEST SHEET

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

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

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design fpm	Design cfm	First Test	New Req'd	Final fpm	Final cfm
	RTU-5									
1	Media			1.00	9200	9200	6394		6394	6394
										70%

AIR OUTLET TEST SHEET

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

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

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design		First Test	New Req'd	Final	
					fpm	cfm			fpm	cfm
	RTU-6									
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
						7000				7010
										100%

AIR OUTLET TEST SHEET

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

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

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design		First Test	New Req'd	Final	
					fpm	cfm			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%

AIR OUTLET TEST SHEET

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

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

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design fpm	Design cfm	First Test	New Req'd	Final fpm	Final cfm
	RTU-8									
1	Cafe			1.00	9600	9600	7968		7968	7968
										83%

AIR OUTLET TEST SHEET

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

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

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design		First Test	New Req'd	Final	
					fpm	cfm			fpm	cfm
	RTU-9									
1	Cafe			1.00	10300	10300	9190		9190	9190
										89%

AIR OUTLET TEST SHEET

Job Name: **Polson Middle School Ventilation Survey**
Tested By: **B Cooney / M A DeZinno November 9, 2020 (20203P)**

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design fpm	Design cfm	First Test	New Req'd	Final fpm	Final cfm
	RTU-11									
1	Band			1.00	5560	5560	4707		4707	4707
										85%

TRAVERSE SUMMARY TEST SHEET

Job Name: **Polson Middle School Ventilation Survey**
Tested By: **B Cooney / M A DeZinno November 9, 2020 (20203P)**

System No.	Zone / Room	Height / Dia.	Width	Area	Design		Test		Static Pressure
					Velocity	cfm	Velocity	cfm	
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 / M A DeZinno November 9, 2020 (20203P)**

System No.	Zone / Room	Height / Dia.	Width	Area	Design		Test		Static Pressure
					Velocity	cfm	Velocity	cfm	
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.

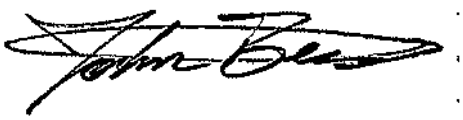
154 STATE STREET SUITE 204
NORTH HAVEN, CT 06473
(203) 234-2089 FAX (203) 234-2147

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

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



Environmental Testing & Balancing, Inc.
Registration No. 2968

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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 Equipment				
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
CH	Chiller	OD	Outside Diameter
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CS	Circuit Setter	PSI	Pounds per Square Inch
CT	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.

AIR OUTLET TEST SHEET

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

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

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design		First Test	New Req'd	Final	
					fpm	cfm			fpm	cfm
	RTU-1									
1	princ/office			1.00	5100	5100	4260		4260	4260
										84%

AIR OUTLET TEST SHEET

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

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

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design		First Test	New Req'd	Final	
					fpm	cfm			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	N/A	1616	0	1616	1616
						11300				8489
										75%

AIR OUTLET TEST SHEET

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

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

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design		First Test	New Req'd	Final	
					fpm	cfm			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%

AIR OUTLET TEST SHEET

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

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

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design		First Test	New Req'd	Final	
					fpm	cfm			fpm	cfm
	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
						9160				8628
										94%

AIR OUTLET TEST SHEET

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

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

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design		First Test	New Req'd	Final	
					fpm	cfm			fpm	cfm
	RTU-5									
1	Media			1.00	9200	9200	6394		6394	6394
										70%

AIR OUTLET TEST SHEET

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

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

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design		First Test	New Req'd	Final	
					fpm	cfm			fpm	cfm
	RTU-6									
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
						7000				7010
										100%

AIR OUTLET TEST SHEET

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

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

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design		First Test	New Req'd	Final	
					fpm	cfm			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%

AIR OUTLET TEST SHEET

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

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

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design		First Test	New Req'd	Final	
					fpm	cfm			fpm	cfm
	RTU-8									
1	Cafe			1.00	9600	9600	7968		7968	7968
										83%

AIR OUTLET TEST SHEET

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

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

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design		First Test	New Req'd	Final	
					fpm	cfm			fpm	cfm
	RTU-9									
1	Cafe			1.00	10300	10300	9190		9190	9190
										89%

AIR OUTLET TEST SHEET

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

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

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design		First Test	New Req'd	Final	
					fpm	cfm			fpm	cfm
	RTU-11									
1	Band			1.00	5560	5560	4707		4707	4707
										85%

TRAVERSE SUMMARY TEST SHEET

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

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

System No.	Zone / Room	Height / Dia.	Width	Area	Design		Test		Static Pressure
					Velocity	cfm	Velocity	cfm	
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%

Environmental Testing & Balancing, Inc.

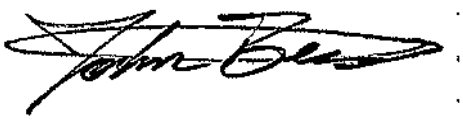
154 STATE STREET SUITE 204
NORTH HAVEN, CT 06473
(203) 234-2089 FAX (203) 234-2147

CERTIFIED TESTING AND BALANCING REPORT

Date:	September 3, 2020
Project:	Kathleen H. Ryerson Elementary School Ventilation Survey
Address:	982 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



Environmental Testing & Balancing, Inc.
Registration No. 2968

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kW	Kilowatt		
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LD	Linear Diffuser		

Notes

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

GRILLE, REGISTER & DIFFUSER TEST SHEET

Job Name: Kathleen H. Ryerson Elementary School Ventilation Survey

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

Outlet Number	Room Number	Code	Size	"Ak" Factor	Required fpm	Required cfm	First Test	New Req'd	Final fpm	Final cfm
Library UV										
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
Room K1 UV										
1	Supply	UV	6x42	1.00	0	N/A	313		313	313
2	Outside Air	oed	6x42	1.00	0	N/A	60		60	60
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 UV										
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 UV										
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 UV										
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 UV										
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 UV										
1	Supply	UV	6x42	1.00	0	N/A	406		406	406
2	Outside Air	oed	6x42	1.00	0	N/A	54		54	54

GRILLE, REGISTER & DIFFUSER TEST SHEET

Job Name: Kathleen H. Ryerson Elementary School Ventilation Survey

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

Outlet Number	Room Number	Code	Size	"Ak" Factor	Required fpm	Required cfm	First Test	New Req'd	Final fpm	Final cfm
Room 6 UV										
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
Room 7 UV										
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 UV										
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 UV										
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 UV										
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 UV										
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
Room 12 UV										
1	Supply	UV	6x42	1.00	0	N/A	245		197	197
2	Outside Air	oed	6x42	1.00	0	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

GRILLE, REGISTER & DIFFUSER TEST SHEET

Job Name: Kathleen H. Ryerson Elementary School Ventilation Survey

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

Outlet Number	Room Number	Code	Size	"Ak" Factor	Required fpm	Required cfm	First Test	New Req'd	Final fpm	Final cfm
Room 14 UV										
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 UV										
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
Room 16 UV										
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 UV										
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

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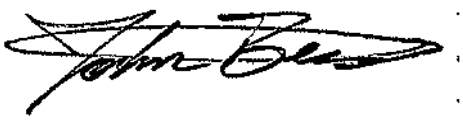
Submitted and Certified by:
NEBB Professional John E. Burgess



Environmental Testing & Balancing, Inc.
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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.

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.

FAN TEST SHEET

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

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						
Voltage						
Service Factor						
Rated Amperage						
Corrected for Voltage						
No Load Amperage						
Operating Amperage						
Brake Horsepower						
Fan rpm						

FAN TEST SHEET

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

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						
Fan rpm						

FAN TEST SHEET

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

GRILLE, REGISTER & DIFFUSER TEST SHEET

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

Outlet Number	Room Number	Code	Size	"Ak" Factor	Required fpm	Required cfm	First Test	New Req'd	Final fpm	Final cfm
Room 8 AHU										
1	8	SW	12x6	0.33	0	N/A	1052		1052	347
2	8	SW	12x6	0.33	0	N/A	956		956	315
3	8	SW	12x6	0.33	0	N/A	1123		1123	371
4	8	SW	12x6	0.33	0	N/A	621		621	205
5	8	SW	12x6	0.33	0	N/A	732		732	242
6	8	SW	12x6	0.33	0	N/A	1020		1020	337
7	8	SW	12x6	0.33	0	N/A	945		945	312
8	8	SW	12x6	0.33	0	N/A	1060		1060	350
										2478
Outside Air										
1	Room 8 AHU	oed	40x9	1.00	0	N/A	45		265	265
Room 23 RTU										
1	RDG Total			1.00	0	N/A	1433		1433	1433
Room 24 RTU										
1	RDG Total			1.00	0	N/A	1274		1274	1274
Room 25 RTU										
1	RDG Total			1.00	0	N/A	1246		1246	1246
Room 26 RTU										
1	RDG Total			1.00	0	N/A	1259		1259	1259
Room 27 RTU										
1	RDG Total			1.00	0	N/A	1310		1310	1310
Room 28 RTU										
1	RDG Total			1.00	0	N/A	1295		1295	1295

GRILLE, REGISTER & DIFFUSER TEST SHEET

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

Outlet Number	Room Number	Code	Size	"Ak" Factor	Required fpm	Required cfm	First Test	New Req'd	Final fpm	Final cfm
Art Room UV										
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
Music Room B UV										
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
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 UV 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 UV										
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 UV										
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

GRILLE, REGISTER & DIFFUSER TEST SHEET

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

Outlet Number	Room Number	Code	Size	"Ak" Factor	Required fpm	Required cfm	First Test	New Req'd	Final fpm	Final cfm
Room 4 UV										
1	Supply	UV	51.5x6	1.00	0	N/A	630		630	630
2	Outside Air	oed	49x10	1.00	0	N/A	65		65	65
Room 6 UV										
1	Supply	UV	51.5x6	1.00	0	N/A	570		570	570
2	Outside Air	oed	49x10	1.00	0	N/A	58		58	58
Room 10 UV										
1	Supply	UV	51.5x6	1.00	0	N/A	540		540	540
2	Outside Air	oed	49x10	1.00	0	N/A	105		105	105
Room 12 UV										
1	Supply	UV	51.5x6	1.00	0	N/A	382		382	382
2	Outside Air	oed	49x10	1.00	0	N/A	92		92	92
Room 13 UV										
1	Supply	UV	51.5x6	1.00	0	N/A	300		300	300
2	Outside Air	oed	49x10	1.00	0	N/A	58		58	58
Room 15 UV										
1	Supply	UV	42x9	1.00	0	N/A	533		533	533
2	Outside Air	oed	40x9	1.00	0	N/A	235		235	235
Room 16 UV										
1	Supply	UV	42x9	1.00	0	N/A	538		538	538
2	Outside Air	oed	40x9	1.00	0	N/A	206		206	206
Room 17 UV										
1	Supply	UV	42x9	1.00	0	N/A	513		513	513
2	Outside Air	oed	40x9	1.00	0	N/A	170		170	170

GRILLE, REGISTER & DIFFUSER TEST SHEET

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

Outlet Number	Room Number	Code	Size	"Ak" Factor	Required fpm	Required cfm	First Test	New Req'd	Final fpm	Final cfm
Room 18 UV										
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 UV										
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
Room 20 UV										
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 UV										
1	Supply	UV	42x9	1.00	0	N/A	484		484	484
2	Outside Air	oed	40x9	1.00	0	N/A	308		308	308
Room 22 UV										
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 unit										
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	0	N/A	124		124	311
4	cafe	SW	30x8	1.20	0	N/A	172		172	206
										827
Outside Air										
1	cafe unit	oed	16x16	1.78	0	N/A	45		460	819

GRILLE, REGISTER & DIFFUSER TEST SHEET

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

Outlet Number	Room Number	Code	Size	"Ak" Factor	Required fpm	Required cfm	First Test	New Req'd	Final fpm	Final cfm
Teachers Lounge 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	247
										858
Outside Air										
1	teacher unit	oed	24x14	2.33	0	N/A	69		69	161
Gym Unit										
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	530
										3011
Outside Air										
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)**

System No.	Zone / Room	Height / Dia.	Width	Area	Design		Test		Static Pressure
					Velocity	cfm	Velocity	cfm	
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%
RTU-28	OA	10	9	0.6	424	265	427	267	100%

Environmental Testing & Balancing, Inc.

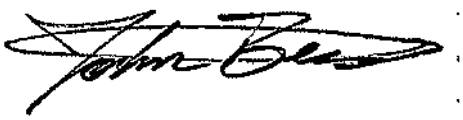
154 STATE STREET SUITE 204
NORTH HAVEN, CT 06473
(203) 234-2089 FAX (203) 234-2147

CERTIFIED TESTING AND BALANCING REPORT

Date:	September 3, 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



Environmental Testing & Balancing, Inc.
Registration No. 2968

TABLE OF CONTENTS

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 Equipment				
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
CH	Chiller	OD	Outside Diameter
CHWC, CC	Chilled Water Coil, Cooling Coil	OED	Open End Duct
CS	Circuit Setter	PSI	Pounds per Square Inch
CT	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

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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.

FAN TEST SHEET

Job Name: **J. Milton Jeffrey Elementary School Ventilation Survey**
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	T07H59198	R082L602H	R0532TN2H

	Design	**Test**	**Design**	**Test**	**Design**	**Test**
Total cfm	2500	2478	N/A	1433	N/A	1274

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						
Voltage						
Service Factor						
Rated Amperage						
Corrected for Voltage						
No Load Amperage						
Operating Amperage						
Brake Horsepower						
Fan rpm						

FAN TEST SHEET

Job Name: **J. Milton Jeffrey Elementary School Ventilation Survey**
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

	Design	Test	Design	Test	Design	Test
Total cfm	N/A	1246	N/A	1259	N/A	1310

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						
Fan rpm						

FAN TEST SHEET

Job Name: J. Milton Jeffrey Elementary School Ventilation Survey
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						

GRILLE, REGISTER & DIFFUSER TEST SHEET

Job Name: **J. Milton Jeffrey Elementary School Ventilation Survey**

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

Outlet Number	Room Number	Code	Size	"Ak" Factor	Required fpm	Required cfm	First Test	New Req'd	Final fpm	Final cfm
Room 8 AHU										
1	8	SW	12x6	0.33	0	N/A	1052	0	1052	347
2	8	SW	12x6	0.33	0	N/A	956	0	956	315
3	8	SW	12x6	0.33	0	N/A	1123	0	1123	371
4	8	SW	12x6	0.33	0	N/A	621	0	621	205
5	8	SW	12x6	0.33	0	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
										2478
Outside Air										
1	Room 8 AHU	oed	40x9	1.00	0	N/A	45		265	265
Room 23 RTU										
1	RDG Total			1.00	0	N/A	1433		1433	1433
Room 24 RTU										
1	RDG Total			1.00	0	N/A	1274		1274	1274
Room 25 RTU										
1	RDG Total			1.00	0	N/A	1246		1246	1246
Room 26 RTU										
1	RDG Total			1.00	0	N/A	1259		1259	1259
Room 27 RTU										
1	RDG Total			1.00	0	N/A	1310		1310	1310
Room 28 RTU										
1	RDG Total			1.00	0	N/A	1295		1295	1295

GRILLE, REGISTER & DIFFUSER TEST SHEET

Job Name: **J. Milton Jeffrey Elementary School Ventilation Survey**

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

Outlet Number	Room Number	Code	Size	"Ak" Factor	Required fpm	Required cfm	First Test	New Req'd	Final fpm	Final cfm
Art Room UV										
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
Music Room B UV										
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
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 UV 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 UV										
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 UV										
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

GRILLE, REGISTER & DIFFUSER TEST SHEET

Job Name: **J. Milton Jeffrey Elementary School Ventilation Survey**

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

Outlet Number	Room Number	Code	Size	"Ak" Factor	Required fpm	Required cfm	First Test	New Req'd	Final fpm	Final cfm
Room 4 UV										
1	Supply	UV	51.5x6	1.00	0	N/A	630		630	630
2	Outside Air	oed	49x10	1.00	0	N/A	65		65	65
Room 6 UV										
1	Supply	UV	51.5x6	1.00	0	N/A	570		570	570
2	Outside Air	oed	49x10	1.00	0	N/A	58		58	58
Room 10 UV										
1	Supply	UV	51.5x6	1.00	0	N/A	540		540	540
2	Outside Air	oed	49x10	1.00	0	N/A	105		105	105
Room 12 UV										
1	Supply	UV	51.5x6	1.00	0	N/A	382		382	382
2	Outside Air	oed	49x10	1.00	0	N/A	92		92	92
Room 13 UV										
1	Supply	UV	51.5x6	1.00	0	N/A	300		300	300
2	Outside Air	oed	49x10	1.00	0	N/A	58		58	58
Room 15 UV										
1	Supply	UV	42x9	1.00	0	N/A	533		533	533
2	Outside Air	oed	40x9	1.00	0	N/A	235		235	235
Room 16 UV										
1	Supply	UV	42x9	1.00	0	N/A	538		538	538
2	Outside Air	oed	40x9	1.00	0	N/A	206		206	206
Room 17 UV										
1	Supply	UV	42x9	1.00	0	N/A	513		513	513
2	Outside Air	oed	40x9	1.00	0	N/A	170		170	170

GRILLE, REGISTER & DIFFUSER TEST SHEET

Job Name: J. Milton Jeffrey Elementary School Ventilation Survey
Tested By: B Cooney / P Ouellette / M A DeZinno September 3, 2020 (20203J)

Outlet Number	Room Number	Code	Size	"Ak" Factor	Required fpm	Required cfm	First Test	New Req'd	Final fpm	Final cfm
Room 18 UV										
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 UV										
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
Room 20 UV										
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 UV										
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
Room 22 UV										
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**

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

System No.	Zone / Room	Height / Dia.	Width	Area	Design		Test		Static Pressure
					Velocity	cfm	Velocity	cfm	
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%
RTU-28	OA	10	9	0.6	424	265	427	267	100%

Environmental Testing & Balancing, Inc.

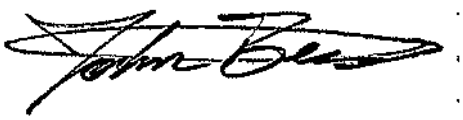
154 STATE STREET SUITE 204
NORTH HAVEN, CT 06473
(203) 234-2089 FAX (203) 234-2147

CERTIFIED TESTING AND BALANCING REPORT

Date:	September 3, 2020
Project:	Town Campus Learning Center
	Ventilation Survey
Address:	10 Campus Drive
	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



Environmental Testing & Balancing, Inc.
Registration No. 2968

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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 Equipment				
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
CH	Chiller	OD	Outside Diameter
CHWC, CC	Chilled Water Coil, Cooling Coil	OED	Open End Duct
CS	Circuit Setter	PSI	Pounds per Square Inch
CT	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.

Town Campus Learning Center Ventilation Survey

Remarks

September 3, 2020

General Note:

All outside airs set to full open.

FAN TEST SHEET

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

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
Serial Number	R193XXW2H	R194KJ42H	R194PW32H

	Design	Test	Design	Test	Design	Test
Total cfm	N/A	1230	N/A	1320	N/A	1244

Suction Static Pressure		-0.03		-0.06		-0.06
Discharge Static Pressure		0.40		0.28		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**
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

	Design	**Test**	**Design**	**Test**	**Design**	**Test**
Total cfm	N/A	986	N/A	1140	N/A	1118

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						

FAN TEST SHEET

Job Name: **Town Campus Learning Center Ventilation Survey**
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

	Design	**Test**	**Design**	**Test**	**Design**	**Test**
Total cfm	N/A	1134	N/A	1266	N/A	1134

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

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
Serial Number	R19MAJ2H	R1935UP2H	R194K8X2H

	Design	**Test**	**Design**	**Test**	**Design**	**Test**
Total cfm	N/A	1244	N/A	1280	N/A	1249
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 Survey**
Tested By: **B Cooney / P Ouellette / M A DeZinno September 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						
Service Factor						
Rated Amperage						
Corrected for Voltage						
No Load Amperage						
Operating Amperage						
Brake Horsepower						
Fan rpm						

GRILLE, REGISTER & DIFFUSER TEST SHEET

Job Name: Town Campus Learning Center Ventilation Survey

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

Outlet Number	Room Number	Code	Size	"Ak" Factor	Required fpm	Required cfm	First Test	New Req'd	Final fpm	Final cfm
RTU-Rm 1										
1	Total			1.00	0	N/A	1230		1230	1230
RTU-Rm 2										
1	Total			1.00	0	N/A	1320		1320	1320
RTU-Rm 3										
1	Total			1.00	0	N/A	1244		1244	1244
RTU-Rm 4										
1	Total			1.00	0	N/A	986		986	986
RTU-Rm 5										
1	Total			1.00	0	N/A	1140		1140	1140
RTU-Rm 6										
1	Total			1.00	0	N/A	1118		1118	1118
RTU-Rm 7										
1	Total			1.00	0	N/A	1134		1134	1134
RTU-Rm 8										
1	Total			1.00	0	N/A	1266		1266	1266
RTU-Rm 9										
1	Total			1.00	0	N/A	1134		1134	1134
RTU-Rm 10										
1	Total			1.00	0	N/A	1244		1244	1244

GRILLE, REGISTER & DIFFUSER TEST SHEET

Job Name: Town Campus Learning Center Ventilation Survey

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

Outlet Number	Room Number	Code	Size	"Ak" Factor	Required fpm	Required cfm	First Test	New Req'd	Final fpm	Final cfm
RTU-Rm 11										
1	Total			1.00	0	N/A	1280		1280	1280
RTU-Rm 12										
1	Total			1.00	0	N/A	1249		1249	1249
RTU-Rm 13										
1	Total			1.00	0	N/A	835		835	835
RTU-Server 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 / P Ouellette / M A DeZinno September 3, 2020 (20203TC)**

System No.	Zone / Room	Height / Dia.	Width	Area	Design		Test		Static Pressure
					Velocity	cfm	Velocity	cfm	
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
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
RTU	Room 7	5	10	0.3	0	N/A	632	219	N/A
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
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
RTU	Rm Server	5	10	0.3	0	N/A	622	216	N/A

Environmental Testing & Balancing, Inc.

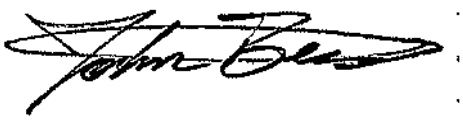
154 STATE STREET SUITE 204
NORTH HAVEN, CT 06473
(203) 234-2089 FAX (203) 234-2147

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



Environmental Testing & Balancing, Inc.
Registration No. 2968

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CFM	Cubic Feet per Minute	OBD	Opposed Blade Damper
CH	Chiller	OD	Outside Diameter
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CT	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

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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 =**

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	
Total Static Pressure =		1.51
External Suction Static Pressure =	-0.22	
External Discharge Static Pressure =	1.15	
External 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)

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design fpm	Design cfm	First Test	New Req'd	Final fpm	Final 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	350	359	345	359	359
						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 Pressure =**	
Fan rpm =		**Brake Horsepower =**	

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	
Total Static Pressure =		1.73
External Suction Static Pressure =	-0.48	
External Discharge Static Pressure =	0.94	
External 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 =					

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
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 Number	Room Number	Code	Size	"Ak" Factor	Design fpm	Design cfm	First Test	New Req'd	Final fpm	Final cfm
	AHU-2									
VAV-05										
1	537	C	24x24	1.00	75	75	70	75	70	70
2	538	C	24x24	1.00	275	275	268	274	268	268
3	539	C	24x24	1.00	145	145	155	145	155	155
4	541	C	24x24	1.00	150	150	154	150	154	154
5	542	C	24x24	1.00	150	150	146	150	146	146
						795				793
										100%
Box Type	Box Size	Flow Correction Factor for DDC					Design Minimum		Test Minimum	
Exist	9						230			
VAV-07										
1	285	C	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	480	455	488	455	455
						1960				1993
										102%
Box Type	Box Size	Flow Correction Factor for DDC					Design Minimum		Test Minimum	
Exist	14						590			
VAV-08										
1	544	C	24x24	1.00	390	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	380	390	415	390	390
						2280				2489
										109%
Box Type	Box Size	Flow Correction Factor for DDC					Design Minimum		Test Minimum	
Exist	16						940			

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 Pressure =**	
Fan rpm =		**Brake Horsepower =**	

MOTOR DESIGN DATA

Horsepower =	**Voltage =**	**Phase =**	**rpm =**

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 Static Pressure =		1.06
External Suction Static Pressure =	-0.10	
External Discharge Static Pressure =	0.87	
External 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 =			**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
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)**

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design fpm	Design cfm	First Test	New Req'd	Final fpm	Final cfm
	AHU-3									
VAV-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	280	297	295	297	297
						660				695
										105%
Box Type	Box Size	Flow Correction Factor for DDC					Design Minimum		Test Minimum	
Exist	9						230			
VAV-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	325	315	312	315	315
						1300				1247
										96%
Box Type	Box Size	Flow Correction Factor for DDC					Design Minimum		Test Minimum	
Exist	12						360			
VAV-03										
1	529	CD	2410	1.00	315	315	268		268	268
										85%
Box Type	Box Size	Flow Correction Factor for DDC					Design Minimum		Test Minimum	
Exist	6						100			

AIR OUTLET TEST SHEET

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

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

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design fpm	Design cfm	First Test	New Req'd	Final fpm	Final cfm
VAV-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	275	286	265	286	286
						1575				1516
										96%
Box Type	Box Size	Flow Correction Factor for DDC					Design Minimum		Test Minimum	
Exist	12						420			
VAV-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	223	231	223	223
						750				692
										92%
Box Type	Box Size	Flow Correction Factor for DDC					Design Minimum		Test Minimum	
Exist	9						225			

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 =**

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 Static Pressure =		1.64
External Suction Static Pressure =	-1.10	
External Discharge Static Pressure =	0.38	
External 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)

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design fpm	Design cfm	First Test	New Req'd	Final fpm	Final 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	310
						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	
Total Static Pressure =		2.30
External Suction Static Pressure =	-0.65	
External Discharge Static Pressure =	0.80	
External 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 =					

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 OUTLET TEST SHEET

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

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

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design		First Test	New Req'd	Final	
					fpm	cfm			fpm	cfm
	AHU-A1									
1	217	B	18x18	1.00	1000	1000	854	908	854	854
2	corr	B	9x9	1.00	100	100	123	91	123	123
3	218	B	18x18	1.00	1200	1200	1027	1090	1027	1027
4	240	B	18x18	1.00	900	900	673	817	673	673
5	219	B	18x18	1.00	1200	1200	1073	1090	1073	1073
6	257	B	6x6	1.00	50	50	56	45	56	56
7	239	B	9x9	1.00	100	100	76	91	76	76
8	corr	B	9x9	1.00	100	100	73	91	73	73
9	238	B	9x9	1.00	100	100	185	91	185	185
10	220	B	18x18	1.00	1200	1200	1264	1090	1264	1264
						5950				5404
										91%

AIR APPARATUS TEST SHEET

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 =**

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	
	Total Static Pressure =	1.52
External Suction Static Pressure =	-0.44	
External Discharge Static Pressure =	0.38	
	External 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 =					

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)**

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design		First Test	New Req'd	Final	
					fpm	cfm			fpm	cfm
	AHU-A2									
1	107	B	18x18	1.00	1100	1100	705	718	705	705
2	132	B	15x15	1.00	450	450	330	294	330	330
3	corr	B	9x9	1.00	100	100	32	65	32	32
4	106	B	15x15	1.00	750	750	482	490	482	482
5	106	B	15x15	1.00	750	750	491	490	491	491
6	132	B	12x12	1.00	450	450	318	294	318	318
7	108	B	18x18	1.00	1100	1100	713	718	713	713
8	131	B	12x12	1.00	500	500	293	326	293	293
9	109	B	18x18	1.00	1100	1100	771	718	771	771
10	130	B	9x9	1.00	100	100	66	65	66	66
11	corr	B	9x9	1.00	100	100	42	65	42	42
						6500				4243
										65%

AIR APPARATUS TEST SHEET

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 =**

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 =					

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)

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design		First Test	New Req'd	Final	
					fpm	cfm			fpm	cfm
	AHU-A3									
1	221	B	18x18	1.00	1200	1200	1136	1107	1136	1136
2	222	B	18x18	1.00	1200	1200	1113	1107	1113	1113
3	223	B	18x18	1.00	1200	1200	1048	1107	1048	1048
4	224	B	18x18	1.00	1200	1200	1159	1107	1159	1159
5	225	B	18x18	1.00	1200	1200	1079	1107	1079	1079
						6000				5535
										92%

AIR APPARATUS TEST SHEET

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	
Total Static Pressure =		1.70
External Suction Static Pressure =	-0.27	
External Discharge Static Pressure =	0.25	
External 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 =					

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 =	45% Open	

AIR OUTLET TEST SHEET

Job Name: Brown Middle School Ventilation Survey

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

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design		First Test	New Req'd	Final	
					fpm	cfm			fpm	cfm
	AHU-A4									
1	128	B	12x12	1.00	400	400	362	351	362	362
2	129	B	6x6	1.00	50	50	81	44	81	81
3	129-A	B	9x9	1.00	100	100	92	88	92	92
4	corr	B	9x9	1.00	100	100	138	88	138	138
5	110	B	18x18	1.00	1100	1100	990	964	990	990
6	111	B	18x18	1.00	1100	1100	885	964	885	885
7	127	B	12x12	1.00	450	450	404	395	404	404
8	127	B	12x12	1.00	450	450	415	395	415	415
9	corr	B	9x9	1.00	100	100	128	88	128	128
10	112	B	18x18	1.00	1100	1100	845	964	845	845
						4950				4340
										88%

AIR APPARATUS TEST SHEET

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
Total Static Pressure =	-11.47
External Suction Static Pressure =	-0.44
External Discharge Static Pressure =	0.57
External 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 =					

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 =	35% Open	

AIR OUTLET TEST SHEET

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

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

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design		First Test	New Req'd	Final	
					fpm	cfm			fpm	cfm
	AHU-A5									
1	226	B	12x12	1.00	450	450	424	418	424	424
2	212	B	6x6	1.00	50	50	56	46	56	56
3	226	B	12x12	1.00	450	450	420	418	420	420
4	Corr	B	6x6	1.00	50	50	69	46	69	69
5	230	B	18x18	1.00	900	900	749	837	749	749
6	230	B	18x18	1.00	900	900	849	837	849	849
7	171	B	9x9	1.00	100	100	117	93	117	117
8	233	B	9x9	1.00	125	125	91	116	91	91
9	235	B	6x6	1.00	50	50	96	46	96	96
10	232	B	9x9	1.00	125	125	104	116	104	104
						3200				2975
										93%

AIR APPARATUS TEST SHEET

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 Pressure =**	
Fan rpm =		**Brake Horsepower =**	

MOTOR DESIGN DATA

Horsepower =	**Voltage =**	**Phase =**	**rpm =**

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 Static Pressure =		1.86
External Suction Static Pressure =	-0.68	
External Discharge Static Pressure =	0.15	
External 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 =					

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 =	58% Open		

AIR OUTLET TEST SHEET

Job Name: Brown Middle School Ventilation Survey

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

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design		First Test	New Req'd	Final	
					fpm	cfm			fpm	cfm
	AHU-A6									
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	100
										2247

AIR APPARATUS TEST SHEET

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 Pressure =**	
Fan rpm =		**Brake Horsepower =**	

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	
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 =			**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 =	35% Open
Static Control Setpoint =	1.85" 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 Number	Room Number	Code	Size	"Ak" Factor	Design fpm	Design cfm	First Test	New Req'd	Final fpm	Final cfm
	AHU-A7									
VAV 1										
1	209	B	12x12	1.00	400	400	262	251	262	262
2	208	B	12x12	1.00	75	75	1	47	1	1
3	210	B	12x12	1.00	200	200	160	125	160	160
						675				423
										63%
Box Type	Box Size	Flow Correction Factor for DDC					Design Minimum		Test Minimum	
VAV										
VAV 2										
1	301	A	6x6	1.00	50	50	1	29	1	1
2	201	B	12x12	1.00	400	400	245	233	245	245
3	201	B	12x12	1.00	400	400	250	233	250	250
						850				496
										58%
Box Type	Box Size	Flow Correction Factor for DDC					Design Minimum		Test Minimum	
VAV										
VAV3										
1	201	B	12x12	1.00	400	400	267	274	267	267
2	201	B	12x12	1.00	400	400	281	274	281	281
						800				548
										69%
Box Type	Box Size	Flow Correction Factor for DDC					Design Minimum		Test Minimum	
VAV										
VAV 4										
1	201	B	12x12	1.00	400	400	244	241	244	244
2	201	B	12x12	1.00	400	400	238	241	238	238
						800				482
										60%
Box Type	Box Size	Flow Correction Factor for DDC					Design Minimum		Test Minimum	
VAV										

AIR OUTLET TEST SHEET

Job Name: **Brown Middle School Ventilation Survey**
Tested By: **B Cooney / M A DeZinno November 9, 2020 (20203BM)**

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design fpm	Design cfm	First Test	New Req'd	Final fpm	Final cfm
VAV 5										
1	201	B	12x12	1.00	500	500	1	1	1	1
2	201	B	12x12	1.00	500	500	1	1	1	1
						1000				2
										0%
Box Type	Box Size	Flow Correction Factor for DDC					Design Minimum		Test Minimum	
VAV										
VAV 6										
1	201	B	12x12	1.00	500	500	267	283	267	267
2	201	B	12x12	1.00	500	500	298	283	298	298
						1000				565
										57%
Box Type	Box Size	Flow Correction Factor for DDC					Design Minimum		Test Minimum	
VAV										
VAV 7										
1	204	A	9x9	1.00	125	125	77	76	77	77
2	205	A	9x9	1.00	100	100	59	60	59	59
						225				136
										60%
Box Type	Box Size	Flow Correction Factor for DDC					Design Minimum		Test Minimum	
VAV										
VAV 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	1
										135
Box Type	Box Size	Flow Correction Factor for DDC					Design Minimum		Test Minimum	
VAV										

AIR OUTLET TEST SHEET

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

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

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design fpm	Design cfm	First Test	New Req'd	Final fpm	Final cfm
VAV 9										
1	301	B	12x12	1.00	400	400	229	233	229	229
2	201	B	12x12	1.00	400	400	220	233	220	220
3	201	B	12x12	1.00	400	400	251	233	251	251
						1200				700
										58%
Box Type	Box Size	Flow Correction Factor for DDC					Design Minimum		Test Minimum	
VAV										

AIR APPARATUS TEST SHEET

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 =**

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 =					

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 = 35%	

AIR OUTLET TEST SHEET

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

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

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design		First Test	New Req'd	Final	
					fpm	cfm			fpm	cfm
	AHU-A8									
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	1000	616	906	616	616
						12600				11414
										91%

AIR APPARATUS TEST SHEET

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 =**

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	
Total Static Pressure =		1.57
External Suction Static Pressure =	-0.30	
External Discharge Static Pressure =	0.57	
External 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 =					

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 OUTLET TEST SHEET

Job Name: **Brown Middle School Ventilation Survey**
Tested By: **B Cooney / M A DeZinno November 9, 2020 (20203BM)**

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design fpm	Design cfm	First Test	New Req'd	Final fpm	Final cfm
	AHU-A9									
						@ 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	1000	608	519	608	1021
						8000				6970
										87%

AIR APPARATUS TEST SHEET

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 =**

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 =					

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)

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design		First Test	New Req'd	Final	
					fpm	cfm			fpm	cfm
	AHU-B1									
1	305	B	9x9	1.00	225	225	193	189	193	193
2	305	B	9x9	1.00	225	225	208	189	208	208
3	305	B	9x9	1.00	225	225	201	189	201	201
4	305	B	9x9	1.00	225	225	176	189	176	176
5	306	B	9x9	1.00	225	225	188	189	188	188
6	306	B	9x9	1.00	225	225	205	189	205	205
7	306	B	9x9	1.00	225	225	197	189	197	197
8	306	B	9x9	1.00	225	225	200	189	200	200
9	307	B	9x9	1.00	275	275	203	230	203	203
10	307	B	9x9	1.00	275	275	197	230	197	197
11	307	B	9x9	1.00	275	275	232	230	232	232
12	322 corr	B	9x9	1.00	225	225	196	189	196	196
13	322	B	9x9	1.00	250	250	202	209	202	202
14	322	B	9x9	1.00	250	250	209	209	209	209
						3350				2807
										84%

AIR APPARATUS TEST SHEET

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 =**

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 =					

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)

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design		First Test	New Req'd	Final	
					fpm	cfm			fpm	cfm
	AHU-B2									
1	322	B	9x9	1.00	250	250	219	246	219	219
2	322	B	9x9	1.00	250	250	240	246	240	240
3	322 Corr	B	9x9	1.00	225	225	252	222	252	252
4	308	B	9x9	1.00	275	275	254	271	254	254
5	308	B	9x9	1.00	275	275	279	271	279	279
6	308	B	9x9	1.00	275	275	261	271	261	261
7	309	B	9x9	1.00	225	225	220	222	220	220
8	309	B	9x9	1.00	225	225	216	222	216	216
9	309	B	9x9	1.00	225	225	219	222	219	219
10	309	B	9x9	1.00	225	225	208	222	208	208
11	310	B	9x9	1.00	225	225	225	222	225	225
12	310	B	9x9	1.00	225	225	226	222	226	226
13	310	B	9x9	1.00	225	225	243	222	243	243
14	310	B	9x9	1.00	225	225	240	222	240	240
						3350				3302
										99%

AIR APPARATUS TEST SHEET

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 =**

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 =					

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)

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design		First Test	New Req'd	Final	
					fpm	cfm			fpm	cfm
	AHU-B3									
1	303	B	9x9	1.00	225	225	194	213	194	194
2	303	B	9x9	1.00	225	225	225	213	225	225
3	303	B	9x9	1.00	225	225	204	213	204	204
4	303	B	9x9	1.00	225	225	217	213	217	217
5	corr	B	9x9	1.00	200	200	225	190	225	225
6	304	B	9x9	1.00	225	225	201	213	201	201
7	304	B	9x9	1.00	225	225	201	213	201	201
8	304	B	9x9	1.00	225	225	207	213	207	207
9	304	B	9x9	1.00	225	225	209	213	209	209
10	321	B	9x9	1.00	250	250	286	237	286	286
11	320	B	9x9	1.00	50	50	81	47	81	81
12	319	B	9x9	1.00	50	50	79	47	79	79
13	314	B	9x9	1.00	250	250	213	237	213	213
14	314	B	9x9	1.00	250	250	212	237	212	212
15	314	B	9x9	1.00	250	250	205	237	205	205
16	314	B	9x9	1.00	250	250	219	237	219	219
						3350				3178
										95%

AIR APPARATUS TEST SHEET

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 =			**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)**

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design		First Test	New Req'd	Final	
					fpm	cfm			fpm	cfm
	AHU-B4									
1	313	B	9x9	1.00	250	250	233	245	233	233
2	313	B	9x9	1.00	250	250	231	245	231	231
3	313	B	9x9	1.00	250	250	215	245	215	215
4	313	B	9x9	1.00	250	250	221	245	221	221
5	315	B	9x9	1.00	50	50	57	49	57	57
6	316	B	9x9	1.00	50	50	54	49	54	54
7	321	B	9x9	1.00	250	250	245	245	245	245
8	311	B	9x9	1.00	225	225	251	221	251	251
9	311	B	9x9	1.00	225	225	251	221	251	251
10	311	B	9x9	1.00	225	225	241	221	241	241
11	311	B	9x9	1.00	225	225	245	221	245	245
12	Corr	B	9x9	1.00	200	200	226	196	226	226
13	312	B	9x9	1.00	225	225	217	221	217	217
14	312	B	9x9	1.00	225	225	215	221	215	215
15	312	B	9x9	1.00	225	225	210	221	210	210
16	312	B	9x9	1.00	225	225	175	221	175	175
						3350				3287
										98%

TRAVERSE SUMMARY TEST SHEET

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

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

System No.	Zone / Room	Height / Dia.	Width	Area	Design		Test		Static Pressure
					Velocity	cfm	Velocity	cfm	
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
	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
	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
	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
	OA Minimum	36	28	7.0	161	1125	167	1169	25% Open

TRAVERSE SUMMARY TEST SHEET

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

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

System No.	Zone / Room	Height / Dia.	Width	Area	Design		Test		Static Pressure
					Velocity	cfm	Velocity	cfm	
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

Environmental Testing & Balancing, Inc.

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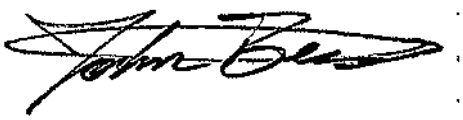
NORTH HAVEN, CT 06473
(203) 234-2089 FAX (203) 234-2147

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



Environmental Testing & Balancing, Inc.
Registration No. 2968

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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 Equipment				
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
CH	Chiller	OD	Outside Diameter
CHWC, CC	Chilled Water Coil, Cooling Coil	OED	Open End Duct
CS	Circuit Setter	PSI	Pounds per Square Inch
CT	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

AIR APPARATUS TEST SHEET

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 =**

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	
Total Static Pressure =		1.51
External Suction Static Pressure =	-0.22	
External Discharge Static Pressure =	1.15	
External 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 / P Ouellette / M A DeZinno September 3, 2020 (20203BM)

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design		First Test	New Req'd	Final	
					fpm	cfm			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	350	359	345	359	359
						11910				11736
										99%

AIR APPARATUS TEST SHEET

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 Pressure =**	
Fan rpm =		**Brake Horsepower =**	

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		
	Total Static Pressure =	1.73	
External Suction Static Pressure =	-0.48		
External Discharge Static Pressure =	0.94		
	External 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 =					

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		
Static Control Setpoint =	1.14" w.g.		

AIR OUTLET TEST SHEET

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

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

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design fpm	Design cfm	First Test	New Req'd	Final fpm	Final cfm
	AHU-2									
VAV-05										
1	537	C	24x24	1.00	75	75	70	75	70	70
2	538	C	24x24	1.00	275	275	268	274	268	268
3	539	C	24x24	1.00	145	145	155	145	155	155
4	541	C	24x24	1.00	150	150	154	150	154	154
5	542	C	24x24	1.00	150	150	146	150	146	146
						795				793
										100%
Box Type	Box Size	Flow Correction Factor for DDC					Design Minimum		Test Minimum	
Exist	9						230			
VAV-07										
1	285	C	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	480	455	488	455	455
						1960				1993
										102%
Box Type	Box Size	Flow Correction Factor for DDC					Design Minimum		Test Minimum	
Exist	14						590			
VAV-08										
1	544	C	24x24	1.00	390	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	380	390	415	390	390
						2280				2489
										109%
Box Type	Box Size	Flow Correction Factor for DDC					Design Minimum		Test Minimum	
Exist	16						940			

AIR APPARATUS TEST SHEET

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 Pressure =**	
Fan rpm =		**Brake Horsepower =**	

MOTOR DESIGN DATA

Horsepower =	**Voltage =**	**Phase =**	**rpm =**

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 Static Pressure =		1.06
External Suction Static Pressure =	-0.10	
External Discharge Static Pressure =	0.87	
External 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 =			**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		
Static Control Setpoint =	1.50" w.g.		

AIR OUTLET TEST SHEET

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

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

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design fpm	Design cfm	First Test	New Req'd	Final fpm	Final cfm
	AHU-3									
VAV-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	280	297	295	297	297
						660				695
										105%
Box Type	Box Size	Flow Correction Factor for DDC					Design Minimum		Test Minimum	
Exist	9						230			
VAV-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	325	315	312	315	315
						1300				1247
										96%
Box Type	Box Size	Flow Correction Factor for DDC					Design Minimum		Test Minimum	
Exist	12						360			
VAV-03										
1	529	CD	2410	1.00	315	315	268		268	268
										85%
Box Type	Box Size	Flow Correction Factor for DDC					Design Minimum		Test Minimum	
Exist	6						100			

AIR OUTLET TEST SHEET

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

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

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design fpm	Design cfm	First Test	New Req'd	Final fpm	Final cfm
VAV-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	275	286	265	286	286
						1575				1516
										96%
Box Type	Box Size	Flow Correction Factor for DDC					Design Minimum		Test Minimum	
Exist	12						420			
VAV-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	223	231	223	223
						750				692
										92%
Box Type	Box Size	Flow Correction Factor for DDC					Design Minimum		Test Minimum	
Exist	9						225			

AIR APPARATUS TEST SHEET

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 =**

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 Static Pressure =		1.64
External Suction Static Pressure =	-1.10	
External Discharge Static Pressure =	0.38	
External 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 / P Ouellette / M A DeZinno September 3, 2020 (20203BM)

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design fpm	Design cfm	First Test	New Req'd	Final fpm	Final 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	310
						9690				10066
										104%

AIR APPARATUS TEST SHEET

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 =**

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	
Total Static Pressure =		2.30
External Suction Static Pressure =	-0.65	
External Discharge Static Pressure =	0.80	
External 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 =					

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 OUTLET TEST SHEET

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

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

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design		First Test	New Req'd	Final	
					fpm	cfm			fpm	cfm
	AHU-A1									
1	217	B	18x18	1.00	1000	1000	854	908	854	854
2	corr	B	9x9	1.00	100	100	123	91	123	123
3	218	B	18x18	1.00	1200	1200	1027	1090	1027	1027
4	240	B	18x18	1.00	900	900	673	817	673	673
5	219	B	18x18	1.00	1200	1200	1073	1090	1073	1073
6	257	B	6x6	1.00	50	50	56	45	56	56
7	239	B	9x9	1.00	100	100	76	91	76	76
8	corr	B	9x9	1.00	100	100	73	91	73	73
9	238	B	9x9	1.00	100	100	185	91	185	185
10	220	B	18x18	1.00	1200	1200	1264	1090	1264	1264
						5950				5404
										91%

AIR APPARATUS TEST SHEET

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 =**

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	
	Total Static Pressure =	1.52
External Suction Static Pressure =	-0.44	
External Discharge Static Pressure =	0.38	
	External 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 =				

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 / P Ouellette / M A DeZinno September 3, 2020 (20203BM)**

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design		First Test	New Req'd	Final	
					fpm	cfm			fpm	cfm
	AHU-A2									
1	107	B	18x18	1.00	1100	1100	705	718	705	705
2	132	B	15x15	1.00	450	450	330	294	330	330
3	corr	B	9x9	1.00	100	100	32	65	32	32
4	106	B	15x15	1.00	750	750	482	490	482	482
5	106	B	15x15	1.00	750	750	491	490	491	491
6	132	B	12x12	1.00	450	450	318	294	318	318
7	108	B	18x18	1.00	1100	1100	713	718	713	713
8	131	B	12x12	1.00	500	500	293	326	293	293
9	109	B	18x18	1.00	1100	1100	771	718	771	771
10	130	B	9x9	1.00	100	100	66	65	66	66
11	corr	B	9x9	1.00	100	100	42	65	42	42
						6500				4243
										65%

AIR APPARATUS TEST SHEET

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 =					

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 / P Ouellette / M A DeZinno September 3, 2020 (20203BM)**

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design		First Test	New Req'd	Final	
					fpm	cfm			fpm	cfm
	AHU-A3									
1	221	B	18x18	1.00	1200	1200	1136	1107	1136	1136
2	222	B	18x18	1.00	1200	1200	1113	1107	1113	1113
3	223	B	18x18	1.00	1200	1200	1048	1107	1048	1048
4	224	B	18x18	1.00	1200	1200	1159	1107	1159	1159
5	225	B	18x18	1.00	1200	1200	1079	1107	1079	1079
						6000				5535
										92%

AIR APPARATUS TEST SHEET

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	
External 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 =					

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 =	45% Open	

AIR OUTLET TEST SHEET

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

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

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design		First Test	New Req'd	Final	
					fpm	cfm			fpm	cfm
	AHU-A4									
1	128	B	12x12	1.00	400	400	362	351	362	362
2	129	B	6x6	1.00	50	50	81	44	81	81
3	129-A	B	9x9	1.00	100	100	92	88	92	92
4	corr	B	9x9	1.00	100	100	138	88	138	138
5	110	B	18x18	1.00	1100	1100	990	964	990	990
6	111	B	18x18	1.00	1100	1100	885	964	885	885
7	127	B	12x12	1.00	450	450	404	395	404	404
8	127	B	12x12	1.00	450	450	415	395	415	415
9	corr	B	9x9	1.00	100	100	128	88	128	128
10	112	B	18x18	1.00	1100	1100	845	964	845	845
						4950				4340
										88%

AIR APPARATUS TEST SHEET

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 =**

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	
	Total Static Pressure =	-11.47
External Suction Static Pressure =	-0.44	
External Discharge Static Pressure =	0.57	
	External 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 =					

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 = 35% Open	

AIR OUTLET TEST SHEET

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

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

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design		First Test	New Req'd	Final	
					fpm	cfm			fpm	cfm
	AHU-A5									
1	226	B	12x12	1.00	450	450	424	418	424	424
2	212	B	6x6	1.00	50	50	56	46	56	56
3	226	B	12x12	1.00	450	450	420	418	420	420
4	Corr	B	6x6	1.00	50	50	69	46	69	69
5	230	B	18x18	1.00	900	900	749	837	749	749
6	230	B	18x18	1.00	900	900	849	837	849	849
7	171	B	9x9	1.00	100	100	117	93	117	117
8	233	B	9x9	1.00	125	125	91	116	91	91
9	235	B	6x6	1.00	50	50	96	46	96	96
10	232	B	9x9	1.00	125	125	104	116	104	104
						3200				2975
										93%

AIR APPARATUS TEST SHEET

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 Pressure =**	
Fan rpm =		**Brake Horsepower =**	

MOTOR DESIGN DATA

Horsepower =	**Voltage =**	**Phase =**	**rpm =**

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 Static Pressure =		1.86
External Suction Static Pressure =	-0.68	
External Discharge Static Pressure =	0.15	
External 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 =					

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 =	58% Open		

AIR OUTLET TEST SHEET

Job Name: Brown Middle School Ventilation Survey

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

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design		First Test	New Req'd	Final	
					fpm	cfm			fpm	cfm
	AHU-A6									
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	100
										2247

AIR APPARATUS TEST SHEET

Job Name: Brown Middle School Ventilation Survey
Tested By: B Cooney / P Ouellette / M A DeZinno September 3, 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 Pressure =**	
Fan rpm =		**Brake Horsepower =**	

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	
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 =			**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 =	35% Open		
Static Control Setpoint =	1.85" w.g.		

AIR OUTLET TEST SHEET

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

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

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design fpm	Design cfm	First Test	New Req'd	Final fpm	Final cfm
	AHU-A7									
VAV 1										
1	209	B	12x12	1.00	400	400	262	251	262	262
2	208	B	12x12	1.00	75	75	1	47	1	1
3	210	B	12x12	1.00	200	200	160	125	160	160
						675				423
										63%
Box Type	Box Size	Flow Correction Factor for DDC					Design Minimum		Test Minimum	
VAV										
VAV 2										
1	301	A	6x6	1.00	50	50	1	29	1	1
2	201	B	12x12	1.00	400	400	245	233	245	245
3	201	B	12x12	1.00	400	400	250	233	250	250
						850				496
										58%
Box Type	Box Size	Flow Correction Factor for DDC					Design Minimum		Test Minimum	
VAV										
VAV3										
1	201	B	12x12	1.00	400	400	267	274	267	267
2	201	B	12x12	1.00	400	400	281	274	281	281
						800				548
										69%
Box Type	Box Size	Flow Correction Factor for DDC					Design Minimum		Test Minimum	
VAV										
VAV 4										
1	201	B	12x12	1.00	400	400	244	241	244	244
2	201	B	12x12	1.00	400	400	238	241	238	238
						800				482
										60%
Box Type	Box Size	Flow Correction Factor for DDC					Design Minimum		Test Minimum	
VAV										

AIR OUTLET TEST SHEET

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

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

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design fpm	Design cfm	First Test	New Req'd	Final fpm	Final cfm
VAV 5										
1	201	B	12x12	1.00	500	500	1	1	1	1
2	201	B	12x12	1.00	500	500	1	1	1	1
						1000				2
										0%
Box Type	Box Size	Flow Correction Factor for DDC					Design Minimum		Test Minimum	
VAV										
VAV 6										
1	201	B	12x12	1.00	500	500	267	283	267	267
2	201	B	12x12	1.00	500	500	298	283	298	298
						1000				565
										57%
Box Type	Box Size	Flow Correction Factor for DDC					Design Minimum		Test Minimum	
VAV										
VAV 7										
1	204	A	9x9	1.00	125	125	77	76	77	77
2	205	A	9x9	1.00	100	100	59	60	59	59
						225				136
										60%
Box Type	Box Size	Flow Correction Factor for DDC					Design Minimum		Test Minimum	
VAV										
VAV 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	1
										135
Box Type	Box Size	Flow Correction Factor for DDC					Design Minimum		Test Minimum	
VAV										

AIR OUTLET TEST SHEET

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

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

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design fpm	Design cfm	First Test	New Req'd	Final fpm	Final cfm
VAV 9										
1	301	B	12x12	1.00	400	400	229	233	229	229
2	201	B	12x12	1.00	400	400	220	233	220	220
3	201	B	12x12	1.00	400	400	251	233	251	251
						1200				700
										58%
Box Type	Box Size	Flow Correction Factor for DDC					Design Minimum		Test Minimum	
VAV										

AIR APPARATUS TEST SHEET

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 =**

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 =					

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 =	35%	

AIR OUTLET TEST SHEET

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

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

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design		First Test	New Req'd	Final	
					fpm	cfm			fpm	cfm
	AHU-A8									
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	1000	616	906	616	616
						12600				11414
										91%

AIR APPARATUS TEST SHEET

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 =**

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	
Total Static Pressure =		1.57
External Suction Static Pressure =	-0.30	
External Discharge Static Pressure =	0.57	
External 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 =					

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 OUTLET TEST SHEET

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

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

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design		First Test	New Req'd	Final	
					fpm	cfm			fpm	cfm
	AHU-A9									
						@ 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	1000	608	519	608	1021
						8000				6970
										87%

AIR APPARATUS TEST SHEET

Job Name: Brown Middle School Ventilation Survey
Tested By: B Cooney / P Ouellette / M A DeZinno September 3, 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 =**

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 =					

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 / P Ouellette / M A DeZinno September 3, 2020 (20203BM)**

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design		First Test	New Req'd	Final	
					fpm	cfm			fpm	cfm
	AHU-B1									
1	305	B	9x9	1.00	225	225	193	189	193	193
2	305	B	9x9	1.00	225	225	208	189	208	208
3	305	B	9x9	1.00	225	225	201	189	201	201
4	305	B	9x9	1.00	225	225	176	189	176	176
5	306	B	9x9	1.00	225	225	188	189	188	188
6	306	B	9x9	1.00	225	225	205	189	205	205
7	306	B	9x9	1.00	225	225	197	189	197	197
8	306	B	9x9	1.00	225	225	200	189	200	200
9	307	B	9x9	1.00	275	275	203	230	203	203
10	307	B	9x9	1.00	275	275	197	230	197	197
11	307	B	9x9	1.00	275	275	232	230	232	232
12	322 corr	B	9x9	1.00	225	225	196	189	196	196
13	322	B	9x9	1.00	250	250	202	209	202	202
14	322	B	9x9	1.00	250	250	209	209	209	209
						3350				2807
										84%

AIR APPARATUS TEST SHEET

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 =**

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 =					

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 / P Ouellette / M A DeZinno September 3, 2020 (20203BM)**

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design		First Test	New Req'd	Final	
					fpm	cfm			fpm	cfm
	AHU-B2									
1	322	B	9x9	1.00	250	250	219	246	219	219
2	322	B	9x9	1.00	250	250	240	246	240	240
3	322 Corr	B	9x9	1.00	225	225	252	222	252	252
4	308	B	9x9	1.00	275	275	254	271	254	254
5	308	B	9x9	1.00	275	275	279	271	279	279
6	308	B	9x9	1.00	275	275	261	271	261	261
7	309	B	9x9	1.00	225	225	220	222	220	220
8	309	B	9x9	1.00	225	225	216	222	216	216
9	309	B	9x9	1.00	225	225	219	222	219	219
10	309	B	9x9	1.00	225	225	208	222	208	208
11	310	B	9x9	1.00	225	225	225	222	225	225
12	310	B	9x9	1.00	225	225	226	222	226	226
13	310	B	9x9	1.00	225	225	243	222	243	243
14	310	B	9x9	1.00	225	225	240	222	240	240
						3350				3302
										99%

AIR APPARATUS TEST SHEET

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 =**

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 =					

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 / P Ouellette / M A DeZinno September 3, 2020 (20203BM)**

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design		First Test	New Req'd	Final	
					fpm	cfm			fpm	cfm
	AHU-B3									
1	303	B	9x9	1.00	225	225	194	213	194	194
2	303	B	9x9	1.00	225	225	225	213	225	225
3	303	B	9x9	1.00	225	225	204	213	204	204
4	303	B	9x9	1.00	225	225	217	213	217	217
5	corr	B	9x9	1.00	200	200	225	190	225	225
6	304	B	9x9	1.00	225	225	201	213	201	201
7	304	B	9x9	1.00	225	225	201	213	201	201
8	304	B	9x9	1.00	225	225	207	213	207	207
9	304	B	9x9	1.00	225	225	209	213	209	209
10	321	B	9x9	1.00	250	250	286	237	286	286
11	320	B	9x9	1.00	50	50	81	47	81	81
12	319	B	9x9	1.00	50	50	79	47	79	79
13	314	B	9x9	1.00	250	250	213	237	213	213
14	314	B	9x9	1.00	250	250	212	237	212	212
15	314	B	9x9	1.00	250	250	205	237	205	205
16	314	B	9x9	1.00	250	250	219	237	219	219
						3350				3178
										95%

AIR APPARATUS TEST SHEET

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 =**

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 =					

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 / P Ouellette / M A DeZinno September 3, 2020 (20203BM)**

Outlet Number	Room Number	Code	Size	"Ak" Factor	Design		First Test	New Req'd	Final	
					fpm	cfm			fpm	cfm
	AHU-B4									
1	313	B	9x9	1.00	250	250	233	245	233	233
2	313	B	9x9	1.00	250	250	231	245	231	231
3	313	B	9x9	1.00	250	250	215	245	215	215
4	313	B	9x9	1.00	250	250	221	245	221	221
5	315	B	9x9	1.00	50	50	57	49	57	57
6	316	B	9x9	1.00	50	50	54	49	54	54
7	321	B	9x9	1.00	250	250	245	245	245	245
8	311	B	9x9	1.00	225	225	251	221	251	251
9	311	B	9x9	1.00	225	225	251	221	251	251
10	311	B	9x9	1.00	225	225	241	221	241	241
11	311	B	9x9	1.00	225	225	245	221	245	245
12	Corr	B	9x9	1.00	200	200	226	196	226	226
13	312	B	9x9	1.00	225	225	217	221	217	217
14	312	B	9x9	1.00	225	225	215	221	215	215
15	312	B	9x9	1.00	225	225	210	221	210	210
16	312	B	9x9	1.00	225	225	175	221	175	175
						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)**

System No.	Zone / Room	Height / Dia.	Width	Area	Design		Test		Static Pressure
					Velocity	cfm	Velocity	cfm	
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
	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
	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
	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
	OA Minimum	36	28	7.0	161	1125	167	1169	25% Open

TRAVERSE SUMMARY TEST SHEET

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

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

System No.	Zone / Room	Height / Dia.	Width	Area	Design		Test		Static Pressure
					Velocity	cfm	Velocity	cfm	
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