

Town of New Hartford, Connecticut
Air Quality & HVAC
Review for New Hartford
Schools
Bakerville Consolidated
Elementary School



TOWN OF NEW HARTFORD REPORT

Prepared for:
New Hartford, CT
51 Cedar Lane, New Hartford, CT 06057
Bakerville Consolidated School, New Hartford, CT 06057



Silver Petrucelli + Associates
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FACILITY HVAC CONDITIONS ASSESSMENT

BUILDING DESCRIPTION

Bakerville Consolidated School an elementary school at 51 Cedar Lane in New Hartford Connecticut. The school is in the 5A ASHRAE climate zone. The building consists of classrooms, offices, a kitchen and a multipurpose room.

The HVAC system consists of a hot water boiler, radiators, unit heaters, rooftop units, window air conditioners, and exhaust fans.

SCOPE OF WORK

Silver Petrucelli and Associates (SP+A) completed a building walkthrough and noted all systems of heating, ventilation and cooling throughout the school. The systems were assessed based on their ages, visual conditions, capacities, controls, and energy efficiencies.

The TAB contractor measured all areas of ventilation throughout the building for their outdoor air capabilities as well as their damper controls.

Based on the information gathered, and a comparison with ASHRAE 62.1, SP+A made several recommendations for consideration to increase the indoor air quality and energy efficiency of the building.

HEATING VENTILATION AND COOLING SYSTEMS

HOT WATER BOILERS AND HEATING

There is one gas fired hot water boiler that serves the building (see Photo 1: Hot Water Boiler).



Photo 1: Hot Water Boiler

The boiler serves the perimeter radiators and the unit heaters throughout the school. It is in poor condition and has visible damage on its exterior (see Photo 2: Boiler Damage).



Photo 2: Boiler Damage

SP+A recommends replacing the boiler with two (2) hot water condensing boilers. Condensing boilers are typically more efficient than traditional cast iron boilers because they recover a portion of the heat that would usually be lost in the flue exhaust. More efficient heating equipment can result in energy savings for the school. SP+A also recommends installing a second boiler for redundancy in the event that one of the boilers was to be offline. The perimeter radiation should be replaced once it approaches the end of its useful lifespan of about 25 years.

There are two (2) hot water pumps that pressurize the hot water system. The pumps are in poor condition (see Photos 3 and 4: Hot Water Pump Condition).



Photo 3: Hot Water Pump Condition



Photo 4: Hot Water Pump Condition

There is insulation missing from the hot water system and a lot of rust. SP+A recommends replacing the hot water pumps and insulating the entire hot water system in accordance with energy code.

DOMESTIC WATER HEATER

There is one (1) propane fired Vaughn domestic hot water heater that serves the Kitchen (see Photo 5: Domestic Hot Water Heater Condition).



Photo 5: Domestic Hot Water Heater Condition

The heater is in fair condition and was manufactured in 2006. The typical lifespan of a propane fired domestic hot water heater is about 10 years. There is also a domestic water heater in the Boiler Room (see Photo 6: Domestic Hot Water Heater – Boiler Room).



Photo 6: Domestic Hot Water Heater - Boiler Room

SP+A recommends replacing the hot water heater with a new propane hot water heater. SP+A also recommends installing hot water recirculation pumps with electrically commutated motors (ECM) which are a very efficient option for pump motors.

ROOFTOP UNITS

There are four (4) rooftop units that serve the addition part of the school (see Photo 7: Rooftop Units).



Photo 7: Rooftop Units

SP+A was informed that the units are beyond their useful lifespans and in poor condition. See Table 1 for the rooftop units' performance.

Table 1: Rooftop Units' Performance

Room No.	Area	Equipment Tag	Supply Air (SA) Sum	Return Air (RA) Sum	Outside Air (OA)	Code Required Ventilation Air (OA) or Exhaust Air (EA)
Classroom 9	731	AHU-1	1321	1225	256	271
1st Grade 10	721	AHU-3	1360	1154	399	267
2nd Grade 11	733	AHU-2	1219	1215	272	271
2nd Grade 12	733	AHU-4	1119	935	206	271

The rooftop units were considered deficient if their outdoor air flows were +/- 10 percent of the ASHRAE 62.1 recommended air flows. AHU-3 and AHU-4 are deficient because they are supplying ventilation air that is outside of the ten percent threshold of the code required ventilation rates. There are also several rooms that require ventilation but do not have any mechanical systems providing the ventilation. See Table 2 for non mechanically ventilated rooms.

Table 2: Non Mechanically Ventilated Rooms

Room No.	Area	Equipment Tag	Code Required Ventilation Air (OA) or Exhaust Air (EA)
Office Room	171	No Mechanical	-
Music/Art	994	No Mechanical	368
Nurse	239	No Mechanical	20
Main Office	297	No Mechanical	25
Office Side Room	148	No Mechanical	13
Classroom 8	1063	No Mechanical	393
Classroom 3	1101	No Mechanical	407
Principal's Office	228	No Mechanical	19
Classroom 4	1057	No Mechanical	391
Kindergarten 7	1032	No Mechanical	382
Kitchen	314	No Mechanical	85
Office 1	207	No Mechanical	18
Kindergarten 6	1073	No Mechanical	397
Multipurpose	2682	No Mechanical	2173
Conference	489	No Mechanical	152

The various deficient rooms require attention to increase their air quality. SP+A recommends removing the rooftop units and installing dedicated outdoor air systems (DOAS). DOAS will serve only the code required ventilation to the classrooms and corridors. The DOAS is an energy efficient system that will help the air quality of the building by ensuring the rooms will always be mechanically ventilated. The exact location of the DOAS will require architectural and structural investigation. To be paired with the DOAS, SP+A recommends installing variable refrigerant flow (VRF) equipment throughout the building. Heat pumps provide heating or cooling by removing or adding heat to the space depending on the system. VRF changes the flow of the refrigerant to modulate the heat transfer capability of the system depending on the heating and cooling load. Overall, VRF is an energy efficient system that will provide supplemental heating to the fin tube radiation as well as introduce cooling to the building. Provisions will have to be made for the heat pump outdoor units and their locations.

For the Gymnasium, SP+A recommends installing a packaged air handling unit with heating and cooling capabilities. Since the Gymnasium is a shared space with the Cafeteria, the unit will have to be sized accordingly.

EXHAUST FANS

There are also various exhaust fans that serve the classrooms (see Photo 8: Exhaust Fans).



Photo 8: Exhaust Fans

SP+A does not recommend using the exhaust fans as ventilation for any of the rooms as the air that enters the rooms will be unconditioned and allow moisture into the building as well. The exhaust fans are in poor condition and beyond their useful lifespans of 20 years.

There is also an exhaust fan located in the crawl space attic (see Photos 9 and 10: Attic Exhaust Fan).



Photo 9: Attic Exhaust Fan



Photo 10: Attic Exhaust Fan

The exhaust fan is disconnected from the flexible duct in and does not appear to be operating. SP+A recommends removing the exhaust fan and tying the served rooms with the proposed DOAS. For the toilet exhaust performances see Table 3: Toilet Exhausts.

Table 3: Toilet Exhausts

Room No.	Exhaust Air (EA)	Code Required Exhaust Air (EA) Per Fixture (cfm)	Estimated Number of Fixtures
Nurse Restroom	56	50	1
Girls W	213	50	4
Boys W	207	50	4
Music/Art RR	134	50	2
Girls S	145	50	2
Staff S	49	50	1
Boys S	173	50	3
Staff Men	58	50	1

SP+A was unable to determine the exact number of fixtures (toilets and urinals) in each restroom, so the estimated number of fixtures was based on the measured cfm. If a restroom has more than the estimated number of fixtures, the associated exhaust fan would be considered deficient, and an adjustment will have to be made. SP+A recommends removing all applicable exhaust fans and installing the recommended DOAS paired with VRF (see Rooftop Units) section.

MISCELLANEOUS MEASURES

- There was some ceiling discoloration and wall peeling which could be a sign of a humidity issue or a leak (see Photos and: Ceiling Discoloration and Wall Peeling).



Photo 11: Ceiling Discoloration



Photo 12: Wall Peeling



Photo 13: Ceiling Discoloration

SP+A recommends investigating all ceiling and wall discoloration as well as the wall peeling to determine what the source of the moisture is. Any form of moisture or humidity build up can promote the growth of microorganisms and decrease the overall quality of the air.

- SP+A recommends replacing all cleaning equipment such as brooms, mops and dusters that are past their useful lifespans or are in poor condition. If the cleaning

equipment does not adequately clean the rooms and furniture, it could have a negative impact on the overall indoor air quality of the building due to bacteria growth and dust accumulation.

- SP+A recommends installing hand sanitation stations throughout the school to promote a healthy environment
- SP+A recommends investigating high efficiency sinks and hand dryers (see Photo 13: High Efficiency Sink and Hand Dryer).



Photo 13: High Efficiency Sink and Hand Dryer

High efficiency hand dryers (and others like it) can aid in promoting healthy indoor air quality because they filter the air for the dryer as opposed to traditional hand dryers which recirculate dirty bathroom air. They save energy because they are water efficient and dry hands faster.

- SP+A recommends the abatement of any asbestos in the school in accordance with CT standards.
- Provisions for radon were not witnessed. Per the CT Dept of Public Health, buildings should be tested for radon, and retested every 5 years if the initial measurements are less than 4.0 pCi/L. If the measurements are above the state's acceptable level then radon mitigation is required to reduce levels, and re-evaluation is performed every 2.5 years. Test for radon and take corrective action as needed.
- SP+A recommends investigating if there is adequate sealing for windows and door sweeps for exterior doors to help control the amount of moisture and bugs that get into the building.
- SP+A observed that the school's dumpsters are relatively close to the school (see Photo 14: Arial View)



Photo 14: Arial View

The school's dumpsters (outlined in red above) are approximately within 5ft from the school's perimeter. SP+A recommends relocating the school's dumpsters to at least twenty five (25) ft from the school's perimeter. Increasing the distance of the school's garbage will decrease the likelihood of bugs and creatures coming into the building which will hurt the overall air quality.

APPENDICES

The following documents attached in order are:

- HVAC data
- Ventilation Survey
- EPA Checklists



Environmental Testing & Balancing, Inc.
154 State Street Suite 204
North Haven Connecticut 06473
(203) 234-2089 Fax (203) 234-2147

CERTIFIED TESTING and BALANCING REPORT

Date: November 5, 2024

Project: Bakerville Consolidated School
HVAC Survey

Address: 51 Cedar Lane
New Hartford
Connecticut

HVAC Contractor: Enviro-Med Services, Inc.

The data presented in this report is a record of system measurements and final adjustment that have been obtained in accordance with the current edition of the NEBB *Procedure Standard for Testing, Adjusting and Balancing of Environmental Systems*. The measurements shown, and the information presented in this report, are certified to be accurate and complete, at the time and date information was gathered. Any variances from design quantities, which exceed NEBB tolerances, are noted in the TAB report project summary.

Submitted and Certified by:
NEBB Professional Michael R. DeZinno



Environmental Testing & Balancing, Inc.
Registration No.: 2968



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Glossary

Abbreviation	Meaning	Abbreviation	Meaning
" W.G.	(measured in) Inches Water Gauge	MBH	Thousand BTUs per Hour
A/C	Air Changes per Hour	MIN	Minimum
AF	Air Foil	MVD	Manual Volume Damper
AFMS	Air Flow Monitoring (Measuring) Station	N/A	Not Applicable, Not Available
AHU	Air Handling Unit	N/ACC	No Reasonable Access
AMP(S)	Amperage(s)	NDI	No Damper Installed
BD	Balancing Damper	NF	No Flow
BHP	Brake Horsepower	NG	Not Given
BLNC	Balance	No.	Number
BTU	British Thermal Unit	NPSH	Net Positive Suction Head
BTUh	BTU per Hour	NPSHA	Net Positive Suction Head Available
BV	Balancing Valve	NPSHR	Net Positive Suction Head Required
CD	Ceiling Diffuser	OA	Outside Air
CEF	Ceiling Exhaust Fan	OBD	Opposed Blade Damper
CF	Correction Factor	OD	Outside Diameter
CF for DDC	BMS Correction Factor	OED	Open End Duct
CFLA	Corrected Full Load Amperage	P	Pump
CFM	Cubic Feet per Minute	PD	Pressure Drop
CH	Chiller	PH	Phase
CHWC, CC	Chilled Water Coil, Cooling Coil	PP	Pressure Port
CONFIG	Configuration	PSI	Pounds per Square Inch
CS	Circuit Setter	PSIA	Pounds per Square Inch Absolute
CT	Cooling Tower	PSIG	Pounds per Square Inch Gauge
CV	Constant Volume	QTY	Quantity
dB	Decibel	RA	Return Air
DB	Dry Bulb	RAF	Return Air Fan
DFC	Damper Fully Closed	RCP	Radiant Ceiling Panel
Dia	Diameter	RECT	Rectangular
dP, DP	Differential Pressure	Req'd	Required
DWO	Damper Wide Open	RG	Return Grille
EA	Exhaust Air	RGD(s)	Register(s), Grille(s), Diffuser(s)
EADB	Entering Air Dry Bulb	RHC	Reheat Coil
EAT	Entering Air Temperature	Rm Press	Room Pressure
EAWB	Entering Air Wet Bulb	RND	Round
EF	Exhaust Fan	RP	Radiant Panel
EG	Exhaust Grille	RPM	Revolutions per Minute
ER	Exhaust Register	RR	Return Register
ESP	External Static Pressure	RTU	Roof Top Unit
EWT	Entering Water Temperature	RVA, RV	Rotating Vane Anemometer
EX / EXH	Exhaust	SA	Supply Air
F	Fahrenheit	SD	Supply Diffuser

FCU	Fan Coil Unit	SL	Slot
FD	Fire Damper	SNRKL	Snorkel
FH	Flow Hood	SP	Static Pressure
FLA	Full Load Amperage	TADBF	Total Air Delivered by Fan
FPM	Feet per Minute	TB	Terminal Box
GPM	Gallons per Minute	TD	Temperature Differential
HP	Horsepower	TDH	Total Dynamic Head
HWC, HC	Hot Water Coil, Heating Coil	TEMP	Temperature
HX	Heat Exchanger	TF	Thermafuser
HZ	Hertz	TP	Thermally Protected
kW	Kilowatt	TRAV/TRV	Traverse
LADB	Leaving Air Dry Bulb	TSP	Total Static Pressure
LAT	Leaving Air Temperature	V	Volt(s) / Voltage
LAWB	Leaving Air Wet Bulb	VAV	Variable Air Volume
LD	Linear Diffuser	VD	Volume Damper
LS	Linear Slot	VEL	Velocity
LWT	Leaving Water Temperature	VFD	Variable Frequency Drive
MA	Mixed Air	VG	Velgrid
MAU, MUA	Make-Up Air Unit	WB	Wet Bulb
MAX	Maximum		

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.

Bakerville Consolidated School HVAC Survey

Remarks

November 5, 2024

General Note

Rooms identified as "No Mech" on the Room Air Change Report have no mechanical ventilation.

AHU-1, AHU-2, AHU-3, AHU-4

There is limited motor information due to the motor tags being inaccessible.

These units were found with the outside air dampers 100% closed.

Outside air chnages were based onn the outside air damper being 100% open.

AIR APPARATUS TEST SHEET

Job Name: Bakerville Consolidated School HVAC Survey
 Tested by: Mike DeZinno November 5, 2024 (24082B)

AHU-1 DESIGN DATA

Manufacturer =	Trane	Model No. =	YCCO48F3H0BH
Type =	AHU	Serial No. =	24031042H
Total Scheduled cfm =			
Outside Air cfm =			
Total Static Pressure =		External Static Pressure =	
Fan rpm =		Brake Horsepower =	

MOTOR DESIGN DATA

Horsepower =	0.75	Voltage =	208	Phase =	3	rpm =	
--------------	------	-----------	-----	---------	---	-------	--

AIR TEST DATA

Total cfm by Grille Readings =	1321	Return Air =	1225
Outside Air =	0		

PRESSURE TEST DATA

Total Suction Static Pressure =	-0.50
Total Discharge Static Pressure =	0.31
Total Static Pressure =	0.81
External Suction Static Pressure =	-0.18
External Discharge Static Pressure =	0.31
External Static Pressure =	0.49
Cooling Filter & Coil =	0.32

MOTOR TEST DATA

Motor Manufacturer / Frame =					
Horsepower =		Phase =		Voltage =	
				209	211
Full Load Amps =		5.1		FLA Corrected for Voltage =	
				5.1	
Motor rpm =			Service Factor =		
			1		
No Load Amps =			Operating Amps =		
			3.1	3.1	3.0
Calculated Brake Horsepower =			ERR		

FAN TEST DATA

Motor Sheave Model / Dia. =	Direct Drive
Motor Sheave Bore =	
Fan Sheave Model / Dia. =	
Fan Sheave Bore =	Fan rpm = N/A
Adjustable Sheave Dia. =	Center Line Distance =
Belts =	
Filters =	(3) 16"x24"x1"
Outside Air Setting =	

Job Name: Bakerville Consolidated School HVAC Survey
Tested by: Mike DeZinno November 5, 2024 (24082B)

AIR APPARATUS TEST SHEET

Job Name: Bakerville Consolidated School HVAC Survey
 Tested by: Mike DeZinno November 5, 2024 (24082B)

AHU-2 DESIGN DATA

Manufacturer =	Trane	Model No. =	YCC048F3H0BH
Type =	AHU	Serial No. =	2332M7L2H
Total Scheduled cfm =			
Outside Air cfm =			
Total Static Pressure =		External Static Pressure =	
Fan rpm =		Brake Horsepower =	

MOTOR DESIGN DATA

Horsepower =	Voltage =	Phase =	rpm =
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AIR TEST DATA

Total cfm by Grille Readings =	1219	Return Air =	1215
Outside Air =	0		

PRESSURE TEST DATA

Total Suction Static Pressure =	-0.55
Total Discharge Static Pressure =	0.23
Total Static Pressure =	0.78
External Suction Static Pressure =	-0.17
External Discharge Static Pressure =	0.23
External Static Pressure =	0.40
Cooling Filter & Coil =	0.38

MOTOR TEST DATA

Motor Manufacturer / Frame =					
Horsepower =		Phase =		Voltage = 210 208 208	
Full Load Amps = 5.1		FLA Corrected for Voltage = 0.0			
Motor rpm =		Service Factor = 1			
No Load Amps =				Operating Amps = 3.0 3.1 3.0	
Calculated Brake Horsepower =		ERR			

FAN TEST DATA

Motor Sheave Model / Dia. =	Direct Drive
Motor Sheave Bore =	
Fan Sheave Model / Dia. =	
Fan Sheave Bore =	Fan rpm =
Adjustable Sheave Dia. =	Center Line Distance =
Belts =	
Filters =	(3) 16"x24"x1"
Outside Air Setting =	

AIR OUTLET TEST SHEET

Job Name: Bakerville Consolidated School HVAC Survey
Tested by: Mike DeZinno November 5, 2024 (24082B)

Tested by: Mike DeZinno November 5, 2024 (24082B)

[illegible]

AIR APPARATUS TEST SHEET

Job Name: Bakerville Consolidated School HVAC Survey
 Tested by: Mike DeZinno November 5, 2024 (24082B)

AHU-3 DESIGN DATA

Manufacturer =	Trane	Model No. =	YCC048F3H0BH
Type =	AHU	Serial No. =	24015BE2H
Total Scheduled cfm =			
Outside Air cfm =			
Total Static Pressure =		External Static Pressure =	
Fan rpm =		Brake Horsepower =	

MOTOR DESIGN DATA

Horsepower =	0.75	Voltage =	208	Phase =	3	rpm =	
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AIR TEST DATA

Total cfm by Grille Readings =	1360	Return Air =	1154
Outside Air =	0		

PRESSURE TEST DATA

Total Suction Static Pressure =	-0.68
Total Discharge Static Pressure =	0.28
Total Static Pressure =	0.96
External Suction Static Pressure =	-0.32
External Discharge Static Pressure =	0.28
External Static Pressure =	0.60
Cooling Filter & Coil =	0.36

MOTOR TEST DATA

Motor Manufacturer / Frame =					
Horsepower =		Phase =		Voltage = 208 210 209	
Full Load Amps = 5.1			FLA Corrected for Voltage = 5.1		
Motor rpm =			Service Factor = 1		
No Load Amps =				Operating Amps = 3.5 3.5 3.5	
Calculated Brake Horsepower = ERR					

FAN TEST DATA

Motor Sheave Model / Dia. =	Direct Drive
Motor Sheave Bore =	
Fan Sheave Model / Dia. =	
Fan Sheave Bore =	Fan rpm =
Adjustable Sheave Dia. =	Center Line Distance =
Belts =	
Filters =	(2) 16"x24"x1" (1) 10"x24"x1"
Outside Air Setting =	

[illegible]

AIR APPARATUS TEST SHEET

Job Name: Bakerville Consolidated School HVAC Survey
 Tested by: Mike DeZinno November 5, 2024 (24082B)

AHU-4 DESIGN DATA

Manufacturer =	Trane	Model No. =	YCC048F3H0BH
Type =	AHU	Serial No. =	2402KW72H
Total Scheduled cfm =			
Outside Air cfm =			
Total Static Pressure =		External Static Pressure =	
Fan rpm =		Brake Horsepower =	

MOTOR DESIGN DATA

Horsepower =	0.75	Voltage =	208	Phase =	3	rpm =	
--------------	------	-----------	-----	---------	---	-------	--

AIR TEST DATA

Total cfm by Grille Readings =	1119	Return Air =	985
Outside Air =	0		

PRESSURE TEST DATA

Total Suction Static Pressure =	-0.74
Total Discharge Static Pressure =	0.23
Total Static Pressure =	0.97
External Suction Static Pressure =	-0.11
External Discharge Static Pressure =	0.23
External Static Pressure =	0.34
Cooling Filter & Coil =	0.63

MOTOR TEST DATA

Motor Manufacturer / Frame =					
Horsepower =		Phase =		Voltage = 207 208 208	
Full Load Amps = 5.1		FLA Corrected for Voltage = 5.1			
Motor rpm =			Service Factor = 1		
No Load Amps =				Operating Amps = 2.6 2.7 2.6	
Calculated Brake Horsepower = ERR					

FAN TEST DATA

Motor Sheave Model / Dia. =	Direct Drive
Motor Sheave Bore =	
Fan Sheave Model / Dia. =	
Fan Sheave Bore =	Fan rpm =
Adjustable Sheave Dia. =	Center Line Distance =
Belts =	
Filters =	(3) 16"x24"x1"
Outside Air Setting =	

[illegible]

GRILLE, REGISTER & DIFFUSER TEST SHEET

Job Name: Bakerville Consolidated School HVAC Survey
 Tested by: Mike DeZinno November 5, 2024 (24082B)

Outlet Number	Room Number	Code	Size	"Ak" Factor	Required		First Test	New Req'd	fpm/cfm Reading	Final cfm
					fpm	cfm				
Exhaust										
1	Multipurpose	EG	24"x24"	1.00	0	N/A	N/A			0
Exhaust										
1	Conference	EG	24"x24"	1.00	0	N/A	N/A		0	0
Exhaust										
1	Nurse's RR	EG	24"x24"	1.00	0	N/A	56		56	56
Exhaust										
1	Staff S	EG	24"x24"	1.00	0	N/A	49		49	49
Exhaust										
1	Girls S	EG	24"x24"	1.00	0	N/A	82		82	82
2	Girls S	EG	24"x24"	1.00	0	N/A	63		63	<u>63</u>
										145
Exhaust										
1	Custodian	EG	6x12"	0.50	0	N/A	113		113	57
Exhaust										
1	Staff Men SW	EG	24"x24"	1.00	0	N/A	58		58	58
Exhaust										
1	Boys S	EG	24"x24"	1.00	0	N/A	90		90	90
2	Boys S	EG	24"x24"	1.00	0	N/A	83		83	<u>83</u>
										173
Exhaust										
1	Office S	EG	24"x24"	1.00	0	N/A	0		0	0

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Outlet Number	Room Number	Code	Size	"Ak" Factor	Required		First Test	New Req'd	fpm/cfm Reading	Final cfm
					fpm	cfm				
Exhaust										
1	Cust Office	EG	10"x10"	0.69	0	N/A	110		110	76
Exhaust										
1	Office 1 SW	EG	24"x24"	1.00	0	N/A	0		0	0
Exhaust										
1	Music/Art RR	EG	12"x12"	1.00	0	N/A	134		134	134
Exhaust										
1	Boys W	EG	24"x24"	1.00	0	N/A	97		97	97
2	Boys W	EG	24"x24"	1.00	0	N/A	110		110	110
Exhaust										
1	Girls W	EG	24"x24"	1.00	0	N/A	110		110	110
2	Girls W	EG	24"x24"	1.00	0	N/A	103		103	103
213										

[illegible]

Environmental Testing & Balancing, Inc.

Instrument Calibration Sheet

Date Calibration	Instrument	Model No.	Serial No.	Manufacturer
Air Test Equipment				
February 2024	Air Data Multimeter	ADM 843	1734178	Shorebridge
September 2023	Digital Anemometer	RVA816	A52M70	Ametek
December 2023	Digital Anemometer	324 Plus 19P5	23620941	Fluke
April 2024	Digital Laser Thermometer	PLT130	1533189	Monarch
October 2023	Digital Thermometer	21/2	38132024	Fluke
October 2023	Humidity Meter	TH100	03137177	Q1000
Hydraulic Test Equipment				
December 2023	Hydraulic Multimeter	HCM-132	W18040	Shorebridge

ARDATA MULTIMETER CERTIFICATE OF RECALIBRATION

Customer ID: 03552 Customer: ENVIRONMENTAL TESTING & BALANCING, INC. City: NORTH HAVEN State: CT Zip: 06460

As Recalibrated: ADV 800 Calibration Date: 02/13/2024 Calibration Due Date: 02/13/2025

Calibration Technician: [Signature] Date: 02/13/2024

Calibration Approved by: [Signature] Date: 02/13/2024

Test Results:

Item	Standard	Test Value	% Diff	Standard	Test Value	% Diff	Standard	Test Value	% Diff	
Pressure Standard - Item 821.1	SN: 47124040	As Recal	Test 1	Pressure Standard - Item 821.1	SN: 47124040	As Recal	Test 1	Pressure Standard - Item 821.1	SN: 47124040	As Recal
Pressure Standard - Item 821.1	SN: 47124040	As Recal	Test 2	Pressure Standard - Item 821.1	SN: 47124040	As Recal	Test 2	Pressure Standard - Item 821.1	SN: 47124040	As Recal
Pressure Standard - Item 821.1	SN: 47124040	As Recal	Test 3	Pressure Standard - Item 821.1	SN: 47124040	As Recal	Test 3	Pressure Standard - Item 821.1	SN: 47124040	As Recal
Pressure Standard - Item 821.1	SN: 47124040	As Recal	Test 4	Pressure Standard - Item 821.1	SN: 47124040	As Recal	Test 4	Pressure Standard - Item 821.1	SN: 47124040	As Recal
Pressure Standard - Item 821.1	SN: 47124040	As Recal	Test 5	Pressure Standard - Item 821.1	SN: 47124040	As Recal	Test 5	Pressure Standard - Item 821.1	SN: 47124040	As Recal
Pressure Standard - Item 821.1	SN: 47124040	As Recal	Test 6	Pressure Standard - Item 821.1	SN: 47124040	As Recal	Test 6	Pressure Standard - Item 821.1	SN: 47124040	As Recal
Pressure Standard - Item 821.1	SN: 47124040	As Recal	Test 7	Pressure Standard - Item 821.1	SN: 47124040	As Recal	Test 7	Pressure Standard - Item 821.1	SN: 47124040	As Recal
Pressure Standard - Item 821.1	SN: 47124040	As Recal	Test 8	Pressure Standard - Item 821.1	SN: 47124040	As Recal	Test 8	Pressure Standard - Item 821.1	SN: 47124040	As Recal
Pressure Standard - Item 821.1	SN: 47124040	As Recal	Test 9	Pressure Standard - Item 821.1	SN: 47124040	As Recal	Test 9	Pressure Standard - Item 821.1	SN: 47124040	As Recal
Pressure Standard - Item 821.1	SN: 47124040	As Recal	Test 10	Pressure Standard - Item 821.1	SN: 47124040	As Recal	Test 10	Pressure Standard - Item 821.1	SN: 47124040	As Recal

Shorebridge Instruments, Inc.
7860 East Highland Road, Canton, MA 01920
(408) 851-8744 • Fax (408) 851-1287 • www.shorebridge.com

Pro-Calibration, LLC
480 North 10th Street, Suite 204
North Haven, CT 06460

Calibration Certificate

Manufacturer: ALNOR INSTRUMENTS CUSTOMER: Environmental Testing & Balancing
Model: ENV821 184 State St, Suite 204
Serial Number: A21375 North Haven, CT 06460
Asset Number: ETR-028

Pro-Calibration, LLC certifies that the above listed instrument meets or exceeds all specifications as stated in the referenced procedure (unless otherwise noted). It has been calibrated using measurement standards traceable to the National Institute of Standards and Technology (NIST), or to NIST accredited external sources of measurement, or derived by the calibration of measurement standards. This calibration complies with ANSI Z39.5-2006 and/or ISO/IEC 17025:2005. This is not a full compliance with "The Guide to the Expression of Uncertainty in Measurement (GUM)". This report may not be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or by any information storage and retrieval system, without prior written permission from Pro-Calibration, LLC. This report may not be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or by any information storage and retrieval system, without prior written permission from Pro-Calibration, LLC.

Calibration Information:

Cal Date	Cal Due	Temperature	Humidity	As Required	In Tolerance
14 Jan 2024	14 Jan 2025	71.0°F	41.4%	As Required	In Tolerance
Cal Procedure	Manufacturer Specifications	Test Result			

Remarks:

Asset Number	Description	Cal Date	Due Date
CT173	SHOREBRIDGE INSTRUMENTS ADVISORY MULTIMETER	04 Oct 2023	04 Oct 2024
CT174	FLUKE 7890C DIGITAL MULTIMETER	01 May 2023	01 May 2024
CT175	FLUKE 7890C DIGITAL MULTIMETER	01 May 2023	01 May 2024
CT176	FLUKE 7890C DIGITAL MULTIMETER	01 May 2023	01 May 2024
CT177	FLUKE 7890C DIGITAL MULTIMETER	01 May 2023	01 May 2024
CT178	FLUKE 7890C DIGITAL MULTIMETER	01 May 2023	01 May 2024
CT179	FLUKE 7890C DIGITAL MULTIMETER	01 May 2023	01 May 2024
CT180	FLUKE 7890C DIGITAL MULTIMETER	01 May 2023	01 May 2024
CT181	FLUKE 7890C DIGITAL MULTIMETER	01 May 2023	01 May 2024
CT182	FLUKE 7890C DIGITAL MULTIMETER	01 May 2023	01 May 2024
CT183	FLUKE 7890C DIGITAL MULTIMETER	01 May 2023	01 May 2024
CT184	FLUKE 7890C DIGITAL MULTIMETER	01 May 2023	01 May 2024
CT185	FLUKE 7890C DIGITAL MULTIMETER	01 May 2023	01 May 2024
CT186	FLUKE 7890C DIGITAL MULTIMETER	01 May 2023	01 May 2024
CT187	FLUKE 7890C DIGITAL MULTIMETER	01 May 2023	01 May 2024
CT188	FLUKE 7890C DIGITAL MULTIMETER	01 May 2023	01 May 2024
CT189	FLUKE 7890C DIGITAL MULTIMETER	01 May 2023	01 May 2024
CT190	FLUKE 7890C DIGITAL MULTIMETER	01 May 2023	01 May 2024

Signature: [Signature]

Pro-Calibration, LLC
480 North 10th Street, Suite 204
North Haven, CT 06460

Calibration Certificate

Manufacturer: ALNOR INSTRUMENTS CUSTOMER: Environmental Testing & Balancing
Model: ENV821 184 State St, Suite 204
Serial Number: A21375 North Haven, CT 06460
Asset Number: ETR-028

Pro-Calibration, LLC certifies that the above listed instrument meets or exceeds all specifications as stated in the referenced procedure (unless otherwise noted). It has been calibrated using measurement standards traceable to the National Institute of Standards and Technology (NIST), or to NIST accredited external sources of measurement, or derived by the calibration of measurement standards. This calibration complies with ANSI Z39.5-2006 and/or ISO/IEC 17025:2005. This is not a full compliance with "The Guide to the Expression of Uncertainty in Measurement (GUM)". This report may not be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or by any information storage and retrieval system, without prior written permission from Pro-Calibration, LLC. This report may not be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or by any information storage and retrieval system, without prior written permission from Pro-Calibration, LLC.

Calibration Information:

Cal Date	Cal Due	Temperature	Humidity	As Required	In Tolerance
14 Jan 2024	14 Jan 2025	71.0°F	41.4%	As Required	In Tolerance
Cal Procedure	Manufacturer Specifications	Test Result			

Remarks:

Asset Number	Description	Cal Date	Due Date
CT173	SHOREBRIDGE INSTRUMENTS ADVISORY MULTIMETER	04 Oct 2023	04 Oct 2024
CT174	FLUKE 7890C DIGITAL MULTIMETER	01 May 2023	01 May 2024
CT175	FLUKE 7890C DIGITAL MULTIMETER	01 May 2023	01 May 2024
CT176	FLUKE 7890C DIGITAL MULTIMETER	01 May 2023	01 May 2024
CT177	FLUKE 7890C DIGITAL MULTIMETER	01 May 2023	01 May 2024
CT178	FLUKE 7890C DIGITAL MULTIMETER	01 May 2023	01 May 2024
CT179	FLUKE 7890C DIGITAL MULTIMETER	01 May 2023	01 May 2024
CT180	FLUKE 7890C DIGITAL MULTIMETER	01 May 2023	01 May 2024
CT181	FLUKE 7890C DIGITAL MULTIMETER	01 May 2023	01 May 2024
CT182	FLUKE 7890C DIGITAL MULTIMETER	01 May 2023	01 May 2024
CT183	FLUKE 7890C DIGITAL MULTIMETER	01 May 2023	01 May 2024
CT184	FLUKE 7890C DIGITAL MULTIMETER	01 May 2023	01 May 2024
CT185	FLUKE 7890C DIGITAL MULTIMETER	01 May 2023	01 May 2024
CT186	FLUKE 7890C DIGITAL MULTIMETER	01 May 2023	01 May 2024
CT187	FLUKE 7890C DIGITAL MULTIMETER	01 May 2023	01 May 2024
CT188	FLUKE 7890C DIGITAL MULTIMETER	01 May 2023	01 May 2024
CT189	FLUKE 7890C DIGITAL MULTIMETER	01 May 2023	01 May 2024
CT190	FLUKE 7890C DIGITAL MULTIMETER	01 May 2023	01 May 2024

Signature: [Signature]

Manufacturer: MONARCH INSTRUMENTS	CUSTOMER: Environmental Testing & Balancing
Model: PLT300	154 State St. Suite 204
Serial Number: 1823199	North Haven CT 06473
Asset Number: E7BI-075	

Pre-Calibration, LLC certifies that the above listed instrument meets or exceeds all requirements as stated in the referenced standard unless otherwise noted. It has been calibrated using traceable standards according to the National Institute of Standards and Technology (NIST). It has NIST accepted calibration standards of measurement, as derived by the NIST code of calibration technology. The calibration complies with ANSI/ISO 12942:2008 and ISO/IEC 17025:2005. (UFR 444) is in accordance with the *Guide to the Expression of Uncertainty in Measurement* (GUM). This report may not be reproduced, except in full, without permission or the publication of an approved abstract is obtained in writing from the calibration organization. *Pre-Calibration, LLC* certifies this report.

Cal Cells	4 Apr 2024	Temperature	21.0 °C	As Received	In Test mode
Heat Cal Due	4 Apr 2025	Humidity	45 %	As Received	In Test mode
Cal Parameters	Manufacturing Specifications				
		Test Result	Y		

Asset Number	Description	Est. Date	Due Date
CT1009	PRO-EAL USB LIGHT SOURCE	28 MAR 2024	20 MAR 2025
CT0803	HELIOTTE BACKARD SUSA TENSORMETER	21 JAN 2024	21 JAN 2025

Spec Wentworth

PRINTED ON 4 Apr 2024

Certificate Number
EYEN-072-171ZZ3000

Page 1 of 7

Manufacturer:	FLUKE	Cal/OSHA:	Environmental Testing & Inspection
Model:	5171	Cal EHSR 34	Issue 2006
Serial Number:	04165923	Web Page:	Cal EHSR 71
Asset Number:	FTW-014		

The Collaboration, LLC certifies that the above listed employees are in custody of operations as stated in the referenced production release information. This has been confirmed with the referenced company's Human Resources and the National Institute of Standards and Technology (NIST). It is noted that certain activities of measurement are derived by the same type of well established techniques. The calibration company will provide the NIST 1900 and NIST 1902 1903 1904 1905 1906 1907 1908 1909 1910 1911 1912 1913 1914 1915 1916 1917 1918 1919 1920 1921 1922 1923 1924 1925 1926 1927 1928 1929 1930 1931 1932 1933 1934 1935 1936 1937 1938 1939 1940 1941 1942 1943 1944 1945 1946 1947 1948 1949 1950 1951 1952 1953 1954 1955 1956 1957 1958 1959 1960 1961 1962 1963 1964 1965 1966 1967 1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030 2031 2032 2033 2034 2035 2036 2037 2038 2039 2040 2041 2042 2043 2044 2045 2046 2047 2048 2049 2050 2051 2052 2053 2054 2055 2056 2057 2058 2059 2060 2061 2062 2063 2064 2065 2066 2067 2068 2069 2070 2071 2072 2073 2074 2075 2076 2077 2078 2079 2080 2081 2082 2083 2084 2085 2086 2087 2088 2089 2090 2091 2092 2093 2094 2095 2096 2097 2098 2099 2100 2101 2102 2103 2104 2105 2106 2107 2108 2109 2110 2111 2112 2113 2114 2115 2116 2117 2118 2119 2120 2121 2122 2123 2124 2125 2126 2127 2128 2129 2130 2131 2132 2133 2134 2135 2136 2137 2138 2139 2140 2141 2142 2143 2144 2145 2146 2147 2148 2149 2150 2151 2152 2153 2154 2155 2156 2157 2158 2159 2160 2161 2162 2163 2164 2165 2166 2167 2168 2169 2170 2171 2172 2173 2174 2175 2176 2177 2178 2179 2180 2181 2182 2183 2184 2185 2186 2187 2188 2189 2190 2191 2192 2193 2194 2195 2196 2197 2198 2199 2200 2201 2202 2203 2204 2205 2206 2207 2208 2209 2210 2211 2212 2213 2214 2215 2216 2217 2218 2219 2220 2221 2222 2223 2224 2225 2226 2227 2228 2229 2230 2231 2232 2233 2234 2235 2236 2237 2238 2239 2240 2241 2242 2243 2244 2245 2246 2247 2248 2249 2250 2251 2252 2253 2254 2255 2256 2257 2258 2259 2260 2261 2262 2263 2264 2265 2266 2267 2268 2269 2270 2271 2272 2273 2274 2275 2276 2277 2278 2279 2280 2281 2282 2283 2284 2285 2286 2287 2288 2289 2290 2291 2292 2293 2294 2295 2296 2297 2298 2299 2300 2301 2302 2303 2304 2305 2306 2307 2308 2309 2310 2311 2312 2313 2314 2315 2316 2317 2318 2319 2320 2321 2322 2323 2324 2325 2326 2327 2328 2329 2330 2331 2332 2333 2334 2335 2336 2337 2338 2339 2340 2341 2342 2343 2344 2345 2346 2347 2348 2349 2350 2351 2352 2353 2354 2355 2356 2357 2358 2359 2360 2361 2362 2363 2364 2365 2366 2367 2368 2369 2370 2371 2372 2373 2374 2375 2376 2377 2378 2379 2380 2381 2382 2383 2384 2385 2386 2387 2388 2389 2390 2391 2392 2393 2394 2395 2396 2397 2398 2399 2400 2401 2402 2403 2404 2405 2406 2407 2408 2409 2410 2411 2412 2413 2414 2415 2416 2417 2418 2419 2420 2421 2422 2423 2424 2425 2426 2427 2428 2429 2430 2431 2432 2433 2434 2435 2436 2437 2438 2439 2440 2441 2442 2443 2444 2445 2446 2447 2448 2449 2450 2451 2452 2453 2454 2455 2456 2457 2458 2459 2460 2461 2462 2463 2464 2465 2466 2467 2468 2469 2470 2471 2472 2473 2474 2475 2476 2477 2478 2479 2480 2481 2482 2483 2484 2485 2486 2487 2488 2489 2490 2491 2492 2493 2494 2495 2496 2497 2498 2499 2500 2501 2502 2503 2504 2505 2506 2507 2508 2509 2510 2511 2512 2513 2514 2515 2516 2517 2518 2519 2520 2521 2522 2523 2524 2525 2526 2527 2528 2529 2530 2531 2532 2533 2534 2535 2536 2537 2538 2539 2540 2541 2542 2543 2544 2545 2546 2547 2548 2549 2550 2551 2552 2553 2554 2555 2556 2557 2558 2559 2560 2561 2562 2563 2564 2565 2566 2567 2568 2569 2570 2571 2572 2573 2574 2575 2576 2577 2578 2579 2580 2581 2582 2583 2584 2585 2586 2587 2588 2589 2590 2591 2592 2593 2594 2595 2596 2597 2598 2599 2600 2601 2602 2603 2604 2605 2606 2607 2608 2609 2610 2611 2612 2613 2614 2615 2616 2617 2618 2619 2620 2621 2622 2623 2624 2625 2626 2627 2628 2629 2630 2631 2632 2633 2634 2635 2636 2637 2638 2639 2640 2641 2642 2643 2644 2645 2646 2647 2648 2649 2650 2651 2652 2653 2654 2655 2656 2657 2658 2659 2660 2661 2662 2663 2664 2665 2666 2667 2668 2669 2670 2671 2672 2673 2674 2675 2676 2677 2678 2679 2680 2681 2682 2683 2684 2685 2686 2687 2688 2689 2690 2691 2692 2693 2694 2695 2696 2697 2698 2699 2700 2701 2702 2703 2

Eintrag	17.04.2016	Temperature	21.0°C	As. Decidens	16.10.2016
Neu Eintrag	17.04.2016	Humidity	45%	As. Reticulatus	9.10.2016
As. Proveniens	16.10.2016	Top Sheet	0		

Account Number	Description	Cal Date	Exp Date
CTN 12	FELIX MEGA PC/D MATH ACTION CALIBRATION	26 Aug 2022	26 Aug 2024

Signature _____

RECEIVED 11 NOV 2004

Certificate Number
6194 676 7837 686133

Page 9 of 9

Manufacturer	EMERSON	CUSTOMER	Exxon Fuel Trading & Supply Inc
Model	11-000		1500 Ave 51 Suite 704
Serial Number	02131777		North Haven CT 06460
Asset Number	ET11-001		

[illegible]

Ch. 10	11 Day 1003	Percent 88.4	31.0%	Ag. 100000	10 100000
Day 100	11 Day 1004	Percent 88.4	31.0%	Ag. 100000	10 100000
Day 100	11 Day 1005	Percent 88.4	31.0%	Ag. 100000	10 100000

Account Number	Account Name	Get Date	Post Date
071103	MINDO S PTD INCORPORATED	08 Feb 2023	08 Feb 2023
	CHINA CITIC BANK	04 Mar 2023	04 Mar 2023

0-100

10/12/2014

CONFIDENTIAL
 570-002 + 00 P233-00

Page 1 of 1

FORM 22 HYDROGATA MULTIMETER CERTIFICATE OF RECALIBRATION

Customer	ESTABLIMENTAL TESTING & BALANCING, INC.	City	WORTHINGTON	State	GA
PO #		Customer Contact		Calibration Due Date	01/22/2010

[illegible][illegible]

199- WATER TREATMENT PLANT									
GROSS PRODUCTION OF TREAT PLANT									
Station No.	Station Name	Station	Station	Station	Station	Station	Station	Station	Station
101	101-01	101-02	101-03	101-04	101-05	101-06	101-07	101-08	101-09
102	102-01	102-02	102-03	102-04	102-05	102-06	102-07	102-08	102-09
103	103-01	103-02	103-03	103-04	103-05	103-06	103-07	103-08	103-09
104	104-01	104-02	104-03	104-04	104-05	104-06	104-07	104-08	104-09
105	105-01	105-02	105-03	105-04	105-05	105-06	105-07	105-08	105-09
106	106-01	106-02	106-03	106-04	106-05	106-06	106-07	106-08	106-09
107	107-01	107-02	107-03	107-04	107-05	107-06	107-07	107-08	107-09
108	108-01	108-02	108-03	108-04	108-05	108-06	108-07	108-08	108-09
109	109-01	109-02	109-03	109-04	109-05	109-06	109-07	109-08	109-09
110	110-01	110-02	110-03	110-04	110-05	110-06	110-07	110-08	110-09
111	111-01	111-02	111-03	111-04	111-05	111-06	111-07	111-08	111-09
112	112-01	112-02	112-03	112-04	112-05	112-06	112-07	112-08	112-09
113	113-01	113-02	113-03	113-04	113-05	113-06	113-07	113-08	113-09
114	114-01	114-02	114-03	114-04	114-05	114-06	114-07	114-08	114-09
115	115-01	115-02	115-03	115-04	115-05	115-06	115-07	115-08	115-09
116	116-01	116-02	116-03	116-04	116-05	116-06	116-07	116-08	116-09
117	117-01	117-02	117-03	117-04	117-05	117-06	117-07	117-08	117-09
118	118-01	118-02	118-03	118-04	118-05	118-06	118-07	118-08	118-09
119	119-01	119-02	119-03	119-04	119-05	119-06	119-07	119-08	119-09
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121	121-01	121-02	121-03	121-04	121-05	121-06	121-07	121-08	121-09
122	122-01	122-02	122-03	122-04	122-05	122-06	122-07	122-08	122-09
123	123-01	123-02	123-03	123-04	123-05	123-06	123-07	123-08	123-09
124	124-01	124-02	124-03	124-04	124-05	124-06	124-07	124-08	124-09
125	125-01	125-02	125-03	125-04	125-05	125-06	125-07	125-08	125-09
126	126-01	126-02	126-03	126-04	126-05	126-06	126-07	126-08	126-09
127	127-01	127-02	127-03	127-04	127-05	127-06	127-07	127-08	127-09
128	128-01	128-02	128-03	128-04	128-05	128-06	128-07	128-08	128-09
129	129-01	129-02	129-03	129-04	129-05	129-06	129-07	129-08	129-09
130	130-01	130-02	130-03	130-04	130-05	130-06	130-07	130-08	130-09
131	131-01	131-02	131-03	131-04	131-05	131-06	131-07	131-08	131-09
132	132-01	132-02	132-03	132-04	132-05	132-06	132-07	132-08	132-09

Shoulder Instruments, Inc.
7825 East Pacific Road Scottsdale, Arizona 85260
(480) 351-4744 • Fax (480) 463-1257 • www.shoulderinst.com