

To: Jordana Harper

Site: Greenfield Public Schools

Good afternoon Jordana,

Per your request, we have completed phases 1 & 2 of airflow testing at the Greenfield Public Schools as previously agreed upon. Please see the final and most up to date data sheet attached.

Nexus Consulting typically completes a service report following our services. The field service reports explain details of failed equipment, inefficiencies, and technical troubleshooting tactics. In this case the deficiencies are listed in the notes portion of each data sheet. Due to the lack of guidance by governing bodies such as CDC or ASHRAE to provide actual ACH guidelines and/or parameters related to HVAC equipment; we are unable to provide ACH recommendations when related to any data gathering associated with Covid testing. We cannot create guidelines from the CDC or ASHRAE suggestions, nor are we able to describe what a safe work space may consist of when related to health concerns linked to sickness & disease control.

I am comfortable reporting feedback related to the HVAC plans put into action by the school district. The main air handling units tested are operating properly and carefully monitored by a central building management system. The Town of Greenfield Facilities Director George Vandelinder PE, is highly trained in HVAC and holds the experience and knowledge to recognize failures through the BMS graphical interface. He has proven to be critical in the district's action related to locating and quickly repairing any and all HVAC deficiencies. This is vital when monitoring a large amount of commercial equipment. I am happy to learn the district did purchase a number of stand-alone air purifying units in the event a space may need supplemental air purification. This equipment will not only purify the air, but also boost each zones rate of air changes per hour. Each air purifying unit will need specific maintenance completed per manufacturers requirements. Please make sure all HVAC equipment and air purifying units are maintained properly to the ASHRAE preventative maintenance guidelines.

We completed our ACH data gathering with few HVAC equipment deficiencies (failed fan motors, clogged coils, etc.). All units tested were equipped with new air filters and set to "AUTO" mode at the sites central BMS graphical interface by the districts HVAC technician.

All testing was completed by licensed HVAC technicians holding degrees in HVAC and Environmental Controls. The equipment used to gather CFM samples is the highest of quality with active "up to date" calibration certificates.

Please let us know if you have any questions. We would be happy to help any way we can.

Sincerely,

Benjamin Cenedella

Nexus Consulting | Owner



Terms & Definitions

NOTE* 19 stand alone air purifiers are recommended to be utilized throughout the district

ACH	Air Changes Per Hour: How many times the air filling a space is conditioned and or filtered with local HVAC equipment
TOTAL ACH	Total air changes per hour of each room including air purifying unit
VOLUME	Amount of space filled with air
CFM	Cubic feet per minute
READING TYPE	Testing equipment used to take CFM readings
AP	Air purifying unit
UV	Unit ventilator
AHU	Air handling unit
MWR	Medical waiting room (next to room number on each sheet)
RR	Rest Room
MAU	Make up air unit: Unit providing 100% fresh air to space & 100% exhaust out of space

NOTES:

Causes for low flow:

- Weak fan motor
- Dirty filter
- Bearings need oil
- Loose belt
- Weak speed transformer
- Dirty coil
- Blocked return



Site: Greenfield Middle School
Date: 11/6/2020

Technician: Ben Cenedella, Josh Sprague **Note:** Bathrooms designed with exhaust ducts only. Airchanges per hour not calculated. All exhaust fans were tested for proper operation to ensure bathrooms are sufficiently vented.

Room No.	Length	Width	Height	Volume	CFM	Equip Type	Reading Type	ACH	AP CFM	Total CFM	Total ACH	Ex CFM	Ret CFM	Notes
102	27	24	9	5832	511	AHU	Hood	5.26					270	
Room 104	irregular	shaped	room	5736	537	AHU	Hood	5.62						
103	24	31	9	6696	2175	AHU	Hood	19.49					847	
211	28	25	11	7700	477	AHU	Hood	3.72	285.00	762.00	5.94		202	
212	28	25	11	7700	539	AHU	Hood	4.20					330	
213	28	25	11	7700	397	AHU	Hood	3.09	285.00	682.00	5.31		255	Room labeled 214 in hall
RR 124	10	11	8	880		EX FAN	Hood						171	
RR 244 Mens	7	6	8	336		EX FAN	Hood						30	Staff restroom. Equipment operating properly.
RR 244 Wo	7	6	8	336		EX FAN	Hood						51	Staff restroom. Equipment operating properly.
Flr 2 Girls	18	10	8	1440		EX FAN	Hood						47	Equipment operating properly.
Flr 2 Boys	18	10	8	1440		EX FAN	Hood						53	Equipment operating properly.
RR 223	10	12	8	960		EX FAN	Hood						125	Equipment operating properly.
RR 220	10	11	8	880		EX FAN	Hood						150	Equipment operating properly.
PE Office RR	irregular	shaped	room	976		EX FAN	Hood						55	Equipment operating properly.
Flr 3 RR 330	7	6	8	336		EX FAN	Hood						152	Equipment operating properly.
Flr 3 RR 329	7	6	8	336		EX FAN	Hood						170	Equipment operating properly.
Caf	irregular	shaped	room	53400	4617	AHU	Hood	5.19					2969	Sectioned room and calculated volume
Gymnasium	irregular	shaped	room	169008	8769	AHU	Hood	3.11					6384	Average ACH rate for a gymnasium.
Room 104 RR	irregular	shaped	room	714		EX FAN	Hood						221	Equipment operating properly. Bathroom Rm. No. 123
Staff RR	11	12	8	1056		EX FAN	Hood							Equipment operating properly.



Site: Newton School
Date: 11/6/2020

Technician: Josh Sprague, Ben Cenedella Note: Bathrooms designed with exhaust ducts only. Airchanges per hour not calculated. All exhaust fans were tested for proper operation to ensure bathrooms are sufficiently vented.

Room No.	Length	Width	Height	Volume	CFM	Equip Type	Reading Type	ACH	AP CFM	Total CFM	Total ACH	Ex CFM	Ret CFM	Notes
Lobby Girls RR	11	12	8.5	1122		EX FAN	Hood					110		Equipment operating properly
Lobby Boys RR	11	12	8.5	1122		EX FAN	Hood					105		Equipment operating properly
101 RR	6	6	8.5	306		EX FAN	Hood					59		Equipment operating properly
102 RR	6	6	8.5	306		EX FAN	Hood					59		Equipment operating properly
Facs Mens RR	5	5	8.5	212.5		EX FAN	Hood					67		Equipment operating properly
Fac Wom RR	5	5	8.5	212.5		EX FAN	Hood					14		HVAC dept. repairing exhaust fan
109 Nurse	15	8	8.5	1020	115	AHU	Hood	6.76				120		
Facs RR	9	9	8.5	688.5		EX FAN	Hood					60		
Caf	35	37	12	15540	1822	AHU	Hood	7.03					1243	
Lib Boys RR	12	14	8.5	1428		EX FAN	Hood					0		HVAC dept. repairing exhaust fan
Lib Girls RR	12	10	12	1440		EX FAN	Hood					0		HVAC dept. repairing exhaust fan
Gymnasium				0	2347	AHU	Hood	#DIV/0!	285.00	2632.00	#DIV/0!		481	Need to measure space to complete calculation
Library	58	26	13	19604	934	UV	Hood	2.86	570.00	1504.00	4.60	186		2 stand alone air purifying units recommended
Room 101	30	40	9	10800	1121	UV	Hood	6.23						
Room 104	25	35	9	7875	1017	UV	Hood	7.75						
Room 110	10	13.5	8.5	1147.5		RAD	Hood	n/a						Radiant heat only. No supply or return duct serving room. Do not use
Room 111	23	39	8.5	7624.5	1126	UV	Hood	8.86						
Room 112						AHU	Hood	n/a						Radiant heat only. No supply or return duct serving room. Do not use
Room 113	23	25	10	5750	501	UV	Hood	5.23						
Room 118	17	9.5	10	1615		RAD	Hood	n/a						Radiant heat only. No supply or return duct serving room. Do not use
Room 119	14	25	10	3500	559	UV	Hood	9.58						
Room 121						AHU	Hood							No HVAC, open to library space. Stand alone air purifying unit recommended
Room 122						AHU	Hood							No HVAC, open to library space. Stand alone air purifying unit recommended
Main Office	12	14	8.5	1428	112	AHU	Hood	4.71						
Office Conf	12	14	8.5	1428	87	AHU	Hood	3.66	285.00	372.00	15.63			
Office Copy	10	8	8.5	680	56	AHU	Hood	4.94						
Principal	14	16.5	8.5	1963.5	109	AHU	Hood	3.33	285.00	394.00	12.04			



Site: Federal Street Elementary
 Date: 11/6/2020

Technician: Josh Sprague, Ben Cenedella **Note:** Bathrooms designed with exhaust ducts only. Airchanges per hour not calculated. All exhaust fans were tested for proper operation to ensure bathrooms are sufficiently vented.

Room No.	Length	Width	Height	Volume	CFM	Equip Type	Reading Type	ACH	AP CFM	Total CFM	Total ACH	Ex CFM	Ret CFM	Notes
103 South	42	25	11	11550	807	UV	Hood	4.19						
205 South	25	32	11	8800	751	UV	Hood	5.12						
Library	45	38	11.5	19665	665	UV	Hood	2.03	855.00	1520.00	4.64			3 air purifiers calculated
Caf	46	61	16	44896	4801	UV	Hood	6.42					2397	
306 North	irregular	shaped	room	3877	487	UV	Hood	7.54						Equipment operating properly
Staff RR	10	7	8	560		EX FAN	Hood					36		Located by room 103N. Equipment operating properly
Womens RR	13	10	8	1040		EX FAN	Hood					51		Located by room 103N. Equipment operating properly
Womens RR	11	9	8	792		EX FAN	Hood					90		Located by room 206N. Equipment operating properly
Rest Room	6	7.5	8	360		EX FAN	Hood					50		Located by room 203S. Equipment operating properly
Link RR M	15	8	8	960		EX FAN	Hood					347		
Link RR W	15	8	8	960		EX FAN	Hood					41		
Flr 3 RR M	8	6	8	384		EX FAN	Hood					36		
Flr 3 RR W	8	6	8	384		EX FAN	Hood					43		



Site: Four Corners Elementary School
 Date: 11/6/2020

Technician: Josh Sprague, Ben Cenedella **Note:** Bathrooms designed with exhaust ducts only. Airchanges per hour not calculated. All exhaust fans were tested for proper operation to ensure bathrooms are sufficiently vented.

Room No.	Length	Width	Height	Volume	CFM	Equip Type	Reading Type	ACH	AP CFM	Total CFM	Total ACH	Ex CFM	Ret CFM	Notes
11	42	32	13	17472	1061	AHU	Hood	3.64	285.00	1346.00	4.62		245	
12	irregular	shaped	room	14252	1349	AHU	Hood	5.68						
13	irregular	shaped	room	14252	1050	AHU	Hood	4.42						
Caf	irregular	shaped	room	15328	2280	UV	Hood	8.92						
Gymnasium	72	40	19	54720	4904	AHU	Hood	5.38						
Room 11 BR	5	5	8.5	212.5		EXH FAN	Hood					97		Equipment operating properly
Rm 12 north BR	5	5	8.5	212.5		EXH FAN	Hood					54		Equipment operating properly
Rm 12 south BR	5	5	8.5	212.5		EXH FAN	Hood					91		Equipment operating properly
Room 13 BR	5	5	8.5	212.5		EXH FAN	Hood					138		Equipment operating properly
K & 1st hall BR Left	8.5	8	7.5	510		EXH FAN	Hood					63		Equipment operating properly
K & 1st hall BR Rt	8.5	8	7.5	510		EXH FAN	Hood					78		Equipment operating properly
Conference MWR	14	11	7.5	1155	128	AHU	Hood	6.65				431		Negative pressure room



Site: North Parish School (AEL)
Date: 11/6/2020

Technician: Josh Sprague, Ben Cenedella **Note:** Bathrooms designed with exhaust ducts only. Airchanges per hour not calculated. All exhaust fans were tested for proper operation to ensure bathrooms are sufficiently vented.

Room No.	Length	Width	Height	Volume	CFM	Equip Type	Reading Type	ACH	AP CFM	Total CFM	Total ACH	Ex CFM	Ret CFM	Notes
A	38	25	9.5	9025	527	UV	Hood	3.50	285.00	812.00	5.40			
F	39	23	9.5	8521.5	412	UV	Hood	2.90	285.00	697.00	4.91			Check fan for proper operation
E	irregular	shaped	room	10466	560	UV	Hood	3.21	285.00	845.00	4.84			
Room E RR	4.5	5	9.5	213.75		EXH FAN	Anemometer					31		Equipment operating properly
Room E RR	4.5	5	9.5	213.75		EXH FAN	Anemometer					37		Equipment operating properly
Caf Hall RR	17	9.5	9.5	1534.25		EXH FAN	Hood					87		Equipment operating properly
Mens RR	8.5	18	8	1224		EXH FAN	Hood					50		Located by gymnasium. Equipment operating properly
Womens RR	8.5	18	8	1224		EXH FAN	Hood					60		Located by gymnasium. Equipment operating properly
Womens RR	8.5	8.5	11	794.75		EXH FAN	Hood					23		Located across from SLP office. Equipment operating properly
Restroom	8	8	11	704		EXH FAN	Hood					26		Across from 2nd floor break room. Equipment operating properly



Site: High School
Date: 11/6/2020

Note 1: Rooms served by MAU are typically lower ACH readings because the air introduced to the space is 100% OA with 100% ex areas served by make up air units. I added air purifiers to these spaces to ensure safety and comfort for occupants.

Note 2: Bathrooms designed with exhaust ducts only. Airchanges per hour not calculated. All exhaust fans were tested for proper operation to ensure bathrooms are sufficiently vented.

Technician Ben Cenedella, Josh Sprague

Room No.	Length	Width	Height	Volume	CFM	Equip Type	exhausting Typ	ACH	AP CFM	Total CFM	Total ACH	Ex CFM	Ret CFM	Notes
Café 1092	35.5	16.5	10	5857.5	569	MAU	Hood	5.83				242		
Room 1093	irregular	shaped	room	3698.0	251	MAU	Hood	4.07	285.00	536.00	8.70	83		
1093 Office	11	8	8	704.0	69	MAU	Hood	5.88					245	
Room 1087	irregular	shaped	room	3698.0	196	MAU	Hood	3.18	285.00	481.00	7.80	101		
1087 Office	11	8	8	704.0	61	MAU	Hood	5.20					248	
Room 1088	irregular	shaped	room	3698.0	232	MAU	Hood	3.76	285.00	517.00	8.39	121		
1089 Office	11	8	8	704.0	71	MAU	Hood	6.05					251	
Restroom	6.5	9	9	526.5		EXH FAN	Hood					95		Restroom located by 1087. Equipment operating properly.
Restroom	6.5	9	9	526.5		EXH FAN	Hood					96		Restroom located by 1088. Equipment operating properly.
Room 1113	irregular	shaped	room	7344.0	312	MAU	Hood	2.55	285.00	597.00	4.88	266		
1113 Office	6	9	9	486.0	31	MAU	Hood	3.83					21	
Room 1115	27	29	10	7830.0	292	MAU	Hood	2.24	285.00	577.00	4.42	253		
Gym	96	116	33	367488.0		AHU	Hood	0.00						Need to take air reading
Cafeteria	62	52	13	41912.0	8094	AHU	inmemote	11.59					8039	Hood used for return grilles
Boys room	19	9	10	1710.0		EXH FAN	Hood					240		Located by room 1109. Equipment operating properly.
Girls Room	19	9	10	1710.0		EXH FAN	Hood					256		Located by room 1109. Equipment operating properly.
Boys room	19	9	10	1710.0		EXH FAN	Hood					256		Located by storage room 1023. Equipment operating properly.
Girls Room	19	9	10	1710.0		EXH FAN	Hood					251		Located by storage room 1023. Equipment operating properly.
Boys room	19	9	10	1710.0		EXH FAN	Hood					301		Located by room storage 2008A. Equipment operating properly.
Girls Room	19	9	10	1710.0		EXH FAN	Hood					254		Located by room storage 2008A. Equipment operating properly.
Boys room	19	9	10	1710.0		EXH FAN	Hood					266		Located across from room 2033. Equipment operating properly.
Girls Room	19	9	10	1710.0		EXH FAN	Hood					255		Located across from room 2033. Equipment operating properly.
Mens Room	29	12.5	10	3625.0		EXH FAN	Hood					585		Located by Cafeteria. Equipment operating properly.
omens Roc	29	12.5	10	3625.0		EXH FAN	Hood					593		Located by Cafeteria. Equipment operating properly.
ransit RR-C	10	6.5	9	585.0		EXH FAN	Hood					24		Equipment operating properly.
ransit RR-f	10	6.5	9	585.0		EXH FAN	Hood					36		Equipment operating properly.
m 1111 RR-	19.5	8.5	9.5	1574.6		EXH FAN	Hood					307		Equipment operating properly.
m 1112 RR-	19.5	8.5	9.5	1574.6		EXH FAN	Hood					288		Equipment operating properly.
Rm 1014	14	20	8.5	2380.0	363	MAU	Hood	9.15				233		