

03/17/2021

DeLaveaga Elementary School
Attn: Trevor Miller
1145 Morrissey Blvd
Santa Cruz, CA 95065

ACCO Project Number: 60510048
Project Name: Santa Cruz City Schools Ventilation Survey – DeLaveaga Elementary
FINAL REPORT

Dear Mr. Miller,

ACCO has performed a field survey of the existing HVAC units across the DeLaveaga Elementary campus. With this information and provided as-built drawings, an engineering analysis has been conducted to determine methods for improving indoor air flowrate and filtration given each building's HVAC system type. The following table identifies each building that was surveyed and its HVAC system configuration. Subsequent sections of this report include recommendations for improving indoor air quality for each HVAC system type. Please note that the listed filter recommendations are based on the product specifications included in the report's appendices.

For each room summarized in this report, a color-coded designation has been applied to describe the current status of its HVAC system:

- Green – Continuous 100% outside air during occupied hours and MERV-13 filtration are achievable with existing HVAC infrastructure
- Blue – Increased outside airflow and/or MERV-10 or higher filtration are achievable with existing HVAC infrastructure
- Orange – Existing HVAC equipment does not have means for providing outside air or filtered air; therefore, improvements to outside airflow or MERV rating are not possible. Consider providing portable filtration devices.
- White – Existing HVAC equipment is an exhaust fan that is only intended to draw air out of the space; thus, adjustments to outside airflow and filtration are not applicable.

Rooms Excluded from Remodel					
Testing, Adjusting and Balancing by ACCO/Geo H. Wilson					
Room Information			HVAC Information		
Number	Purpose	Type	Configuration	Filter Recommendation	Outside Air / Total Air %
11	Classroom	Permanent	A	MERV-10	55%
12	Classroom	Permanent	A	MERV-10	50%
13	Classroom	Permanent	E	MERV-13	47%
14	Classroom	Permanent	E	MERV-13	
15	Classroom	Permanent	E	MERV-13	
Library	Assembly	Permanent	E	MERV-13	
16	Classroom	Permanent	E	MERV-13	
17	Classroom	Permanent	E	MERV-13	46%
18	Classroom	Permanent	E	MERV-13	
Multipurpose 1	Assembly	Permanent	F	MERV-13	
23	Classroom	Permanent	A	MERV-10	49%
25	Classroom	Permanent	A	MERV-10	40%
26	Classroom	Permanent	A	MERV-10	51%
27	Classroom	Permanent	A	MERV-10	38%
28	Classroom	Permanent	A	MERV-10	48%
29	Classroom	Permanent	A	MERV-10	45%
30	Classroom	Permanent	A	MERV-10	55%
31	Classroom	Permanent	A	MERV-10	62%
32	Classroom	Permanent	A	MERV-10	58%
33	Classroom	Permanent	A	MERV-10	40%
34	Classroom	Permanent	A	MERV-10	51%
35	Classroom	Permanent	A	MERV-10	52%
36	Classroom	Unknown	B	MERV-13	25% ¹
37	Classroom	Unknown	B	MERV-13	18% ¹
38	Classroom	Unknown	B	MERV-13	20% ¹
39	Classroom	Unknown	B	MERV-13	19% ¹
40	Classroom	Unknown	B	MERV-13	31%
41	Classroom	Unknown	B	MERV-13	20% ¹
Boys' Lower	Toilet	Unknown	G	N/A	N/A
Girls' Lower	Toilet	Unknown	G	N/A	N/A
Boys' Mid	Toilet	Unknown	G	N/A	N/A
Girls' Mid	Toilet	Unknown	G	N/A	N/A
Boys' Upper	Toilet	Unknown	G	N/A	N/A
Girls' Upper	Toilet	Unknown	G	N/A	N/A
Men's Admin	Toilet	Unknown	G	N/A	N/A
Women's Admin	Toilet	Unknown	G	N/A	N/A
Office Admin	Toilet	Unknown	G	N/A	N/A
Nurse Admin	Toilet	Unknown	G	N/A	N/A
Office Admin	Toilet	Unknown	G	N/A	N/A
Girls' Admin	Toilet	Unknown	G	N/A	N/A
Boys' Admin	Toilet	Unknown	G	N/A	N/A
Kitchen	Toilet	Unknown	G	N/A	N/A

¹Outside air intake is open to the fullest extent possible and fan is running at maximum speed. MERV-13 filter has been installed to improve indoor air quality.

Newly Remodeled Rooms					
Testing, Adjusting & Balancing by Alpha Air					
Room Information			HVAC Information		
Number	Purpose	Type	Configuration	Filter Recommendation	Outside Air / Total Air %
1	Classroom	Permanent	C	MERV-13	35%
1A	Workroom	Permanent	C	MERV-13	19% ²
2	Classroom	Permanent	C	MERV-13	34%
3	Classroom	Permanent	C	MERV-13	35%
4	Classroom	Permanent	C	MERV-13	40%
4A	Workroom	Permanent	C	MERV-13	19% ²
5	Classroom	Permanent	C	MERV-13	34%
6	Classroom	Permanent	C	MERV-13	35%
6A	Assembly	Permanent	C	MERV-13	28% ²
Room 7	Admin	Permanent	C	MERV-13	31%
Room 7A	Workroom	Permanent	C	MERV-13	19% ²
Room 8	Admin	Permanent	C	MERV-13	33%
Room 9	Admin	Permanent	C	MERV-13	36%
Rooms 10-15 (A-F)	Admin	Permanent	C	MERV-13	13% ²
19 (Kindergarten)	Classroom	Permanent	C	MERV-13	27% ²
Room 19A	Workroom	Permanent	C	MERV-13	18% ²
20 (Kindergarten)	Classroom	Permanent	C	MERV-13	29% ²
21 (Kindergarten)	Classroom	Permanent	C	MERV-13	28% ²
Room 21A	Workroom	Permanent	C	MERV-13	19% ²
Room 22 (Kindergarten)	Classroom	Permanent	C	MERV-13	31%
Room 22A	Admin	Permanent	C	MERV-13	18% ²
Room A1/A1A/A13	Admin	Permanent	C	MERV-13	17% ²
A2 (Principal)	Admin	Permanent	C	MERV-13	48%
A5 (Nurse)	Admin	Permanent	D	MERV-13	N/A
A7 (Counselor)	Admin	Permanent	C	MERV-13	22%
A8 (Speech)	Admin	Permanent	D	MERV-13	N/A
A12 (Conference)	Admin	Permanent	C	MERV-13	19% ²
L1 (Media Center)	Assembly	Permanent	C	MERV-13	26%
L2	Classroom	Permanent	C	MERV-13	49%
L3	Admin	Permanent	C	MERV-13	21% ²
L4 (Storage)	Admin	Permanent	C	MERV-13	27% ²
L5 (Ceramics)	Classroom	Permanent	G	N/A	N/A
Room A3	Toilet (staff)	Permanent	G	N/A	N/A
Room A4	Toilet (staff)	Permanent	G	N/A	N/A
Room A6	Toilet (nurse)	Permanent	G	N/A	N/A
Room A9	Girls'	Permanent	G	N/A	N/A
Room A10	Boys'	Permanent	G	N/A	N/A
Room 2A	Unisex	Permanent	G	N/A	N/A
Room 2B	Unisex	Permanent	G	N/A	N/A
Room 19B	Toilet	Permanent	G	N/A	N/A
Room 20A	Toilet	Permanent	G	N/A	N/A
Room 21B	Toilet	Permanent	G	N/A	N/A
Room 22B	Toilet	Permanent	G	N/A	N/A

²Outside air intake is open to the fullest extent possible. The District is considering supplying a portable room air purifier to improve indoor air quality.

Configuration A

Room is served by a standalone air conditioning unit. The unit has a fan to draw air into the room, but no means of controlling airflow out.

- Maintain outside air damper position at 100% open to improve indoor air quality
 - If the room temperature is colder (in winter) or hotter (in summer) than desired, outside air damper may be closed incrementally until acceptable room temperature is achieved. This incremental approach is recommended to ensure that maximum airflow is being provided.
- If room has operable windows and/or doors to the building exterior, consider opening them to encourage airflow out of the room
- Replace existing air filter with MERV-10 filter
 - Airflow into room may be reduced, but is not expected to affect AC unit operation
 - If AC unit cannot operate with increased filter rating, revert to MERV-8 filter

Configuration B

Room is served by an air conditioning unit drawing air into the room, and an exhaust system drawing air out of the room.

- Maintain outside air damper position at 100% open to improve indoor air quality
 - If the room temperature is colder (in winter) or hotter (in summer) than desired, outside air damper may be closed incrementally until acceptable room temperature is achieved. This incremental approach is recommended to ensure that maximum airflow is being provided.
- Operate the exhaust fan at full speed
 - If there are dampers within the exhaust duct system, set them at 100% open
- Replace existing air filter with MERV-10 filter
 - Airflow into room may be reduced, but is not expected to affect AC unit operation
 - If AC unit cannot operate with increased filter rating, revert to MERV-8 filter

Configuration C

Room is served by a standalone air conditioning unit with a ducted air intake. The unit has a fan to draw air into the room, but no means of controlling airflow out.

- Maintain outside air damper position at 100% open to improve indoor air quality
 - If the room temperature is colder (in winter) or hotter (in summer) than desired, outside air damper may be closed incrementally until acceptable room temperature is achieved. This incremental approach is recommended to ensure that maximum airflow is being provided.
- If room has operable windows and/or doors to the building exterior, consider opening them to encourage airflow out of the room
- Continue using air filters with MERV-13 rating
 - Units were designed assuming MERV-13 filters and should not have issues operating under this condition

Configuration D

Room has an air conditioning unit that recirculates air within the space, but no means of drawing fresh air in.

- If outside air is ducted to the room, ensure that outside air intake louver is free of obstructions
- If room has operable windows and/or doors to the building exterior, consider opening them to encourage airflow out of the room
- If the above options are unavailable, consider installing operable windows or a room air purifier to treat recirculated air with ultraviolet light and bipolar ionization.
- Continue using air filters with MERV-13 rating
 - Units were designed assuming MERV-13 filters and should not have issues operating under this condition

Configuration E

Room is served by a central air conditioning unit that also serves other rooms.

- Maintain outside air damper position at 100% open to improve indoor air quality
 - If the room temperature is colder (in winter) or hotter (in summer) than desired, outside air damper may be closed incrementally until acceptable room temperature is achieved. This incremental approach is recommended to ensure that maximum airflow is being provided.
- If room has operable windows and/or doors to the building exterior, consider opening them to encourage airflow out of the room
- Replace existing air filter with MERV-13 filter
 - Airflow into room may be reduced, but should not affect AC unit operation
 - If AC unit cannot operate with increased filter rating, install MERV-10 filter

Configuration F

Room is served by a standalone air conditioning unit. The unit has a fan to draw air into the room, but no means of controlling airflow out.

- Maintain outside air damper position at 100% open to improve indoor air quality
 - If the room temperature is colder (in winter) or hotter (in summer) than desired, outside air damper may be closed incrementally until acceptable room temperature is achieved. This incremental approach is recommended to ensure that maximum airflow is being provided.
- If room has operable windows and/or doors to the building exterior, consider opening them to encourage airflow out of the room
- Replace existing air filter with MERV-13 filter
 - Airflow into room may be reduced, but should not affect AC unit operation
 - If AC unit cannot operate with increased filter rating, install MERV-10 filter

Configuration G

Room has a fan to draw air out of the room, but no means of supplying air into it.

- Operate exhaust fans at full speed
 - If there are dampers within the exhaust duct system, set them at 100% open
- If room has operable windows and/or doors to the building exterior, consider opening them to encourage airflow out of the room

The recommendations in this report are based on observed site conditions and proposed filter product data. If further modifications are desired, ACCO would be happy to continue working with DeLaveaga Elementary on its HVAC systems.

Sincerely,

Wendy Wang, PE
ACCO Engineered Systems
Design Engineer