

**DRAFT**



# **Barron Park Elementary School**

**Palo Alto Unified School District**

School Reopening Report

Evaluation Date: October 29, 2020

Report Date: December 10, 2020

**Prepared By:**

Ecology Action | 877 Cedar Street, Suite 240

T: 831.426.5925 | F: 831.427.1368

| Santa Cruz, CA 95062

| [www.ecoact.org](http://www.ecoact.org)

***DRAFT***

## Table of Contents

<b>1.0</b>	<b>EXECUTIVE SUMMARY.....</b>	<b>3</b>
1.1	OVERVIEW .....	3
1.2	PROCESS .....	3
1.3	INSPECTION .....	4
<b>2.0</b>	<b>QUALIFICATIONS.....</b>	<b>4</b>
<b>3.0</b>	<b>RESULTS.....</b>	<b>5</b>

# **DRAFT**

## 1.0 Executive Summary

### 1.1 Overview

Ecology Action performed functional testing of the HVAC units at Barron Park Elementary School on 10/29/2020 to focus on whether sufficient outside air ventilation was being supplied to occupied spaces. The evaluation was to determine if the occupied spaces were meeting the minimum indoor air quality (IAQ) guidelines set by PAUSD, referencing CDC, ASHRAE, and Title 24 code.

The following people were involved in the process:

1. Mike Diep, PE  
*Sr. Mechanical Engineer*
2. Aaron Worthy  
*Project Manager*
3. Randy Arenas  
*PAUSD HVAC Technician*

### 1.2 Process

The following steps were taken to evaluate the occupied spaces at school.

#### Specifications

1. Room dimensions were measured using laser distance measurements to calculate room area (sq. ft.) as well as volume (cu. ft.)
2. Make and model of HVAC equipment noted
3. Visual verification of filter and filter size

#### Measurements

1. All windows and doors were closed during testing
2. Outside air (OA) dampers were commanded to minimum position
3. Airflow measurements were taken with flow hood anemometers as well as hot wire anemometer if required. Flows were measured in the occupied space and were as follows:
  - a. Supply air
  - b. Return air
  - c. Outside air
    - i. Calculated based on difference between supply and return
    - ii. Directly measured at HVAC unit when required due to access issue at return air

# DRAFT

## 1.3 Inspection

1. Outside air dampers were inspected for functionality and position
2. Each outside air damper was commanded to open 100% through the BMS, then returned to its minimum position. If there were issues, they were noted and often repaired on site by districts HVAC technician

## 2.0 Qualifications

There are 3 main qualifications to determine whether the system is sufficient for reopening.

1. Air filter
  - a. Min. MERV 13 per CASH Covid-19 recommendation
2. Ventilation
  - a. Requires minimum 30 cfm/person per PAUSD agreement to double Title 24 requirements of 15 cfm/person
  - b. Total outside air cfm is based on district determined occupancy in the space.
    - i. Example: If the space is limited to 15 people, then the total outside air cfm required is 450 cfm (30 cfm/person x 15 people)
3. Mechanical Functionality
  - a. The functionality of the mechanical system is important to remotely control the OA dampers if needed. Although, the minimum position is evaluated to determine if sufficient OA is delivered whenever the unit is operating.

# DRAFT

## 3.0 Results

Results are presented in a table outlining the measurement and evaluation of each room.

To better help understand the table, here are a few items to note:

- i. 3-color ranking – Rows for each room will be highlighted in the following colors to determine performance
  - a. GREEN – No attention required. IAQ and mechanical is sufficient
  - b. YELLOW – Minor attention required. IAQ may still be sufficient
  - c. RED – Major attention required. May not be suitable for occupancy based on IAQ without further filtration or reduction in occupancy
- ii. Actual Room Capacity – This is based on 15 occupants per 1,000 sq. feet of floor space.
  - a. Space dimensions and occupancy quantities that should be noted are highlighted in red text. This may be to show that the area was smaller or larger than the typical room. Also, the room capacity may be modified for the Administration building.
- iii. Sufficient columns – These columns will be highlighted in green if sufficient and red if not.
  - a. MERV Rating
    - i. Based on actual air filters installed
  - b. Ventilation
    - i. Based on Ventilation Required (CFM) column which calculates the minimum cfm based on the Actual Room Capacity.
      1. A “N” will be shown if the measured OA cfm is below the ventilation required cfm.
  - c. Mechanical
    - i. This is to evaluate the operation of the HVAC unit
      1. If the OA damper was functioning based on BMS command and it was set to the appropriate minimum OA damper position, a “Y” will be noted.
      2. A “N” is provided if there is an issue with the mechanical operation. However, the OA damper position can be locked into a minimum position and therefore still pass the OA cfm requirements.
- iv. Air Changes
  - a. Fresh Air Changes per Hour
    - i. Number of air changes per hour of fresh air
  - b. Total Air Changes per Hour
    - i. Number of air changes per hour of total air through filter

# DRAFT

School	Barron Park
Evaluation Date	10/29/2020
Report Date	12/10/2020

Color Legend	
GREEN	No attention required. IAQ and mechanical is sufficient.
YELLOW	Minor attention required. IAQ may still be sufficient.
Portable	Major attention required. May not be suitable for occupancy based on IAQ without further filtration or reduction in occupancy

30	Cfm/person
----	------------

Room ID	Equipment Tag	Type	Manufacturer	Model Number	Filter		Ventilation			Room Specifications				Sufficient?	
					Size (inches)	Currently Installed Rating	Supply (CFM)	Return (CFM)	Outside Air (CFM)	Floor Area (ft2)	Room Volume (ft3)	Actual Room Capacity (Occupant qty)	Ventilation Required (CFM)	MERV Rating <sup>1</sup>	Ventilation <sup>2</sup>
1	Hf-1	Furnace	Comfortmaker	Gnl10016c3	20x25x2	MERV 13	1,110	-562	548	920	11,075	15	450	Y	Y
2	Hf-2	Furnace	Comfortmaker	Gnl10016c3	20x25x2	MERV 13	1,050	-526	524	920	11,075	15	450	Y	Y
3	Hf-3	Furnace	Comfortmaker	Gnl10016c3	20x25x2	MERV 13	1,066	-390	676	920	10,580	15	450	Y	Y
4	Hf-4	Furnace	Comfortmaker	Gnl10016c3	20x25x2	MERV 13	1,357	-698	659	922	10,792	15	450	Y	Y
5	Hf-5	Furnace	Comfortmaker	Gnl10016c3	20x25x2	MERV 13	1,335	-594	741	920	10,580	15	450	Y	Y
6	Hf-6	Furnace	Comfortmaker	Gnl10016c3	20x25x2	MERV 13	na	na	485	920	10,580	15	450	Y	Y
7a	Hf-7	Furnace	Comfortmaker	Gnl10016c3	20x25x2	MERV 13	1,055	-583	472	460	5,290	7	210	Y	Y
7b	Hf-7	Furnace	Comfortmaker	Gnl10016c3	20x25x2	MERV 13	556	na	1,112	460	5,290	7	210	Y	Y
7 combined	Hf-7	Furnace	Comfortmaker	Gnl10016c3	20x25x2	MERV 13	1,611	-583	1,028	920	10,580	15	450	Y	Y
8	Hf-8	Furnace	Comfortmaker	Gnl10016c3	20x25x2	MERV 13	1,211	-537	674	960	11,520	15	450	Y	Y
9	Hf-9	Furnace	Comfortmaker	Gnl10016c3	20x25x2	MERV 13	1,361	-710	651	960	11,520	15	450	Y	Y
10	Hf-10	Furnace	Comfortmaker	Gnl10016c3	20x25x2	MERV 13	1,381	-695	686	960	11,520	15	450	Y	Y
11	Hf-11	Furnace	Comfortmaker	Gnl10016c3	20x25x2	MERV 13	1,352	-626	726	960	11,520	15	450	Y	Y
12	Hf-12	Furnace	Comfortmaker	Gnl10016c3	20x25x2	MERV 13	1,403	-680	723	960	11,520	15	450	Y	Y
13	Hf-13	Furnace	Comfortmaker	Gnl10016c3	20x25x2	MERV 13	1,427	-692	735	1,008	12,005	15	450	Y	Y
14	Hf-14	Furnace	Comfortmaker	Gnl10016c3	20x25x2	MERV 13	1,451	na	584	963	11,557	15	450	Y	Y
15	Hf-16	Furnace	Comfortmaker	Gnl10016c3	20x25x2	MERV 13	na	na	587	980	12,250	15	450	Y	Y
16	Hf-17	Furnace	Comfortmaker	Gnl10016c3	20x25x2	MERV 13	na	na	542	980	12,250	15	450	Y	Y
17	Hf-18	Furnace	Comfortmaker	Gnl10016c3	20x25x2	MERV 13	na	na	575	980	12,250	15	450	Y	Y
18	Hf-19	Furnace	Comfortmaker	Gnl10016c3	20x25x2	MERV 13	na	na	592	980	12,250	15	450	Y	Y
Library	ACU-1	RTU	Trane	YCH075C3LBBE	16x25x1 (3)	MERV 13	2,105	-1,006	1,099	2,703	27,030	15	450	Y	Y
Principal	ACU-2	RTU	Trane	YCC042F1M0BG	20x25x1	MERV 13	1,093	-391	702	1,337	12,297	15	450	Y	Y
Main office	ACU-2a	RTU	Trane	YCC042F1M0BG	20x25x1	MERV 13	971	-484	487	496	6,049	15	450	Y	Y
Speech/ language	ACU-2b	RTU	Trane	YCC042F1M0BG	20x25x1	MERV 13	994	-240	754	791	7,906	15	450	Y	Y
Portable 19		Bard unit	QTEC		16x36	MERV 13	814	-885	0	1,365	12,285	15	450	Y	N
Portable 20		Bard unit	QTEC		16x36	MERV 13	1,385	-1,238	147	1,365	11,603	15	450	Y	N
Portable 21		Bard unit	QTEC		16x36	MERV 13	1,366	-1,280	86	1,365	11,603	15	450	Y	N
Daycare 1		Bard unit	QTEC		16x36x2	MERV 13	982	-623	359	1,365	12,285	15	450	Y	N
Daycare 2		Bard unit	QTEC	Q42H2	16x36x2	MERV 13	899	-1,048	0	1,365	12,285	15	450	Y	N
Daycare 3		Bard unit	QTEC		16x36x2	MERV 13	1,098	-783	315	1,365	12,285	15	450	Y	N

1 MERV 13 minimum rating per CASH Covid-19 recommendations.

2 Values based on 2019 Title 24 120.1(c)3 Equation 120.1-G