

## REPORT REGARDING BUILDINGS VENTILATION

The role of the Facility Planning, Maintenance and Operations (FPMO) team at San Mateo County Community College District is critical to the safety and comfort of faculty, staff, students, and visitors. Ensuring that our valued constituents are safe has taken new meaning and priority in the age of the COVID-19 pandemic. The FPMO team has a track record of facilities excellence and will further document that feasible measures have been taken to provide a safe and comfortable working and learning environment. Our work is ongoing, but the buildings of each campus have been assessed; and the vintage, condition and other characteristics of heating, ventilation and air conditioning systems have been categorized. A range of tools and quality assurance steps lends confidence to the overall findings of the FPMO team, which are: No deficiencies in HVAC system performance have been identified. All areas are open to working and learning.

### INTRODUCTION

The Centers for Disease Control and Prevention (CDC) recommend a layered approach to mitigating exposure and spread of COVID-19. Appropriate ventilation of indoor spaces is one part of a layered approach, but there is little evidence to suggest that COVID-19 is spread through heating, ventilation and air conditioning (HVAC) systems<sup>1</sup>. Cal/OSHA requires the District to evaluate how to maximize ventilation with outdoor air and install the highest level of filtration efficiency compatible with existing ventilation system<sup>2</sup>. While the pandemic continues to evolve, external data remains limited global research is ongoing, the District's Facilities Planning, Maintenance and Operations division is taking precautions and measures to ensure the safety and comfort of staff, faculty students, and visitors to campus.

Here, the focus is on HVAC and naturally ventilated spaces. All the spaces in the District have adequate ventilation, either using mechanical ventilation or natural ventilation. In addition, the District has met Cal/OSHA requirements by enhancing ventilation, air flow, and filtration in the buildings.

The appendices that follow include the following:

- The number of every building on each campus for reference
- The vintage, or period of most recent modernization, of the mechanical or natural ventilation system
- The type of ventilation provided
- The level of filtration provided
- The type of mechanical heating or cooling provided
- The condition of the mechanical system where one exists
- The most recent preventative maintenance provided to the mechanical system

Each of these is described in more detail for context and reference within this brief.

### BUILDING CONSTRUCTION AND MODERNIZATION

SMCCCD's current hilltop campuses were constructed in the mid to late 1960's. Legacy buildings and systems remain in some areas and continue to be functional and serviceable. Over the past 20 years, the

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<sup>1</sup> <https://www.cdc.gov/coronavirus/2019-ncov/community/ventilation.html>

<sup>2</sup> <https://www.dir.ca.gov/title8/3205.html>

SMCCCD, through local bonds and state funding, has engaged in Capital Improvement Plans that have supported modernizations and new construction to provide for safe, comfortable, efficient and modern learning environments. Each project has, at minimum, followed the stringent guidelines of the California Building Code. All new construction in CIP 2 and CIP 3 have exceeded code requirements and achieved at least “Silver” designation in the Leadership in Energy and Environmental Design (LEED) rating system. This third-party rating system requires advanced [Indoor Environmental Quality \(IEQ\) and Indoor Air Quality \(IAQ\)](#) measures. Even where LEED designations have not been achieved, each modernization and new construction project has followed the District’s advanced sustainable design and construction criteria. Buildings have been designed, constructed, commissioned and are now operated by highly qualified and certified professionals.

## HVAC SYSTEMS

To paraphrase the US Environmental Protection Agency: ‘Heating, Ventilation and Air-Conditioning (HVAC) systems are designed, built and operated to accomplish two critical objectives: 1) help maintain indoor air quality through adequate ventilation with filtration and, 2) provide thermal comfort<sup>3</sup>.’ Increasingly, to accomplish these objectives, HVAC systems require highly technical knowledge and expert integration of technologically advanced hardware and software. The FPMO team is equipped with both.

**Providing outside air to spaces and ensuring that that air is clean and healthy does not always require advanced systems. In many cases, natural ventilation – supplied through operable windows or doors – is adequate and appropriate for both air quality and comfort.** This is especially true in the Bay Area’s temperate climate but is increasingly complicated by extreme weather events and the local or regional impacts of the global climate crisis<sup>4</sup>. With ongoing fire and risk of poor air quality, an outside air monitoring sensor has been installed on each campus. When the Air Quality Index (AQI) reaches unhealthy levels, adjustments to campus schedules and systems operations are made accordingly.

Air filtration is a necessity of any functional air handling unit ([AHU](#)) and broader HVAC system. Design professionals go through rigorous training to ensure that a balance of appropriate filtration and ventilation rates is accomplished. Since filters work to catch particles, they impede air flow. The finer the filter medium (or higher the MERV rating) the harder a system must work to push and pull air through the filter. Minimum Efficiency Reporting Value (MERV) 13, while effective for slightly finer particulate, is not appropriate in some cases<sup>5</sup>. SMCCCD’s Facilities team has replaced filtration medium with the highest MERV value possible for the given building and system, including the installation of MERV 13 filters where safe and appropriate. This level of filtration has historically been appropriated for health care facilities, while MERV 8 has been used for commercial/school buildings.

Regardless of the filter density, filters are replaced regularly and the mechanical devices that serve each building space undergo cleaning and preventative maintenance on a regular schedule. The Facilities team also procures and provides reactive maintenance services as required. The characteristics of each building and its mechanical system are further detailed in [Appendices A-C](#).

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<sup>3</sup> <https://www.epa.gov/iaq-schools/heating-ventilation-and-air-conditioning-systems-part-indoor-air-quality-design-tools>

<sup>4</sup> <https://oag.ca.gov/environment/impact>

<sup>5</sup> <https://smacna.org/resources/business-management/hvac-systems/what-is-merv>

## SMCCCD FACILITIES STAFF

Customer Service, Professionalism, Teamwork, and Communications are the principles of the “Facilities Excellence” mantra. A team of over 100 people prepare the physical campuses for learning and working each day with these values in mind. Each member of the team has professional development goals appropriate for their trade and craft. All engineering staff, responsible for the upkeep of HVAC systems, must participate in Building Operator Certification courses. These courses, along with other specialized training, help ensure that SMCCCD Facilities staff members are qualified and prepared to deliver safe, comfortable, efficient buildings.

There are three primary types of maintenance that the SMCCCD Facilities team provides:

1. **Preventative:** Regular, predicted maintenance schedules are assigned and work is conducted
2. **Proactive:** Observed field conditions or technological assessments indicate the potential for a problem and maintenance is performed before an emergent issue arises
3. **Reactive:** a system malfunctions and requires attention without advanced planning

## PREVENTATIVE MAINTENANCE

Preventative maintenance on HVAC systems is conducted on at least a semiannual basis. It consists of the following:

- Filter replacement
- Check and service motors
- Service fans
- Tension, service, and/or replace belts
- Service louvers, dampers, and actuators
- Clean AHU's
- Clean and tidy mechanical rooms
- Controls service and verification
- Other proactive maintenance as required

## HVAC TERMS AND ACRONYMS

Like all specializations, the facilities management field has an extensive acronym library and rather distinct language. To learn more about any unfamiliar terms please find reliable sources in your web browser or visit:

- [HVAC Terminology](#)
- <https://xp20.ashrae.org/terminology/>
- <http://tnd.appa.org/>

## CONCLUSION

COVID-19 is a virus that cannot be fully mitigated by one single solution, thus the layered approach is essential; the care and maintenance of HVAC systems and other building ventilation systems is one of those layers. The District's buildings are safe and comply with Cal/OSHA standards. Facilities are continuously monitored, serviced, and assessed to ensure the safety and relative comfort of building occupants. The training, tools, and dedication of the Facilities team are fully focused on doing everything within the team's power and purview to design, build, and maintain systems to provide for a safe, comfortable, and efficient learning and working environment.

## Appendix A: Cañada College HVAC Systems

Building Number	System Vintage	Building Ventilation Type	HVAC Filtration	Mechanical Heating System	Mechanical Cooling System	Mechanical System Condition	Semi-Annual Preventative Maintenance
1	New Construction - CIP3	Mechanical Ventilation / Variable Air Volume	MERV 13	Central Heating (HHW)	Central Chiller Plant - Entire Building	New - Excellent condition	n/a
2	Modernized - CIP 1	Mechanical Ventilation / Constant Volume	MERV 8 / Filter Media Pads with MERV 8 rating	Central Heating (HHW)	Local Independent Cooling - all spaces	Functional/Modernization Candidate	May-21
3	Modernized - CIP 1	Mechanical Ventilation / Constant Volume / Multiple Systems / Operable Windows	MERV 8 / Filter Media Pads with MERV 8 rating	Central Heating (HHW)	Central Chiller Plant - Entire Building	Good Condition	May-21
4	New Construction - CIP 1	Exhaust Fan Only - Restroom Building	n/a	n/a	n/a	n/a	n/a
5	Modernized - CIP 1 and CIP2	Mechanical Ventilation / Variable Air Volume / Multiple Systems / Operable Windows	MERV 13	Central Heating (HHW)	Central Chiller Plant - Entire Building	Good Condition	Jul-21

<b>6</b>	Modernized - CIP 1 and CIP2	Mechanical Ventilation / Variable Air Volume	MERV 13	Central Heating (HHW)	Central Chiller Plant - Entire Building	Good Condition	Jul-21
<b>7</b>	New Construction - CIP 2	Mechanical Ventilation / Constant Volume / Multiple Systems	MERV 8	Local Independent Heating	Local Independent Cooling	Good Condition	Apr-21
<b>8</b>	Modernized - CIP 1 and CIP2	Mechanical Ventilation / Variable Air Volume / Multiple Systems / Operable Windows	MERV 13	Central Heating (HHW)	Central Chiller Plant - Entire Building	Good Condition	Jul-21
<b>9</b>	New Construction - CIP 1	Mechanical Ventilation / Variable Air Volume / Multiple Systems	MERV 13	Central Heating (HHW)	Central Chiller Plant - Entire Building	Good Condition	Mar-21
<b>12</b>							
<b>13</b>							

<b>16</b>	Modernized - CIP 1 and CIP2	Mechanical Ventilation / Variable Air Volume / Multiple Systems / Operable Windows	MERV 13	Central Heating (HHW)	Central Chiller Plant - Entire Building	Good Condition	Jul-21
<b>17</b>	Modernized - CIP 1	Mechanical Ventilation / Constant Volume / Multiple Systems	MERV 13	Central Heating (HHW)	Central Chiller Plant - Entire Building	Good Condition	Jun-21
<b>18</b>	Modernized - CIP 1 and CIP2	Mechanical Ventilation / Variable Air Volume / Multiple Systems / Operable Windows	MERV 13	Central Heating (HHW)	Central Chiller Plant - Entire Building	Good Condition	Jul-21
<b>19</b>	New Construction - CIP 1	Mechanical Ventilation / Constant Volume / Multiple Systems	MERV 13	Local Independent Heating	Local Independent Cooling	Good Condition	Jun-21

<b>20</b>	New Construction - CIP 1	Mechanical Ventilation / Constant Volume / Multiple Systems	MERV 13	Local Independent Heating	Local Independent Cooling	Good Condition	Jun-21
<b>21</b>	New Construction - CIP 1	Mechanical Ventilation / Constant Volume / Multiple Systems	MERV 13	Local Independent Heating	Local Independent Cooling	Good Condition	Jun-21
<b>22</b>	Modernized - CIP 3	Mechanical Ventilation / Constant Volume / Multiple Systems	MERV 13	Central Heating (HHW)	Central Chiller Plant - Entire Building	New - Excellent condition	n/a
<b>23</b>	New Construction - CIP 3	Mechanical Ventilation / Variable Air Volume	MERV 13	Central Heating (HHW)	Central Chiller Plant - Entire Building	New - Excellent condition	May-21
<b>24 - Astronomy Shed</b>	New Construction - CIP 3	Natural - doors and retractable roof	n/a	n/a	n/a	n/a	n/a

<b>32 - Tennis Court Restroom</b>	New Construction - CIP 2	Mechanical Ventilation / Constant Volume / Multiple Systems / Operable Windows	n/a	Local Independent Heating	Local Independent Cooling	n/a	n/a
<b>33 - Team House 1</b>	New Construction - CIP 2	Mechanical Ventilation / Constant Volume / Multiple Systems	MERV 13	Local Independent Heating	Local Independent Cooling	Good Condition	Jun-21
<b>34 - Team House 2</b>	New Construction - CIP 2	Mechanical Ventilation / Constant Volume / Multiple Systems	MERV 13	Local Independent Heating	Local Independent Cooling	Good Condition	Jun-21
<b>35 - Team House 3</b>	New Construction - CIP 3	Mechanical Ventilation / Constant Volume / Multiple Systems	MERV 13	Local Independent Heating	Local Independent Cooling	Good Condition	Jun-21



## Appendix B: College of San Mateo HVAC Systems

Building Number	System Vintage	Building Ventilation Type	HVAC Filtration	Building System Mechanical Heating	Building System Mechanical Cooling	Building Mechanical System Condition	Semi-Annual Preventative Maintenance
DO	Legacy Minor Modifications	Mechanical Ventilation/Operable Windows	MERV-13	Central Heating (HHW)	DX Cooling	Good Condition	Jul-21
1	Legacy Minor Modifications	Mechanical Ventilation/Operable Windows	MERV-13	Central Heating (HHW)	Local Independent Cooling-In some spaces	Good Condition	Mar-21
2	Modernized - CIP 2	Mechanical Ventilation/Operable Windows	MERV-13	Central Heating (HHW)	No Cooling	Good Condition	Mar-21
3	Legacy Minor Modifications	Mechanical Ventilation/Operable Windows	MERV-13	Central Heating (HHW)	Local Independent Cooling-In some spaces	Good Condition	Mar-21
4	Modernized - CIP 2	Mechanical Ventilation/Operable Windows	MERV-13	Central Heating (HHW)	Local Independent Cooling-In some spaces	Good Condition	Mar-21
4A (46)	Legacy Minor Modifications	Doors/Operable Windows	None		No Cooling	Good Condition	Mar-21
5	New Construction - CIP 2	Variable Air Volume/Demand Control	MERV-13	Central Heating (HHW)	Central Chiller Plant-Entire Building	Good Condition	Mar-21
6	New Construction - CIP 2	Natural -No Mechanical Ventilation	n/a	n/a	DX Cooling/Local Independent	Good Condition	Mar-21

					Cooling-In some spaces		
<b>7</b>	Legacy	Mechanical Ventilation/Natural-- No Mechanical Ventilation/ Operable Windows		Central Heating (HHW)	No Cooling	Good Condition	Mar-21
<b>8</b>	Legacy	Mechanical Ventilation/Demand Control	MERV-13	Central Heating (HHW)	No Cooling	Good Condition	Mar-21
<b>9</b>	Modernized - CIP 2	Mechanical Ventilation/Demand Control/Constant Volume	MERV-13	Central Heating (HHW)	Central Chiller Plant-Entire Building	Good Condition	Mar-21
<b>10</b>	New Construction - CIP 2	Mechanical Ventilation/Variable Air Volume/Demand Control	MERV-13	Central Heating (HHW)	Central Chiller Plant-Entire Building	Good Condition	Apr-21
<b>12</b>	Modernized - CIP 2	Mechanical Ventilation/Constant Volume/Operable Windows	MERV-13	Central Heating (HHW)	No Cooling	Good Condition	Apr-21
<b>14</b>	Modernized - CIP 2	Mechanical Ventilation/Constant Volume/Operable Windows	MERV-13	Central Heating (HHW)	DX Cooling/Local Independent Cooling-In some spaces	Good Condition	Apr-21
<b>15</b>	Modernized - CIP 2	Natural--No Mechanical Ventilation/Operable Windows	None	Central Heating (HHW)	No Cooling	Good Condition	Apr-21

<b>16</b>	Modernized - CIP 2	Mechanical Ventilation/Constant Volume/Operable Windows	MERV-13	Central Heating (HHW)	DX Cooling/Local Independent Cooling-In some spaces	Good Condition	Apr-21
<b>17</b>	Modernized - CIP 3	Natural--No Mechanical Ventilation/Operable Windows	None	Central Heating (HHW)	DX Cooling/Local Independent Cooling-In some spaces	Good Condition	Apr-21
<b>18</b>	Modernized - CIP 1	Mechanical Ventilation/Constant Volume/Operable Windows	MERV-13	Central Heating (HHW)	DX Cooling/Local Independent Cooling-In some spaces	Good Condition	Apr-21
<b>19</b>	Legacy	Mechanical Ventilation/Constant Volume/Operable Windows	MERV-13	Central Heating (HHW)	DX Cooling/Local Independent Cooling-In some spaces	Active Modernization Project - Currently in design phase	Apr-21
<b>30</b>	Modernized - CIP 2	Mechanical Ventilation/Constant Volume	MERV-13	Local Independent Heating	No Cooling	Good Condition	Mar-21
<b>30A</b>	Portable Trailer	Demand Control	MERV-8	Local Independent Heating	DX Cooling	Good Condition	Mar-21
<b>33</b>	Legacy	Mechanical Ventilation/Operable Windows	MERV-13	Local Independent Heating	DX Cooling/Local Independent Cooling-In some spaces	Good Condition	Mar-21
<b>34</b>	Modernized - CIP 2	Mechanical Ventilation/Demand Control/Multiple Systems	MERV-13	Local Independent Heating	DX Cooling	Good Condition	Mar-21

<b>35</b>	New Construction - CIP1	Mechanical Ventilation/Demand Control	MERV-13	Local Independent Heating	DX Cooling	Good Condition	Mar-21
<b>36</b>	New Construction - CIP 1	Mechanical Ventilation/Demand Control/Operable Windows	MERV-13	Central Heating (HHW)	DX Cooling/Local Independent Cooling-In some spaces	Active Modernization Project - Currently in design phase	Mar-21

## Appendix C: Skyline College HVAC Systems

Building Number	System Vintage	Building Ventilation Type	HVAC Filtration	Building System Mechanical Heating	Building System Mechanical Cooling	Building Mechanical System Condition	Semi-Annual Preventative Maintenance
1	Modernized CIP 1	Constant Volume / Operable Windows	MERV 13 House Air MERV 8 Independent Systems 100% Outside Air	Central Heating (HHW)	No Cooling	Functional/Candidate for SMSR	Mar-21
2	Under Construction						Apr-21
3	Modernized - CIP 2	Constant Volume / Large Operable Doors	MERV 13	Central Heating (HHW)	No Cooling	Good Condition	Apr-21
3 A-F Portables	New Construction - CIP 3	Constant Volume / Operable Windows	MERV 13	Local Independent Heating	Local Independent Cooling	New	Apr-21
4	New Construction - CIP 2	VAV / Operable Windows	MERV 13	Central Heating (HHW)	No Cooling	Good Condition	Jun-21
5	Modernization - CIP 2	VAV / Operable Windows	MERV 13	Central Heating (HHW)	Direct Expansion Cooling	Functional/Candidate for SMSR	Jun-21
6	New Construction - CIP 2	VAV	MERV 13	Central Heating (HHW)	Chiller Plant	Good Condition	Jun-21

<b>7</b>	Modernization - CIP 2	Constant Volume	MERV 8	Central Heating (HHW)	DX	Functional/Candidate for SMSR	Feb-21
<b>7A</b>	New Construction - CIP 2	VAV	MERV 13	Central Heating (HHW)	No Cooling	Good Condition	Feb-21
<b>8</b>	Modernization - CIP 2	Multiple Systems - VAV & Constant Volume	MERV 8	Central Heating (HHW)	DX	Functional/Candidate for SMSR	Feb-21
<b>9</b>	Modernization - CIP 1	Natural--No Mechanical Ventilation / Operable Garage Doors	N/A	Local Independent Heating - space heater	No Cooling	Good Condition	Feb-21
<b>10</b>	Modernization - CIP 1	Constant Volume / Operable Garage Doors	MERV 8	Local Independent Heating	No Cooling	Good Condition	Feb-21
<b>11</b>	New Construction - CIP 2	Constant Volume / Operable Garage Doors	MERV 13	Local Independent Heating	No Cooling	Good Condition	Jul-21
<b>12</b>	New Construction - CIP 3	VAV	MERV 13	Local Independent Heating	Chiller Plant	New	Jul-21
<b>14</b>	Modernization - CIP 2	Constant Volume / Operable Doors	MERV 13	Local Independent Heating	No Cooling	Good Condition	Jun-21
<b>15</b>	Modernization - CIP 2	Exhaust Fan Only	n/a	Exhaust Fan Only	Exhaust Fan Only	Good Condition	Jul-21
<b>16</b>	New Construction - CIP 3	Constant Volume / Operable Windows	MERV 13	Local Independent Heating	Local Independent Cooling	Good Condition	Jul-21

17	Modernization - CIP 2	Natural / Operable Garage Door	n/a	n/a	n/a	n/a	n/a
18	Modernization - CIP 2	Natural / Operable Windows	n/a	n/a	n/a	n/a	n/a
19	Modernization - CIP 3	Constant Volume / Operable Windows	MERV 13	Local Independent Heating	No Cooling	Good Condition	Jul-21
20	New Construction - CIP 2	Exhaust Fan Only	n/a	No Heating	No Cooling	Good Condition	Jul-21
21	New Construction - CIP 2	Constant Volume / Operable Windows	MERV 8	Local Independent Heating	Local Independent Cooling	Good Condition	May-21
22	New Construction - CIP 2	Constant Volume / Operable Garage Doors	n/a	Local Independent Heating	No Cooling	Good Condition	May-21
23	New Construction - CIP 2	Constant Volume / Operable Garage Doors	n/a	Local Independent Heating	No Cooling	Good Condition	May-21
24	New Construction - CIP 2	Constant Volume / Operable Garage Doors	n/a	Local Independent Heating	No Cooling	Good Condition	May-21
BAEC	Leased Bldg in San Bruno	Constant Volume / Operable Doors	MERV 13	Local Independent Heating	Local Independent Cooling	Unknown at this time	Jul-21