

**CONGDON ELEMENTARY SCHOOL  
HVAC ASSESSMENT REPORT FOR SCHOOL RE-OPENING**



**General:**

1. The purpose of this report is to give an overview of the potential measures that may be applied to the building HVAC systems and spaces to provide a safer environment for students, teachers, and staff to return to school this year. The diversity of space types and systems require different solutions and strategies to be considered to improve the interior environment.
2. This report does not make recommendations on occupant density, reconfiguration of spaces, cleaning procedures, or implementation of touch-free procedures. The District is urged to seek guidance from the Massachusetts Department of Elementary and Secondary Education (DESE) and the Centers for Disease Control (CDC) on these and other issues related to the COVID-19 virus.
3. This report does not make any certification, determination nor render any opinion, as to whether the building reviewed within this assessment is safe to reoccupy or not. Determination to reoccu-

py the building is the sole purview of the Superintendent of Schools for the City/Town of New Bedford.

4. Buildings included within this report are:

Congdon Elementary School; visited on 8/26/2020; 8:00 AM. Congdon school delegate present during site tour: Darcie Aungst.

**Potential HVAC Strategies:**

1. Increased Ventilation:

- a. Increasing outside air ventilation rates can be an effective strategy to reduce airborne concentrations of viruses, bacteria, and other contaminants.
- b. Operable windows provide a good source of fresh air, which at times can provide a significantly higher amount compared to mechanical ventilation systems. Since this air cannot be filtered directly, the surrounding environment must be low in airborne contaminants to avoid bringing in unhealthy air which could lead to other issues.
- c. Since the use of operable windows is manually controlled by the space occupants, some discretion must be used in determining when to apply this measure. Opening windows during cold weather can lead to loss of space temperature control and increased heating energy consumption. Where mechanical systems have cooling capabilities, the cooling system should be turned off where possible when the windows are open. The amount that a window should be opened should also be considered based on wind speed and outside air temperature to help prevent uncomfortable conditions.
- d. Wherever technology-based strategies are installed such as bipolar ionization systems described later, opening windows for increased ventilation should not be used as it will reduce the effectiveness of the system.
- e. Generally, the use of operable windows is expected to provide a higher benefit than increasing mechanical ventilation rates albeit under less controlled conditions that may still lead to comfort issues.
- a. Ventilation control strategies also include operation of the building exhaust systems. Verifying the operation of the toilet room exhaust systems and setting them to operate for at least 4-hours after occupancy should be considered, since these spaces can potentially be a source for high contamination. Operating continuously may also be considered to provide additional dilution of airborne contaminants that may linger overnight. Installation of hands-free faucets and toilet fixtures should also be considered as a long-term measure to reduce the potential of spread by touching surfaces.

2. Enhanced Filtration:

- a. The ability to add higher efficiency filters in air systems can provide an added level of protection depending on the efficiency level that can be achieved. The thickness of the existing filter systems is the primary factor that limits the level of efficiency that can be attained. The second consideration is that higher efficiency filtration typically has a higher initial resistance to airflow which has an effect on a system's air capacity.
- b. Filters with a higher efficiency rating will remove particles of smaller sizes, which is necessary to remove aerosolized virus particles from the air stream. Filters with a MERV 13 rating are capable of capturing up to 75% of aerosolized virus particles. One-inch and 2-inch filters are available with MERV 11 and 13 ratings which incorporate an electrostatic charge to help obtain their rating. Therefore, these filters must be stored in a dry location to maintain their effectiveness.
- c. Two-inch MERV 13 filters for air handling units is more practical. The air flow resistance of these filters is still higher than MERV 8, but they are not expected to cause a significant loss of unit capacity.
- d. It is important to note that the 1-inch and 2-inch MERV 11 and MERV 13 filters should be changed every 90 days, since the electrostatic charge will lose effectiveness over time. This translates to at least 3 filter changes per year where schools are not occupied during the summer months.
- e. It is recommended that appropriate personal protection (PPE) procedures be exercised when dirty filters are removed from the systems, since active viruses may be present. The dirty filters should be bagged immediately when removed from the system to prevent particles from being dispersed back into the space.

3. Control Strategies:

- b. The operation of the manual outside air damper for the (4) 3<sup>rd</sup> floor classroom air handling systems is recommended to be adjusted in order to allow for additional outdoor air ventilation to space.
- c. Ventilation control strategies can be used to help reduce the level of virus concentration in occupied spaces. These strategies help to increase the effectiveness of the existing ventilations systems.
- d. It is recommended that the operation of the building ventilation systems be extended beyond normal occupied hours. Systems are recommended to be started 2-hours before occupancy and continue for at least 2-hours after occupancy, preferably for 4-hours.

- e. In addition to extended hours for outside ventilation air, ventilation control strategies also include operation of the building exhaust systems. Verifying the operation of the toilet room exhaust systems and setting them to operate for at least 4-hours after occupancy should be considered, since these spaces can potentially be a source for high contamination. This should be done in conjunction with the operation of the building ventilation systems to help maintain the building under neutral or slightly positive pressure conditions. Operating continuously may also be considered to provide additional dilution of airborne contaminants that may linger overnight. Installation of hands-free faucets and toilet fixtures should also be considered as a long-term measure to reduce the potential of spread by touching surfaces.

4. Long-Term Strategies:

- a. Long-term strategies include the installation of airflow system technologies and space treatments. These strategies generally have a higher cost than short-term strategies.
- d. Portable Air Filtration Units
  - 1) Portable filtration units are available in various sizes that can be used in areas that do not have sufficient air circulation or outside air ventilation systems.
  - 2) These units can include multiple levels of filtration including HEPA filters as well as bipolar ionization, and UV-C technologies.

**Strategies for Various System Types:**

1. Mixed/Recirculation Air Systems:

- a. Supply air from these systems can be delivered to one space, such as a cafeteria, or to multiple spaces distributed by supply ductwork. A portion of the supply air includes outside air that is mixed with return air in the air handling unit before it is delivered to the space. These systems may also provide economizer cooling using up to 100% outside air when ambient conditions permit and when the space needs cooling. Since these systems recycle air and may serve multiple spaces, they provide an opportunity to apply centralized solutions. Roof-top units fall into the category of mixed air systems. All the systems at the school are heating only.
- b. Provide enhanced filtration wherever possible. The systems in the school have 2-inch filters, therefore MERV 13 filters are recommended.
- c. Bipolar ionization (BPI) systems are recommended to be installed in the supply ductwork of all mixed air systems wherever possible. BPI should generally be considered over UV-C systems as a long-term strategy due to the ability of BPI to work within the space where the

source of the viruses is located. These can be readily applied to all different system sizes with little restrictions.

- d. Consider extended hours of operation before and after occupancy to further reduce airborne concentrations. Up to four hours of extended operation should be considered.

**Strategies by Building:**

1. Congdon:

- a. Typical Classrooms

- 1) Ventilation for the classrooms is provided by operable windows. Operable windows along with high ceiling heights will assist in introducing fresh outdoor air to classrooms.



Typical Classroom



1<sup>st</sup> and 2<sup>nd</sup> Floor Corner Classrooms

- 2) Heating is provided by two-pipe steam radiators. These radiators can mitigate cold outdoor infiltration due to keeping windows open.

2. 3rd Floor Ventilated Classrooms

- 1) The classrooms located on the 3<sup>rd</sup> floor have mixed air HVAC systems. These four systems serving the 3<sup>rd</sup> floor classrooms should follow the Mixed/Recirculation Air Systems recommendations.



Typical 3<sup>rd</sup> Floor Classroom



3<sup>rd</sup> Floor Classroom HVAC Unit

3. Bathroom exhaust fans are recommended to operate concurrently with the ventilation systems wherever possible.

1) These exhaust fans should be verified for correct operation.



Basement Bathroom Exhaust Fan



Girls Bathroom Exhaust Duct

4. Hallways

1) Hallways have operable windows and should be treated similarly to classrooms. Windows should be opened whenever possible and low outdoor air temperatures should be mitigated with steam radiators.



Typical Hallway



Steam radiators

#### 5. Common Areas (Auditorium/Mixed Use Space)



Auditorium With Operable Windows



Auditorium/Mixed Used Space

- 1) The Auditorium does not have any ventilation other than operable windows. This space should be treated as classrooms whenever being occupied.

#### 6. Basement Areas

- 1) Basement areas have generally old operable windows of questionable quality and advanced age. Many windows have been painted over and many are assumed to not be usable and possibly unsafe to open. Spaces in the basement where the operation of windows is not possible should not be continually occupied.