

**Exhibit A**  
**HVAC Upgrades for Metro Facilities**

**TOTAL Equipment/Installation: \$7,226,000**

The table below shows the funding needed to upgrade HVAC systems throughout Metro to meet CDC recommendations for improved ventilation, for the safety of employees and residents/visitors to Metro buildings.

<b>Department</b>	<b>Equipment &amp; Installation</b>	<b>Annual Operating</b>
General Services	\$2,750,000	\$220,000
DCSO	\$1,139,000	\$91,200
Health	\$1,127,000	\$91,000
Library	\$495,000	\$39,600
NDOT	\$300,000	\$24,000
NFD	\$255,000	\$20,400
Parks	\$1,000,000	\$80,000
Metro Action Commission	\$160,000	\$12,800
<b>TOTAL</b>	<b>\$7,226,000</b>	<b>\$579,000</b>

**HVAC Upgrades – Improvement Options**

There are several options for improving ventilation in Metro buildings. The best option is made, on a case-by-case basis, by building maintenance staff and licensed HVAC professionals. Knowledge of the air handling unit's condition and performance, in addition to the layout and intended use of the space served by the unit, is required to determine which improvement option is best.

- **Replacement of units**
  - The best option when existing equipment can't be upgraded to improve filtration using current technology.
  - Cost varies by unit and can be quite extensive if re-engineering of the building is required.
- **Installation of UV-C (or UVGI)**
  - The best option for buildings where there is a higher risk for airborne pathogens.

- UV-C light fixtures emit ultraviolet rays that penetrate and destroy microorganisms present in the air, such as viruses, germs, and other pathogens, upon direct contact. UV-C fixtures are installed at the entry and exit points of air handling units to emit light to supply and exhaust airflows.
- Approximate cost is \$8,500 per unit or \$150 per HVAC ton.
- **Installation of Needle-point Bipolar Ionization (NPBPI)**
  - The best option for smaller units that don't have a central air handling system or areas with lower risks for airborne pathogens.
  - NPBPI uses static electricity to remove pathogens out of the air stream. NPBPI works by producing negative ions, which attach to other particles in the air, such as dirt and pathogens. As a result, pathogens are removed from the air stream due to the combined load from the negative ions.
  - Approximate cost is \$500 per unit.
- **Addition of portable or wall-mount units**
  - The best option for small high-risk areas.
  - Portable units include HEPA filters and UV-C. These units cover a limited range (approximately 800-1,400 sq ft). Power loads and noise levels should be considered. Electrical upgrades may be required.
  - Approximate cost is \$500-\$2,000 per unit.

## **CDC Recommendations: Tools to Improve Ventilation (Summary)**

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- **Increase the introduction of outdoor air:**
  - Open outdoor air dampers beyond minimum settings to reduce or eliminate HVAC air recirculation. In mild weather, this will not affect thermal comfort or humidity. However, this may be difficult to do in cold, hot, or humid weather, and may require consultation with an experienced HVAC professional.
  - Open windows and doors, when weather conditions allow, to increase outdoor air flow. Do not open windows and doors if doing so poses a safety or health risk (e.g., risk of falling, triggering asthma symptoms) to occupants in the building. Even a slightly open window can introduce beneficial outdoor air.
- **Use fans to increase the effectiveness of open windows:**
  - To safely achieve this, fan placement is important and will vary based on room configuration. Avoid placing fans in a way that could potentially cause contaminated air to flow directly from one person to another. One helpful strategy is to use a window fan, placed safely and securely in a window, to exhaust room air to the outdoors. This will help draw outdoor air into the room via other open windows and doors without generating strong room air currents. Similar results can be established in larger facilities using other fan systems, such as gable fans and roof ventilators.
- **Ensure ventilation systems operate properly and provide acceptable indoor air quality for the current occupancy level for each space.**
- **Rebalance or adjust HVAC systems to increase total airflow to occupied spaces when possible.**

- **Turn off any demand-controlled ventilation (DCV) controls that reduce air supply** based on occupancy or temperature during occupied hours. In homes and buildings where the HVAC fan operation can be controlled at the thermostat, set the fan to the “on” position instead of “auto,” which will operate the fan continuously, even when heating or air-conditioning is not required.
- **Improve central air filtration:**
  - Increase air filtration to as high as possible without significantly reducing design airflow. Increased filtration efficiency is especially helpful when enhanced outdoor air delivery options are limited.
  - Make sure air filters are properly sized and within their recommended service life.
  - Inspect filter housing and racks to ensure appropriate filter fit and minimize air that flows around, instead of through, the filter.
- **Ensure restroom exhaust fans are functional and operating at full capacity when the building is occupied.**
- **Inspect and maintain exhaust ventilation systems in areas such as kitchens, cooking areas, etc.** Operate these systems any time these spaces are occupied. Operating them even when the specific space is not occupied will increase overall ventilation within the occupied building.
- **Use portable high-efficiency particulate air (HEPA) fan/filtration systems to enhance air cleaning** (especially in higher risk areas such as a nurse’s office or areas frequently inhabited by people with a higher likelihood of having COVID-19 and/or an increased risk of getting COVID-19).
- **Generate clean-to-less-clean air movement by evaluating and repositioning as necessary, the supply louvers, exhaust air grilles, and/or damper settings.**
- **Use ultraviolet germicidal irradiation (UVGI)** as a supplemental treatment to inactivate SARS-CoV-2 when options for increasing room ventilation and filtration are limited. Upper-room UVGI systems can be used to provide air cleaning within occupied spaces, and in-duct UVGI systems can help enhance air cleaning inside central ventilation systems.
- **In non-residential settings, run the HVAC system at maximum outside airflow for 2 hours before and after the building is occupied.**