

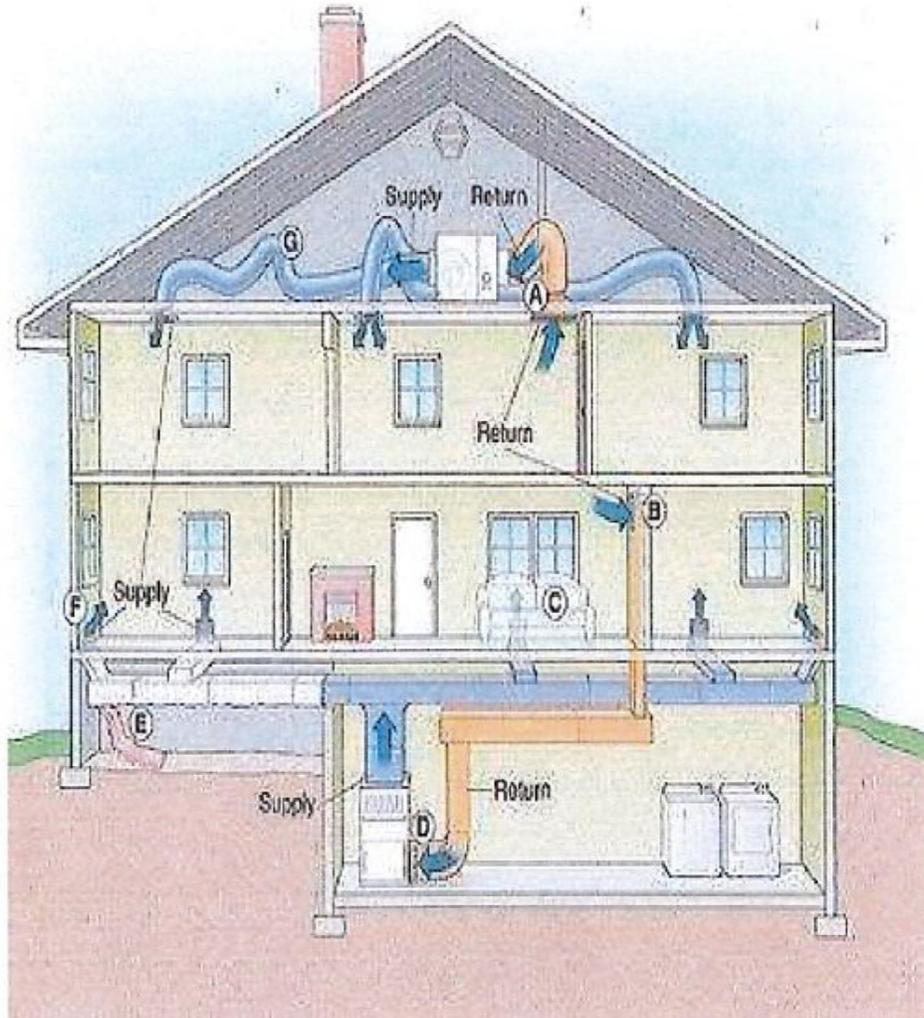
# **Heating Ventilation and Air Conditioning (HVAC) During COVID-19**

The Brecksville-Broadview Heights City School District has been investigating additional ways to improve the overall air quality and the amount of outside air flow in each of our school buildings. We have participated in a number of meetings and webinars with other school districts, HVAC consultants, as well as mechanical engineers to evaluate air ventilation, filters, portable air cleaners and explore both short-term and long-term solutions. The CDC has also provided guidance for HVAC systems in school buildings during the COVID-19 pandemic. As School District staff and outside experts continue to monitor and evaluate our systems, their overall goal, during this crisis has been to increase outside air to our educational spaces and to treat (filter) return air while still maintaining indoor comfort through temperature and relative humidity.

The purpose of this communication is to provide an update on the current condition of the School District's HVAC systems and the steps and investment the School District is taking to ensure that the air quality within each of the buildings is safe for all faculty, staff and students.

## Residential vs. Commercial HVAC Units

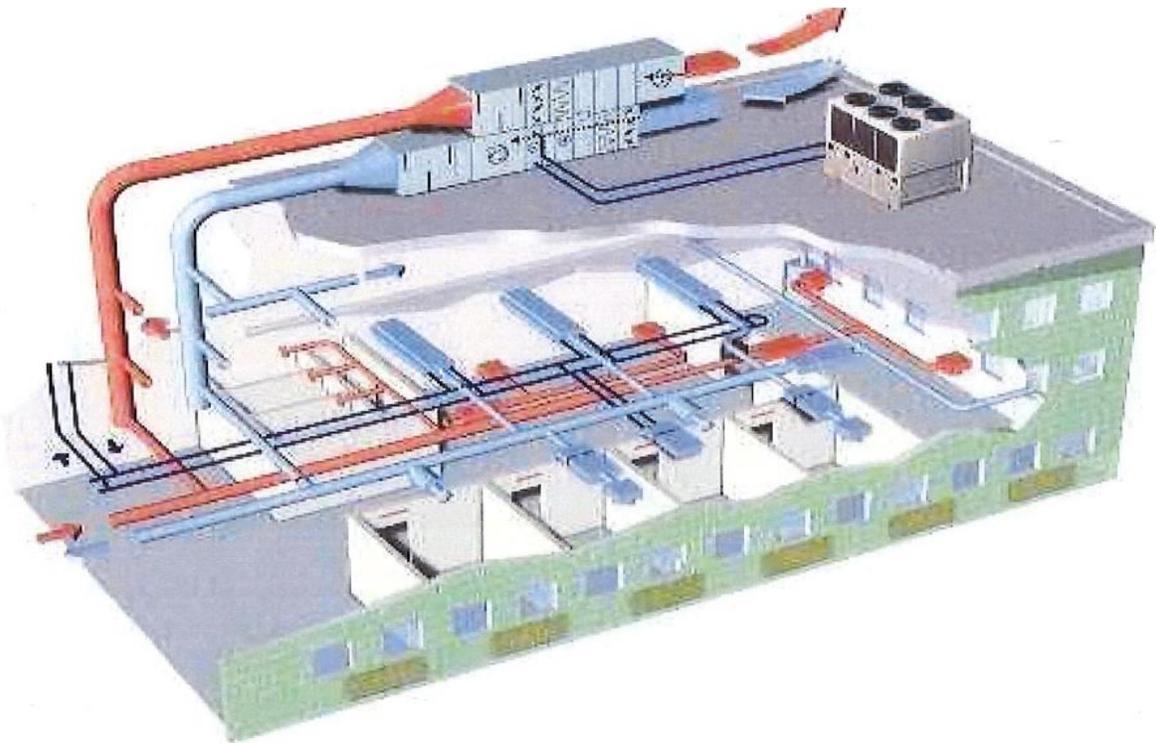
It is important to note that there is a major difference between residential and commercial HVAC systems. A simple diagram of a residential system is presented



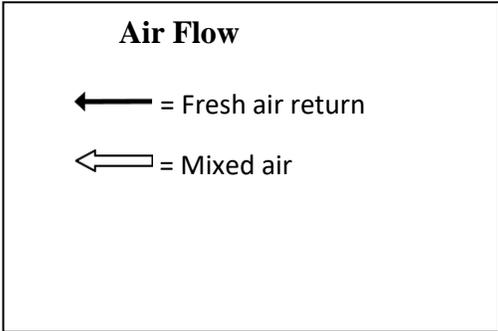
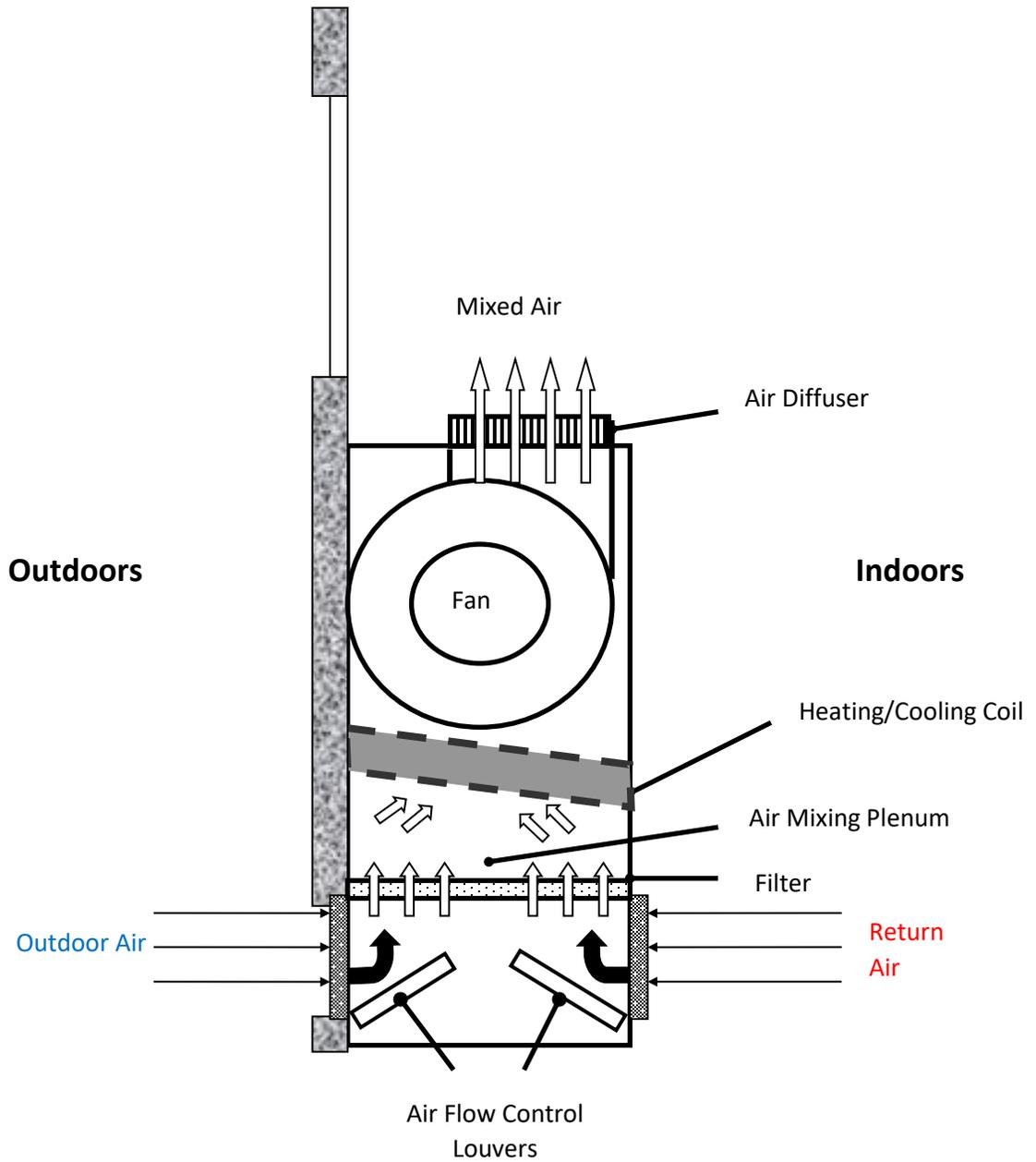
Whether your furnace is located in the basement or rooftop, the principal is the same. The furnace or air conditioner (depending on the season) blows hot or cold air throughout the house and into each room from one central location. Each room also has a return vent which leads back to the furnace and keeps recirculating throughout

the entire home. In a residential system, the same air is recirculated over and over again. Which means that particles or droplets, not captured by a filter, could be circulated throughout your house via the HVAC system.

Commercial HVAC systems do not work in the same way. In these systems, there is a constant flow of fresh filtered outdoor air coming into the building at all times, and (depending on the system) there is an established amount of return air recirculating throughout the building. While there are many types of commercial systems, the one pictured below shows a common commercial HVAC system. Many of our classrooms do not share their return air, keeping each area's return air isolated to a specific room and the return air is not circulated throughout the building in the same way as a residential system. As seen here, the supply air (blue) and return air (red) are separate and do not recirculate. This limits the transfer of particulates (germs) by the HVAC system to other areas in the school building.



**Many of our classrooms have Unit Ventilators (Univent)**



These units are self-contained in each learning space and have their own supply and return air flows built into them. They are able to heat the air independently from one another. Again, this means that there is almost no air exchange between classrooms. As each classroom space reaches its designated temperature, the outside air flow control louver opens up providing additional fresh air.

Our High School has a newer style ventilation system, similar to the commercial HVAC system depicted above, that not only heats the air in the winter months, but also provides cooling during warmer weather conditions. The High School has larger ventilation systems (air handlers) that bring in fresh outside air that is filtered then heated or cooled and sent throughout areas of the building. These air handlers supply tempered air to each individual classroom or area via variable air volume (VAV) ventilation systems. Prior to the VAV system disbursing the conditioned air into school spaces this air is passed through an additional filtration system.

The Middle School also has some areas of the building that are air conditioned and operate in a similar fashion to the High School HVAC system, as well as, classrooms that have unit ventilators. Our elementary school classrooms are equipped with unit ventilators.

## **COVID-19**

In order to combat the COVID-19 pandemic, the CDC has issued guidelines for commercial buildings. The first and foremost guideline is have as much fresh air coming into the building as possible. **All of our systems, regardless of building, are bringing in fresh filtered air to the classrooms.**

- The CDC states, “When weather conditions allow, increase fresh outdoor air by opening windows and doors. Do not open windows and doors if doing so poses a safety or health risk (e.g., risk of falling, triggering asthma symptoms) to children using the facility.” This directive follows CDC recommendations.

The systems in our district range from as little as 10% to as much as 100% outside air flow into school building areas. This range depends on the outside air temperature but at no point is there a time where outside air flow is totally restricted. Filtered fresh air is constantly being brought into all of our buildings. Where possible HVAC system operating parameters have been expanded to automatically adjust the outside air intake dampers to bring more fresh air into the buildings both during the school day and also during unoccupied hours.

## **Filters**

Just as our HVAC systems throughout the district vary, so do the filters systems that are able to be used within them. Systems are designed for specific filters. Restricting air flow or using a higher MERV (Minimum Efficiency Reporting Value) rated filter puts a great amount of pressure and stress on HVAC blower motors to deliver filtered outside air to building educational spaces. The school district uses rated filters for air handlers and VAV's based on manufacturer recommendations. To ensure improved air filtration through our HVAC systems the school district has doubled scheduled filter replacement within these systems.