



## Energy Efficient Indoor Air Quality (IAQ) Analysis

LaBella Associates

Preliminary Findings Report #2

August 27, 2020

### A) Summary of Progress to Date

As of August 27<sup>th</sup>, work plans for all (8) sites have been submitted and approved. The table below outlines a summary of approved sites as well as the progress with site investigations and coordination with vendors.

Work Plan #	Client Name	Facility Name	City	Sector	Work Plan Approved	Kickoff Meeting	Utility Analysis	Review Industry Guidance	Review Site Drawings & Controls Sequences	Site Visits Underway	Identify Potential Measures	Estimated Report Completion Date
WP-01	NFTA	Buffalo Niagara International Airport	Buffalo	Airport	✓	✓	✓	✓	✓	✓	✓	Oct. 15
WP-02	City of Rochester	Blue Cross Arena	Rochester	Arena	✓	✓	✓	✓	✓	✓	✓	Oct. 1
WP-03	The Rosenblum Companies	100 Great Oaks	Albany	Office/ Medical	✓	✓	✓	✓	✓	✓	✓	Nov. 15
WP-04	NFTA	Metro Transportation Center	Buffalo	Offices/ Bus Station	✓	✓		✓	✓	✓	✓	Oct. 15
WP-05	City of Rochester	Rundel Library	Rochester	Library	✓	✓	✓	✓		✓		Dec. 1
WP-06	Webster CSD	Dewitt Road E.S.	Rochester	Primary School	✓			✓				Dec. 1
WP-07	OGS	299 Old Niskayuna	Albany	Office	✓	✓	✓	✓	✓	✓		Nov. 15
WP-08	North Tonawanda CSD	NT Middle School	Buffalo	Middle School	✓		✓	✓				Dec. 1

Note: cumulative report is anticipated to be submitted for review at the same time as the latest individual site report.

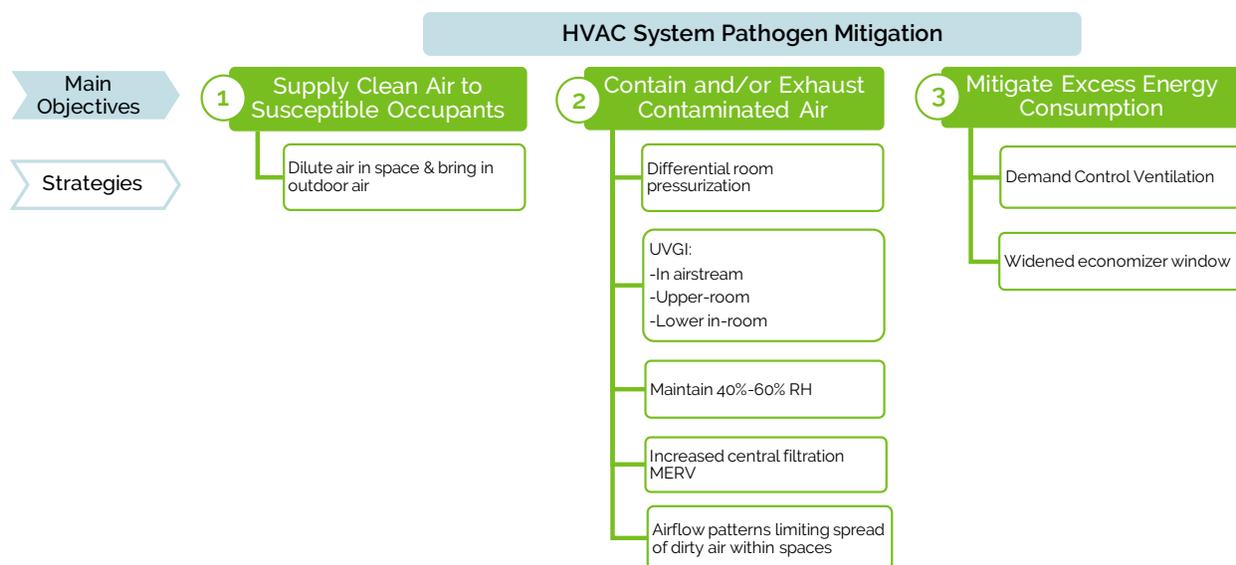
As indicated on the graph below, all approved sites have commenced with data collection. Site visits have commenced with 5 of the 8 sites listed above, with coordination with AHU vendors on available technologies and equipment selection information.

LaBella has been in contact with several vendors regarding information on current filtration and UVGI products that are compatible with on-site air handling units. Potential options for additional filtration and UVGI products are in the process of being selected and priced-out.

LaBella has pending kickoff meetings at Dewitt Road Elementary School and North Tonawanda Middle School with subsequent site investigations. Once the site visits are completed, the appropriate vendors will be contacted to determine what measures are feasible in the facility.

## B) Study Findings to Date

A thorough review of ASHRAE safe-operation measures has been conducted. The chart below indicates the main objectives of the HVAC system within its role in mitigating the spread of pathogens, as well as strategies that can be used to achieve these goals.



Based on a variety of site conditions, the strategies outlined above are narrowed down to specific recommendations that will enable the safest operation conditions. In addition to mitigating the spread of pathogens, additional energy conservation strategies are being evaluated, where feasible.

The following table outlines a summary of the recommended measures on a site-by-site basis. Factors limiting the implementation of certain ASHRAE-recommended measures are stated as well as alternate approaches to help mitigate the spread of pathogens.

Additional pathogen mitigation measures and energy conservation measures may be recommended as the evaluation of their feasibility with equipment vendors progresses. It is important to note that the measures listed below are not yet finalized and are subject to change based on feasibility and building safety.

Measures >>	Increased OA Ventilation	UVGI	Increased Filtration	Energy Conservation Opportunities	Current Ventilation	Current Filtration	Current UVGI	# AHUs
Sites 								
<b>BNIA Terminal</b>	Increased OA ventilation is recommended, as limited by current cooling coil capacities for all units.	1) Recommended UVGI inside large Mammoth AHUs. Smaller units do not have sufficient space for UVGI.  2) Upper-room UVGI for the terminal space is being evaluated for feasibility in spaces where in-duct UVGI is not available.	All units currently have MERV-15 filters. No additional filtration is recommended based on current industry guidance.	1) Replacement of DX cooling coils to centralized chilled water system will allow for reduced maintenance, energy cost savings, and the capacity to allow for additional OA ventilation and space for UVGI.  2) Re-introduction of demand control ventilation/ reduced ventilation during unoccupied hours. Feasibility of current ability to maintain temperature setpoints is being evaluated.	Initial trend logs indicate OA dampers are 20% open during occupied hours. More clarification on the current amount of OA ventilation will be available after attaining remainder of trend logs.	MERV-15 throughout	None	32
<b>NFTA MTC</b>	Increased OA ventilation is recommended. Amount of OA intake will be limited by either cooling coil capacity or ability to meet indoor air setpoints. This has yet to be determined.	1) All AHUs in the facility have opportunity for UVGI next to cooling coil. Potential issues with exposure to wires and obstructions within (2) units may need to be resolved before UVGI is installed.  2) Alternate locations of UVGI in upper-space of bus terminal may be considered if UVGI inside air stream is not feasible for (2) units.	1) Facility is currently using MERV-8 filters and is in the process of upgrading to MERV-11. The air handling units do not currently have the capability of handling beyond MERV-11 filters.  2) Feasibility of pre-filtration or fan upgrades to accommodate increased filtration has yet to be determined	1) Replacing the existing air-cooled chiller, which is nearing the end of it's useful life, may present an opportunity for increased cooling capacity- which will increase the potential for increased OA ventilation.  2) Destratification fans in the bus station terminal may present an opportunity for improved HVAC performance, which will allow more opportunity for OA ventilation.  3) Sealing ductwork in the catwalk above the bus terminals will result in increased HVAC system efficiency- which will result in energy savings as well as reduced limitations on OA intake.	Code-min	MERV-8, upgrading to MERV-11	None	7
<b>Blue Cross Arena</b>	1) Additional OA intake is recommended for AHU-12. Using CO2 sensors throughout will help increase OA intake as the building occupancy increases beyond the original design for 4,500 occupants.  2) Repairing low-temperature cutoff alarms in AHU-14 and AHU-20 will reduce the amount of return air brought into the space and allow for more OA intake.  3) Repairing operating sequences of the suite fan coil units and AHUs supplying fresh air to them will allow the units to supply fresh air instead of the current 100% recirculated air	Recommended UVGI inside AHUs in cooling coil sections - all units.	Feasibility of increased filtration has yet to be evaluated.	Repairing low-temperature cutoff alarms in AHU-14 and AHU-20 will reduce the amount of return air brought into the space and allow for more OA intake.	Code-minimum. Economizer is used when OA is between 45 and 65 deg F.	MERV-8	None	26
<b>Webster CSD - Dewitt Road Elementary</b>	More information required before site-specific recommendations are made.	More information required before site-specific recommendations are made.	More information required before site-specific recommendations are made.	More information required before site-specific recommendations are made.	More information required.	More information required.	More information required.	More information required.
<b>299 Niskayuna</b>	Current OA intake is being overridden in order to satisfy the humidity control issue in the building. Upgraded controls sequencing and CO2 sensors in spaces is being investigated in order to increase OA ventilation as well as maintain humidity in space below required threshold.	1) Coil-mounted UVGI is not possible due to limited space and accessibility to units for maintenance.  2) In-duct UVGI and upper-room UVGI for the warehouse space is currently being evaluated for feasibility and effectiveness.	Owner is currently in process of upgrading to MERV-13 filters. Higher-rated filters are not recommended due to pressure drop issues in the units.	Incorporating an economizer function into the air handling units will allow for significant savings as well as increased outdoor air ventilation.	Units are controlled by combination of CO2 sensors and standard economizer controls. Some units do not currently bring in OA into the space.	MERV-8, upgrading to MERV-13	None	28
<b>100 Great Oaks</b>	The existing units ventilate outdoor air based on CO2 levels in the building. Their unit's ability to incorporate additional ventilation has yet to be determined and will depend on either the cooling coil capacity or unit's ability to meet space setpoints.	There is very limited space in AHUs for UVGI. Installing UVGI in return ducts is a possible solution that will be investigated further in upcoming site visits.	There is currently a 2' filter rack in the AHUs. The feasibility of upgrading to higher-rated MERV filters has yet to be determined and will be restricted by the unit's fan power on a unit-by-unit basis.	More information is required in upcoming site visits before site-specific recommendations are made.	Unit ventilation is controlled by CO2 sensors within space.	MERV-8	None	10
<b>NT Intermediate School</b>	More information required before site-specific recommendations are made.	More information required before site-specific recommendations are made.	More information required before site-specific recommendations are made.	More information required before site-specific recommendations are made.	More information required.	More information required.	More information required.	More information required.
<b>COR Library</b>	More information required before site-specific recommendations are made.	More information required before site-specific recommendations are made.	More information required before site-specific recommendations are made.	More information required before site-specific recommendations are made.	Yet to be determined.	Likely MERV-8. Waiting on documentation.	None	2

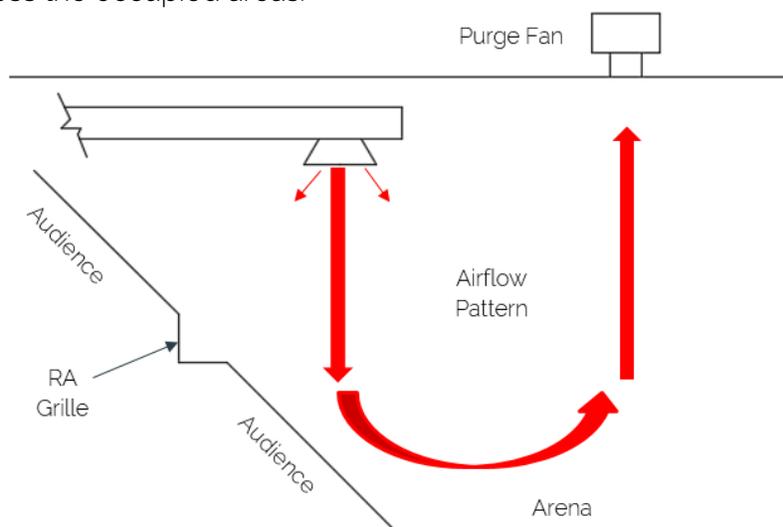
### C) Lessons Learned/ Barriers Encountered

Common Barriers Encountered: Not all AHUs have sufficient submittal data and/or balancing reports. Vendors have been able to furnish most of the requested data from original selection records. In addition, some smaller AHUs do not have limited access to controls and have no way of monitoring pressure drop across the unit without additional instrumentation.

Some notable items encountered in buildings are listed below:

- Multiple AHUs at a site have return air intake located in a separate area from where it serves. This creates an issue with potentially spreading contaminated air from one zone to another.
- Humidification for multiple AHUs have been disconnected – limiting the ability for the building to control humidity within the space to acceptable levels.

An alternate solution that was discovered involves re-purposing purge fans at the Blue Cross Arena to draw potentially contaminated air away from occupants, as opposed to the current strategy of exhausting air in the seated area of the grandstands. The sketch below illustrates how the purge fans on the roof can help direct the airflow away from occupants instead of drawing air across the occupied areas.



### D) Proposed Work Plan Adjustments

N/A

### E) Next Steps

- Finish kick-off meetings for all sites & finish gathering information from facilities and vendors
- Continue site visits with surveys of existing mechanical systems & controls
- Finalize measures to be evaluated at each facility with vendor input and pricing
- Perform energy calculations & feasibility analyses