Thomas P Koch
Mayor

Paul J Hines
Commissioner

City of Quincy
Public Buildings Department

To: Mayor Thomas P. Koch, Superintendent Kevin W. Mulvey, J.D.

From: David Scott – Mechanical Engineer

August 30, 2021

RE: Ventilation Update – Quincy Public School Buildings

Executive Summary

This update outlines ventilation related efforts only and excludes the numerous school renovation, upgrade, and repair efforts not specifically initiated to improve ventilation. Following the extensive ventilation efforts conducted during the 2020-2021 school year, the focus this school year is preventative maintenance and continued improvement. The on-going ventilation efforts include testing, repairing, reprogramming, ordering/purchasing, coordinating, calculating, designing, installing, and maintaining across a broad portfolio of buildings and building systems. Most of the ventilation work this year has been performed by the in-house staff.

School-wide Efforts

- **Exhaust Fans –** Equipped with the 2020-2021 exhaust fan survey information, the team reviewed the operation of each exhaust fan this summer. Each fan was serviced or is in the process of being serviced. Many fans were serviced by lubricating bearings and replacing fan belts. Several of the fans required more significant repairs such as the replacement of motors, motor starters, bearings, and wiring components. Several of the fans were beyond repair and required replacement. As a result of COVID19, there is a shortage of replacement exhaust fans and lead times are long. To overcome this we have purchased through multiple supply sources and utilized a specialty shop to perform complete rebuilding of existing fan assemblies with solid chassis. Some of the more significant repairs are outlined in the school-by-school listing below.
- **Classroom Unit Ventilators –** As part of the summer custodial activities, the ventilation fan motors are tested in all classroom unit ventilators. All inoperative ventilation fans

are identified and submitted to repair through the work order system. Several unit ventilator repairs are ongoing.

- **Energy Recovery Ventilators (ERVs) –** The ERVs were tested to ensure supply and exhaust fans were operating properly to introduce outdoor air and exhaust stale air from the building. Any deficiencies with these fan systems were identified and flagged for repair.
- **Building Control Systems -** Modern control systems equipped with demand control ventilation were adjusted to reduce the level of CO2 required before ventilation increases occurred. This adjustment results in an increase in ventilation rates at all times and not only when CO2 levels increase. This change was implemented for the 2020-2021 school year and will remain in place for the 2021-2022 school year.
- **Building Control System -** Modern control systems responsible for scheduling equipment operation were adjusted to operate ventilation equipment 2 hours before school begins until 2 hours after school ends. This change was implemented for the 2020-2021 school year and will remain in place for the 2021-2022 school year.
- **Air Filters -** A city-wide air filter order was placed for MERV 11 1" filters and MERV 13 2" filters for the 2020-2021 school year. These filters were received and installed in each unit. This summer a review of the filter stock and equipment needs was performed and the 2021-2022 filter order was placed. Each building is currently stocked with the appropriate air filters to meet the need until the new stock order is received.
- **Medical Waiting Rooms** - Negative pressure exhaust fan systems were installed in each of the medical waiting rooms in each school during the 2020-2021 school year. These units are designed to prevent air from migrating from the waiting rooms to adjacent spaces. These units remain in place for the 2021-2022 school year.
- **Portable Air Purifiers (Nurse) -** Portable filtration/air cleaning units were purchased and installed in Nurse's office during the 2020-2021 school year. These units provide HEPA filtration and UV disinfection. Replacement filters and UV lamps have been purchased/received and are scheduled for installation w/o 8/30/21. This is a proactive move as none of the UV lamps have been reported to have failed and none of the units have halted operation due to a restricted filter.
- **Portable Air Purifiers (Classrooms and Small Spaces) –** 60 Classroom-sized and 25 Small Space portable filtration/air cleaning units were purchased and installed in spaces identified without windows and used by multiple individuals. These units provide HEPA filtration and are equipped with ether UV or ion disinfection technology.

School-specific Efforts

Atherton Hough

- 10 new operable windows were installed in November of 2020 in ground floor instructional spaces. To further improve the ventilation of this ground floor area, a new exhaust fan system was installed.
- New acoustical tile ceilings were installed in the newly renovated girls and boys bathrooms. New ceiling-mounted exhaust registers and ducting was installed to complete the upgraded exhaust system.

Beechwood

- Increased several exhaust system flow rates through mechanical adjustment.
- Replaced 1 unit ventilator controller.
- Ordered 1 new air conditioning unit, installation will occur upon delivery.
- Replaced 1 air conditioning unit fan assembly.
- Ordered 1 new replacement Unit ventilator heating coil which is due to arrive w/o 8/30/21. It will be installed prior to heating season.
- Several unit ventilator heating valves are planned for replacement; this will occur prior to the heating season.

Bernazzanni

- Ordered 1 new replacement roof top fan to replace a failed unit. Delivery is scheduled for w/o 8/30/21; installation will immediately follow.

Clifford Marshall

- Programming changes to the chilled and hot water systems were implemented to improve reliability.
- 1 replacement motor was ordered for the Cafeteria air conditioning system; installation will immediately follow delivery.
- 1 unit ventilator fan assembly is currently being rebuilt; installation is scheduled for w/o 8/30/21.

ECC

- Designed and installed 1 new exhaust system including a new roof penetration, fan, and ductwork to improve the ventilation of the ground level classroom area. Final connections are scheduled to be completed prior to 9/8/21.
- Removed and cleaned several exhaust registers to increase air flow.
- Installed 2 replacement exhaust fan motors.

Lincoln Hancock

- In October and November of 2020 an HVAC restoration and new system installation project was completed. This project included the restoration of 2 air handling units responsible for heating and ventilating the top floor common area learning space. These units are now equipped with modern controls and dynamic ventilation. Additionally, a new 10-Ton roof top heating, cooling, and ventilation unit was installed to replace a non-existent unit. This system now provides improved ventilation, with the addition of air conditioning, to the office area and the adjacent common area learning space. The installation of this unit required structural and roofing modifications along with custom ductwork.
- The pool locker room renovation project included all new heating and ventilation for the spaces associated with the pool space and also the 2 ground floor classroom spaces. These classrooms were also fitted with new air conditioning systems.
- Cleaned several ground level outdoor air intake screens to increase air flow rates to unit ventilators.
- Added door stop to prevent door from covering exhaust register.

Merrymount

- Completed the installation of 1 new Energy Recover Ventilator unit to ventilate the new basement restroom and new classroom space. The installation included all new ductwork. This unit serves 2 newly created spaces that were formally storage rooms.
- Completed a major internal cleaning of a large air handling unit responsible for heating and ventilating the gymnasium and multiple classroom spaces. System air flow rates were restored to appropriate levels.
- Repaired mounting system of 1 roof top fan assembly.

Montclair

- Installed 4 new operable windows in new ground floor small group classroom and custodial office spaces. The window installation incorporated 4 new intake and exhaust louvers to allow for the permanent connection of the newly installed Energy Recovery Ventilators. These louvers allow for the intake of fresh air and exhausting of stale air from the newly renovated ground floor spaces. As part of this ground floor renovation, all new spaces were provided with individually controlled heating zones.
- Performed a mechanical overhaul of the large, central exhaust fan responsible for exhausting air from many spaces throughout the building. This work was performed to increase reliability and performance.
- Identified 1 exhaust system damper in the closed position, adjusted to allow appropriate flow rate.

Parker

- A test of a solar-powered, roof-mounted, exhaust fan was completed with favorable results. This effort is part of a project to convert a natural draft ventilation system to a forced ventilation system. Already conducted was a survey of the existing system along

with the current ventilation needs. The project is now moving from the design and testing phase to the next phase of specifying, measuring, and ordering. The project is anticipated to be completed prior to the winter season.

Snug Harbor

- Installed 1 replacement exhaust fan.
- The exhaust fan preventative maintenance efforts are underway and expected to be completed prior to 9/8/21

Squantum

- The exhaust systems for 8 classrooms were converted from natural-draft to fan-forced ventilation. This required the installation of 8 new roof-top fans, sound attenuating ductwork, and ceiling registers.

Wollaston

- During the late fall/early winter of 2020 the first and second floor ventilation systems was significantly modified to improve the volume and distribution of air throughout the spaces. To achieve this, 2 existing exhaust fans were replaced with larger units and 2 existing units were modified to increase volume flow rates. New ductwork and exhaust registers were added to provide significantly increased core ventilation. New transfer louvers were installed between 13 individual rooms and the core space. This system now allows for fresh air to enter through the classroom unit ventilators and exit reliably and effectively through the reconfigured exhaust system.
- Completed Energy Recovery Ventilation ductwork modifications to coincide with the replacement of ground floor water piping and ceiling replacements.

Atlantic Middle

- Installed 2 new replacement roof top fans. Wiring is scheduled for w/o 8/30/21
- Replacement of the partially failed office area HVAC system has been completed. This is a 3 zone system and serves the Principal's office, the office staff area, and the visitor area. This system is primarily used to provide air conditioning but is also capable of heating.
- The complete replacement of the domestic water heating plant is underway. This effort is to replace aging equipment and to increase reliability. Although this is not related to ventilation it is important for sanitation.

Broad Meadows Middle

- This building has undergone the first phase of a major mechanical and electrical upgrade. The new systems provide improved reliability and storm resiliency. Phase 1 includes all building spaces to the right of the main entrance. The renovated spaces are equipped with energy recovery ventilators and demand control ventilation.

- The new system in the gymnasium provides excellent ventilation but proved to be too loud especially last year when the space was re-purposed into instruction space. A sound mitigation engineering firm has been engaged to assist the team with solutions. Temporary noise reduction control strategies are in place until a permanent solution is adopted and implemented.
- The Auditorium renovation is currently underway. This space will receive new sound attenuating ductwork to deliver heating, cooling, and ventilation from the newly installed roof top energy recovery ventilator.
- Identified 2 exhaust system dampers in the closed position, adjusted to allow appropriate flow rates.

Central Middle

- No significant work was required at this building; all efforts were focused on preventative maintenance.

Point Webster Middle

- Large, replacement intake/exhaust hoods were installed on the chimney-type, exterior ventilation shafts. The existing hoods had deteriorated and were in danger of dislodging. These hoods allow for the fresh air intake and exhausting of the auditorium air.
- Minor repairs and service performed to all make up air units responsible from delivering 100% outdoor air to spaces throughout the building.

Southwest Middle

- No significant work was required at this building; all efforts were focused on preventative maintenance.
- 2 factory-originated issues were identified in Roof Top Unit #4. 1 issue which affected its ability to provide full air flow rates has been resolved. The 2nd issue affects the amount of air conditioning it can provide. This issue is in the process of being resolved.

North Quincy High

- 1 roof top exhaust fan has been rebuilt. 1 exhaust fan is planned for a complete overhaul but remains in operation until parts can be sourced.
- 1 unit ventilator fan assembly has been rebuilt.
- Factory-originated issues with the new roof top chillers have been identified and are in the process of being resolved. It is anticipated the system will be at a reduced capacity for the start of school, however; temporary modifications to the control system programming should all but eliminate any noticeable reduction in building air conditioning.

Quincy High

- During the 2020-2021 school year several heating coil leaks were identified in several roof top Energy Recovery Ventilators. Upon further investigation, we discovered evidence of leaking in almost all of the coils. The coils with significant leaks had to be valved-off which prevented these units from heating the associated zones adequately during winter months. After determining the coils could not be repaired, 22 replacement heating coils were ordered, fabricated, and delivered. 20 of the coils were replaced this summer; 2 coils were backordered. The last 2 coils are expected to be delivered and installed in October. The water/glycol charge in the hydronic loop will be adjusted (topped-off) prior to the heating season.
- A fan assembly in 1 of the Energy Recovery Ventilators failed. Replacement components are on order, however; the manufacturer has not yet provided a delivery date. The repair will occur immediately following the delivery of the parts.
- The exhaust fan preventative maintenance efforts are underway and expected to be completed by the second week of September.

Goals

- Improvements to the fresh air control system of 1 roof top unit are underway. This change is to increase the fresh air delivery rate beyond the standard rate associated with the unit. These modifications are planned to be in place by 9/8/21.

The In-House Team

David Scott – Energy Technician, Mechanical Engineer

Bryan Dunn – HVAC Technician, Facilities Engineer

Paul Mason – HVAC Technician

Walter Pienkos, Eddie Davis, Steve Salvatore – Electricians

Daniel Bythrow, Brad Smith, Scott McDonald – Maintenance

Jonathan Wilbur, Vinnie Contrino, Pat Stedman, Terry Driscoll, Peter Coletti – Carpenters

Tony Maldero, Bill Gamel – Plumbers

Sean Martin, Kenny Bedrosian, Jack Luizzo, Mike Mulvey, Dennis Murray - Painters

Paul J. Hines – Commissioner of Public Buildings

Kevin Murphy – Director of Plant Facilities

Susan Stille and Fiona Durkin – Administrative

Walter Macdonald – Director of Building Maintenance

Gary Cunniff – Director or Engineering

Shelly Dein – Energy and Sustainability Director

Mike Monahan, Don Martin, Tom Galvan – Project Management

Ryan Adduci – Facilities Engineering Intern