



City of Quincy
Public Buildings Department

Thomas P Koch
Mayor

Paul J Hines
Commissioner

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

From: David Scott – Mechanical Engineer

September 9, 2020 – UPDATED 9/15/20

RE: Ventilation Update – Quincy Public School Buildings

Executive Summary

This update outlines ventilation efforts only and excludes the numerous school renovation, upgrade, and repair efforts not specifically initiated to improve ventilation. The ventilation efforts include testing, repairing, reprogramming, ordering/purchasing, coordinating, calculating, designing, installing, and maintaining across a broad portfolio of buildings and building systems. Field surveys and correction efforts have been compiled and summarized in this document. The work has been performed by a team of in-house staff, outside contractors, suppliers, and consultants. This team has worked tirelessly to prepare our schools for the return of students and staff.

School-wide Efforts

- An exhaust fan survey process was initiated to confirm operation of exhaust fans and to identify and correct those not operating properly. These repairs and associated service ranged from lubrication of bearings, replacement of fan belts, adjustment of belt tension, replacement of electrical junction boxes and disconnect switches, replacement of fan motors, repair of dampers, replacement of failed damper actuators, damper adjustments, replacement of control relays and motor starters, replacement of control timing devices, and complete replacement of exhaust fan assemblies. Each exhaust fan equipped with timing control was tested for proper operation. Exhaust fans without timing control were wired to operate constantly or via local switch.
- Ventilation fan motor testing in all classroom unit ventilators. Every unit ventilator was tested to ensure the fan operated properly to allow the introduction of outdoor air into the building. All inoperative ventilation fans were documented and flagged for repair.

- All windows were checked for operability. All operable windows identified as inoperative were documented and flagged for repair.
- Energy Recovery Ventilators (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 to repair
- 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.
- 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.
- Following the proactive service and repair of the building ventilation systems, each building complies with its ventilation code requirement. Although there is no required air exchange rate, all school buildings generally exchange air at a rate of 2.3/hr (1 exchange every 26 minutes) or greater.
- A city-wide air filter order has been placed for MERV 11 1" filters and MERV 13 2" filters. The lead time for these filters is 8 weeks.
- Exhaust fan systems have been designed and equipment has been ordered to provide negative pressure in each designated isolation room. These systems will be fabricated and installed using in-house personnel. **These fans have delivered and fabrication has begun.**
- Portable filtration/air cleaning units have been ordered for each Nurse's office.

School-specific Efforts

Atherton Hough

- Ordered 10 new operable windows for ground floor instructional spaces.
- Surveyed 6 exhaust fans
- Exhaust Fan Repairs - 1 damper adjusted
- Installed 1 new roof-top exhaust fan assembly, damper, and all new ductwork. Unit is dedicated to serve the newly renovated 1st and 2nd floor boy's restrooms. The existing restroom exhaust fan was re-ducted to be dedicated to the newly renovated 1st and 2nd floor girl's restrooms.
- Surveyed 18 unit ventilators, all ventilation fans operate
- Adjusted outdoor air damper for multi-zone, outdoor air unit to provide more outdoor air.
- **Recently completed:** Auditorium exhaust fan motor starter has been repaired.

Beechwood

- Surveyed 12 exhaust fans
- Exhaust Fan Repairs - 1 electrical junction box and switch replaced, 2 fan motors replaced, 2 fans re-wired, 1 freeze-stat replaced, 1 operating thermostat replaced.
- Surveyed 22 unit ventilators, all ventilation fans operate.
- **Recently completed:** Updated control logic for gymnasium air handler and exhaust fan; this is an enhancement to an already functional system.

Bernazzanni

- Surveyed 11 exhaust fans
- Exhaust Fan Repairs - 2 bearing sets lubricated, 2 fan belts replaced, 1 belt adjusted.
- Replaced 1 exhaust fan assembly serving the restrooms in the addition
- Replaced large heating and ventilation unit serving the gymnasium to increase heating capacity and ventilation rates.
- Surveyed 18 unit ventilators, all ventilation fans operate
- **Recently completed:** New fire alarm duct smoke detectors installed and air balancing adjustments to the new gym air handling unit and the new restroom exhaust fan have been completed.

Clifford Marshall

- Surveyed 10 exhaust fans
- Exhaust Fan Repairs - 2 belts adjusted, 1 motor overload device replaced.
- Demand control ventilation has been disabled; this allows for constant ventilation of all ventilation equipment.
- Surveyed 39 unit ventilators, all ventilation fans operate

- **Recently completed:** Units responsible for ventilation have been re-scheduled for 2-hour pre and post occupancy purge of the building.

ECC

- Exhaust Fan Repairs (prior to completion of survey) -2 fan belts replaced
- Surveyed 16 unit ventilators, all ventilation fans operate
- Complete building HVAC renovation plans are at 90% status.
- **Recently completed:** Completed survey of exhaust fans. Replaced 3 motors, rebuilt 1 fan assembly, repaired 1 motor starter, replaced 1 switch, and reset 1 motor overload device.
- **Work in progress:** 2 replacement fan motors have been ordered and have longer lead times than most motors. The fans associated with the replacement motors do not serve instructional spaces.

Lincoln Hancock

- Surveyed 10 exhaust fans
- Exhaust Fan Repairs - 1 control timing device was repaired
- 2 exhaust fan assemblies were replaced.
- Surveyed 26 unit ventilators, 24 ventilation fans operate
- Unit ventilator repairs: 1 fan assembly has been removed and sent to repair shop, 1 unit has been identified with a control problem.
- Installed new supply and exhaust ventilation ductwork for 2 new classroom spaces built on the ground floor.
- Pool-related Renovations – Include new HVAC equipment for 2 ground floor classrooms
- **Recently completed:** Re-installed 1 rebuilt unit ventilator fan assembly and repaired 1 unit ventilator control problem. Performed additional preventative maintenance on 4 operational fans which required cutting-off all existing deteriorated fasteners and replacing with new.

Merrymount

- Surveyed 12 exhaust fans
- Exhaust Fan Repairs – 1 fan requires further electrical troubleshooting. 3 fans were identified as having terminal electrical issues and require complete replacement. Of the 3 fans, 1 has been replaced and 2 have been ordered.
- Surveyed 16 unit ventilators, all ventilation fans operate
- **Work in progress:** Installation of 1 new ERV unit to ventilate new basement restroom and new classroom space. This installation will include all new ductwork. The new ERV delivered on 9/15/20; installation is scheduled to begin immediately. This unit serves 2 newly created spaces that were formally storage rooms.
- **Recently completed:** 2 replacement exhaust fans were installed along with new vibration eliminators and noise reduction duct couplings; fans are scheduled for electrical connection on 9/15/20.

Montclair

- Surveyed 8 exhaust fans
- Exhaust Fan Repairs - 2 bearing sets lubricated, 1 fan belt replaced, 1 fan motor replaced, 1 damper actuator and mechanism replaced, 1 fan disassembled and cleaned.
- Installed 2 new ERVs to ventilate 2 ground floor renovated classrooms, a small group classroom, and a custodial office. This installation includes all new ductwork.
- Ordered 4 new operable windows for ground floor small group classroom and custodial office.
- Restored operation of Gymnasium heating and ventilation system. This required a new electrical feed, new service disconnects, new outdoor air damper actuators, new mixed air damper actuators, control wirings, and programming adjustments.
- Installed 1 new exhaust fan assembly to serve ground floor restrooms previously relying on natural draft ventilation
- Replaced a failed controller and restored operation of Room 23 unit ventilator. Installed supply and exhaust distribution ductwork for 2 newly renovated classrooms.
- Surveyed 22 unit ventilators, all ventilation fans operate
- **Recently completed:** Final duct connections of ground floor ERVs.

Parker

- 3 Exhaust fans surveyed
- Ex Fans - 1 fan belt replaced
- 1 Main Air Handling unit with 2 exhaust/return fans serving multiple rooms surveyed and operating properly
- Surveyed 20 unit ventilators, all ventilation fans operate

Snug Harbor

- Surveyed 12 exhaust fans
- Exhaust fan repairs - 8 bearing sets lubricated, 8 fan belts replaced, 2 electrical junction boxes re-wired, 2 fan motors replaced, 1 damper repaired, 1 control timing device replaced.
- Replaced 2 exhaust fans with new exhaust fan assemblies serving classrooms and restrooms, fabricated new ductwork connections, installed sound deadening duct wrap, repaired restroom exhaust ductwork.
- Surveyed 29 unit ventilators, 27 ventilation fans operate
- Unit ventilator repairs: Replaced 1 fan belt and reconnected 1 fan motor. All unit ventilator ventilation fans now operate.

Squantum

- Surveyed 16 exhaust fans
- Exhaust fan repairs - 4 fan belts replaced, 1 electrical issue resolved
- 1 Exhaust fan assembly replaced

- Surveyed 24 unit ventilators, 21 ventilation fans operate
- Unit ventilator repairs: Replaced failed freeze stat devices in 2 units (was preventing ventilation fans from operating), 1 unit requires further electrical troubleshooting.
- Work in progress: Further troubleshooting of 1 unit ventilator fan electrical circuit

Wollaston

- Surveyed 6 exhaust fans
- Ex Fans - 3 bearing sets lubricated, 2 fan belts replaced, 1 overload device reset.
- Re-ducted 4 existing ERV units following the replacement of the ground floor ceiling systems. These units serve the balance of the ground floor instructional spaces
- Surveyed 18 unit ventilators, 12 ventilation fans operate
- Unit ventilator repairs: Reconnected 1 fan motor, reset 1 control transformer
- **Recently completed:** Repairs to 4 unit ventilators, installation of 1 new ERV unit to ventilate ground floor classroom; this installation includes all new ductwork.

Atlantic Middle

- 31 Exhaust fans were surveyed
- Ex Fans – 19 fan belts have been ordered, 3 fan motors have been identified for replacement, 1 has been identified as an electrical problem.
- Surveyed 36 unit ventilators, 33 ventilation fans operate.
- **Recently completed:** 2 of 3 unit ventilators have been repaired, 1 unit ventilator requires a replacement motor which has been ordered and scheduled for delivery 9/15/20; installation will be performed immediately following delivery. Exhaust Fans: 19 fan belts replaced, 2 of 3 motors have been replaced, 1 new motor starter has been installed, and 3 new exhaust fan assemblies have been installed. The last exhaust fan to be repaired serves a non-instruction space. Upon attempting the repair, it was determined a complete fan assembly replacement would be more appropriate; replacement to be ordered 9/15/20.

Broad Meadows Middle

- The exhaust fan survey began on 9/8/20 and is scheduled to be complete on 9/9/20. Repairs begin during the survey and will continue until complete.
- This building is undergoing a major mechanical and electrical upgrade. Phase 1 is nearing completion and includes all building spaces to the right of the main entrance. The renovated phase is equipped with energy recovery ventilators and demand control ventilation. Once commissioned, these systems will be adjusted for pre and post occupancy purge and the demand control ventilation will be disabled. Phase 2 remains existing (see repairs listed below)
- Surveyed 38 unit ventilators, all ventilation fans operate.
- **Recently completed:** The exhaust fan survey has been completed. 14 exhaust fans were surveyed, 5 fan belts were replaced, and electrical repairs began on 9/15/20.

Central Middle

- Surveyed 15 Exhaust fans
- Ex Fans - 7 bearing sets lubricated, 7 fan belts replaced
- **Recently completed:** Demand control ventilation has been disabled; this allows for constant ventilation of all ventilation equipment. Units responsible for ventilation have been scheduled for a 2-hour pre and post occupancy purge of the building.

Point Webster Middle

- Surveyed 19 Exhaust fans
- Ex Fans - 9 fan belts replaced, 2 failed fuses replaced, 3 fan motors replaced
- Replaced existing building management controllers/programs on 4 make-up outdoor air units. These units provide 100% outdoor air ventilation and the existing legacy controllers were not capable of custom adjustments.
- Units responsible for ventilation have been scheduled for pre and post occupancy purge of the building.
- Demand control ventilation has been disabled. This allows for constant ventilation.
- Surveyed 36 unit ventilators, 35 ventilation fans operate
- **Recently completed:** 1 unit ventilator has been repaired. 1 fan belt replaced on a make-up air unit shortly after the controller replacement.

Southwest Middle

- Surveyed 10 Exhaust fans
- Ex Fans – No immediate repairs were required; however, service will be scheduled following the completion of service in older buildings.
- **Recently completed:** Demand control ventilation been disabled; this allows for constant ventilation of all ventilation equipment. Units responsible for ventilation have been scheduled for a 2-hour pre and post occupancy purge of the building.

North Quincy High

- 19 Exhaust fans surveyed
- Ex Fans - 5 fan belts replaced, 5 belts adjusted, 8 electrical junction boxes/switches replaced, 4 fan motors replaced, 1 control relay/starter replaced. 3 motor starters and overload devices have been ordered and are due to arrive w/o 9/8/20
- All air 20 air handling units were surveyed for proper operation of outdoor and exhaust air dampers. Several dampers were identified as needing adjustment.
- Surveyed 90 unit ventilators, 87 ventilation fans operate.
- **Recently completed:** 3 unit ventilators have been repaired. Demand control ventilation has been disabled; this allows for constant ventilation of all ventilation equipment. Units responsible for ventilation have been scheduled for a 2-hour pre and post occupancy purge of the building. Dampers requiring adjustment have been adjusted.

- **Work in progress:** Installation of 3 exhaust fan starters, motor starters are experiencing long lead times. 2 of the 3 fans serve areas outside the areas planned for occupancy. Repairs are scheduled immediately following the delivery of the components. If repair components are not received in the next 2 days, a temporary repair will be initiated for the 1 fan serving as general exhaust.

Quincy High

- 38 Exhaust fans were surveyed
- Ex Fans - 27 fan belts replaced, 3 fan motors have been ordered to replace failed motors.
- Reprogrammed all large roof top units to provide 30-40% outdoor air vs design level of 10%. This percentage will likely need to be reduced toward the design level as the winter weather sets in this will be addressed as conditions dictate.
- ERV Reprogramming - Reprogrammed energy recovery units to provide maximum exhaust fan speeds (increased over speeds set during air balancing), building pressure will be evaluated during this process.
- ERV Repairs - Replaced 1 variable frequency drive, replaced 1 energy recovery wheel motor, replaced 3 failed fuses, resolved variable frequency drive error codes, and tightened 1 exhaust fan belt.
- Units responsible for ventilation have been scheduled for pre and post occupancy purge of the building.
- **Work in progress:** 3 replacement fan motors have been ordered but have longer lead times than typical motors; these fans are small and do not serve instructional spaces.

Goals

- Ventilation survey is underway.

The Team

David Scott – Energy Technician, Mechanical Engineer, City of Quincy

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