



City of Quincy Public Buildings Department

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CO2 Sampling Report, Phase 2 – Quincy Public School Buildings

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Phase 1 – Sampling Results and Response

On October 15th the Department of Public Buildings issued a CO2 sampling report which showed Phase 1 (Pre-Kindergarten through Grade 4 and children with high needs hybrid) CO2 levels in occupied spaces inside all 20 QPS school buildings. Approximately 280 rooms were identified as occupied throughout all schools. No rooms measured 700ppm beyond the local outdoor air CO2 level. 6 rooms sampled in the 800-1000 range. 12 rooms sampled in the 700s. All remaining rooms were under 700ppm.

When current day school buildings are designed with CO2 monitoring and controls, the systems are programmed to begin responding to CO2 levels reaching 800ppm. At this point, the mechanical system begins to increase the volume flow rate of outdoor air. The system continues to increase this flow rate until it delivers the maximum designed outdoor air flow rate at space CO2 levels of 1000ppm. This CO2 response is all in an effort to maintain the space at levels below (700+Outdoor Air) ppm or approximately 1150ppm. Generally, this response reverses the upward trend of CO2 levels and the space levels reduce to below 800ppm at which time the mechanical system returns to normal operation.

Using the measured CO2 levels, we prioritized our efforts and visited each of the 18 spaces identified as exhibiting 700ppm total or higher. Listed below are our findings and subsequent modifications, repairs, upgrades, and progress.

ECC

- Increased hours of operation of gymnasium air handling unit and associated exhaust fans.
- Exhaust registers and dampers were found to be fouled, cleaned.
- 2 exhaust fans were identified to be upgraded to increase exhaust flow rates, new fans ordered.
- Ductwork required to improve exhaust distribution has been ordered.

Parker

- Building uses both forced ventilation and gravity ventilation, pursuing a conversion of gravity to forced system. Design calculations underway. Application-specific exhaust fan on order for test. Goal of ordering additional units to complete the conversion.

Lincoln Hancock

- Identified unit ventilator functioning unreliably due to failing switch; repaired.
- Identified outdoor air louver restriction due to fouled insect screen. Replaced screen with more appropriate screen not susceptible to future fouling. Applied repair to 4 ground level rooms exhibiting the same condition
- Coordinated with custodial staff to relocate bookcase restricting exhaust air flow.

Wollaston

- Determined large exhaust fan was operating unreliably due to marginally sized overload device; upgraded device.
- Adjusted unit ventilator fans from low to medium speed.
- Determined building exhaust air flow is not well distributed. Performed design calculations, ordered equipment and material. Installed 15 transfer registers, installed 2 large exhaust ducts to reroute exhaust air flow, installed 2 exhaust registers in existing ductwork, and replaced 2 roof top fans to increase exhaust flow rates.

Atherton Hough

- Determined classroom exhaust damper was closed; opened damper. Determined associated exhaust fan not performing as designed; ordered and installed new roof-top fan.
- Adjusted unit ventilator fan from low to medium speed.

Snug Harbor

- Identified 4 unit ventilators turned off; 3 of 4 turned on. Replaced motor in 4th unit.
- Determined flow through field-constructed exhaust register was inadequate; installed replacement register.

Goals

- Identified a failed economizer sensor in 1 roof top unit; replaced sensor.
- Adjusted minimum level of outdoor air delivered by 2nd roof top unit up to its maximum.
- Located several abandoned volume dampers restricting classroom air flow; adjusted open.
- Fabricated and installed additional exhaust registers in classroom hallways.
- Installed transfer register in room without.

Broad Meadows

- Determined 2 roof top exhaust fans will not operate reliably despite repairs; ordered and installed 2 new fans.

Squantum

- Building uses both forced ventilation and gravity ventilation. Pursuing conversion of gravity to forced system. Ordered 8 new exhaust fans. Fabricated and installed 8 ventilation shaft adapters. Installation and wiring of fans underway.

In addition to the efforts prompted by the results of the CO2 sampling, we made several ventilation improvements. The more substantial efforts are listed below:

Atherton Hough - Replaced 6 failing damper actuators responsible for automatically regulating outdoor and exhaust air delivery to/from multiple rooms. Retrofitted outdoor air damper actuator for main air handler.

Snug Harbor – Replaced several air handler control devices responsible for automatically regulating outdoor air delivery to multiple rooms.

Lincoln Hancock – Installed new heating/cooling roof top unit to serve office area and first floor building core. Rebuilt and retrofitted new controls on 2 air handling units serving the 2nd floor building core. Replaced kitchen hood exhaust fan; existing fan inadequate.

Phase 2 – Sampling Results

During the weeks of November 9 and 16th we performed CO2 sampling in all 20 school buildings. This period of sampling captured Phase 2 of the Hybrid Model. There were 351 rooms identified as occupied and subsequently sampled. One room measured 700ppm beyond the local outdoor air CO2 level. 8 rooms sampled in the 800-1100 range. 18 rooms sampled in the 700s. All remaining rooms were under 700ppm.

Immediately following the sampling at Atherton Hough, the QPS SLT was notified of the high reading. We recommended relocating the staff member and students to a larger space while we investigated and implemented a remedy. The SLT relayed this to the school level. In the days following the sampling, the new windows that were on order had delivered and were installed. The room now has an operable window to provide ventilation directly to the space.

Similar to the process followed after Phase 1 sampling, we began the process of evaluating the identified buildings/spaces for any new system failures or areas for improvement. To date we have made the following repairs/upgrades:

Montclair – Installed 4 new windows in ground level instructional spaces

Atherton Hough – Installed 10 new windows in basement level spaces. Design underway for a new exhaust system serving the basement.

Beechwood – Identified 1 exhaust fan with electrical problem, repair underway. Adjustments to several exhaust fan flow rates underway.

Squantum and Parker – Ventilation conversion efforts continue from Phase 1.

Broad Meadows – Identified closed dampers within exhaust ductwork, opened.

Lincoln Hancock – Note: The replacement of louver screens was completed a day or two after the Phase 2 sampling occurred at this school.