# INDOOR AIR QUALITY
# PRE-OCCUPANCY ASSESSMENT

**Holyoke Community College at**
**Holyoke Transportation Center**
**206 Maple Street**
**Holyoke, Massachusetts**

Prepared by:
Massachusetts Department of Public Health
Bureau of Environmental Health
Indoor Air Quality Program
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## Background/Introduction

In response to a request from Ms. Lisa Verrochi, Project Manager, Office of Leasing, Division of Capital Asset Management (DCAM), the Massachusetts Department of Public Health (MDPH), Bureau of Environmental Health (BEH), conducted a pre-occupancy air quality assessment at the Holyoke Community College (HCC) offices and classrooms located at the Holyoke Transportation Center (HTC), 206 Maple Street, Holyoke, Massachusetts. This preliminary assessment was done to assess indoor environmental conditions of space leased by Massachusetts state agencies and educational institutions. On August 26, 2010, a visit to conduct an indoor air quality assessment was made by Lisa Hébert, Environmental Analyst/Regional Inspector of BEH's Indoor Air Quality (IAQ) Program. Ms. Hébert was accompanied by Mr. Michael Cichonski, Director of Engineering Services, HCC.

The HTC is a four-story brick building which previously served as the headquarters of the Holyoke Fire Department. The renovations to the building, while extensive, have remained within the original footprint of the building. The HTC is a multi-modal facility which contains a waiting area for customers of an adjacent bus stop (now under construction) as well as a currently vacant storefront on the first floor. A Head Start Program will reportedly occupy the second floor and HCC will occupy the entire third and fourth floors with a mix of office and classroom space. For the purpose of this assessment, only areas under the exclusive control of HCC were evaluated. The building has openable windows.

## Methods

BEH staff performed a visual assessment of the HCC space for potential environmental and indoor air quality issues including an assessment of building materials for water damage

and/or microbial growth.

## Results

HCC has an employee population ranging from 12 to 15 staff planned for occupancy of this space. The student population is expected to range from 75 to 125 daily.

## Discussion

### Ventilation

Each of the two floors planned for occupancy by HCC has a separate air-handling unit (AHU) located on the roof. Fresh air is drawn into the AHU through vents located within the unit. It is then heated or cooled and delivered to occupied areas through ceiling-mounted supply diffusers via ductwork (Picture 1). Return air is drawn through ceiling mounted exhaust vents into ducts that are connected to the rooftop AHUs (Picture 2). BEH/IAQ staff noted that the exhaust vents for the AHUs were located directly below the fresh air intakes (Picture 3). This close configuration of intake and exhaust vents can lead to the capture of exhaust air by the fresh air intake (called entrainment) under certain weather conditions. BEH staff was informed that a shield to direct the exhaust away from the fresh air intakes had already been requested, and would be fabricated and installed. The completion of this adjustment had been added to the final punch list by HCC staff.

### Microbial/Moisture Concerns

No water damage and/or microbial growth was noted during the occupancy assessment. However, BEH staff did observe conditions that, if left unattended, could result in water

penetration of the building envelope and subsequent water damage and/or microbial growth to surfaces within the building.

On the roof, organic material and debris from the installation of the membrane roof was observed to be obstructing a portion of a roof drain (Picture 4). It was evident by the accumulation of silt around the perimeter of the drain that this condition had caused water to accumulate for a period of time at this location. Over time, given conditions of freezing and thawing, the accumulation of standing water can contribute to the deterioration of the roof membrane. With time, and under these conditions, water penetration will occur.

Open utility holes were observed in exterior masonry (Picture 5). While the majority of utility holes were properly sealed on the interior of the building, a few remained to be completed. If not properly sealed, these conditions can provide a means of water penetration through the building envelope.

**Other Indoor Air Evaluations**

A parking area for the bus station was observed under construction (Pictures 6 and 7). Despite the distance between the bus bays and the AHUs at their rooftop location, the possibility exists for fumes emanating from idling buses to become captured by fresh air intakes on the AHUs,. Therefore, it is important to consider limiting the time that buses idle at the station. The Massachusetts Anti-Idling Law (MGL, 1986) prohibits the unnecessary operation of a motor engine in excess of five minutes. Consideration should be given to installing signage at the bus bays to reinforce this message to the operators of these vehicles.

Carpeting has been installed in some areas for space to be occupied by HCC staff. Consider cleaning carpeting annually (or semi-annually in soiled high traffic areas) as per the

recommendations of the Institute of Inspection, Cleaning and Restoration Certification (IICRC, 2005).

Since HCC contains two custodial sinks as well as floor drains in bathroom areas, routine inspection of these fixtures should be done to avoid dry drain traps which can occur when fixtures are infrequently utilized. The purpose of a drain trap is to prevent sewer gases and odors from entering the occupied space. When water is poured into a trap, an air tight seal is created by the water in the U-bend section of the pipe. These drains must have water poured into them to maintain the integrity of the seal. Without water, the drain opens the room to the drainage system and odors can occur. If routine examination of these fixtures results in the identification of dry drains, pouring water into the drain on a routine basis will eliminate sewer gas from entering the building.

Finally, the type of filters installed in rooftop AHUs provide minimal filtration of respirable dusts (Picture 8). In order to decrease aerosolized particulates, disposable filters with an increased dust spot efficiency can be installed. The dust spot efficiency is the ability of a filter to remove particulates of a certain diameter from air passing through the filter. Filters that have been determined by ASHRAE to meet its standard for a dust spot efficiency of a minimum of 40 percent (Minimum Efficiency Reporting Value equal to 9) would be sufficient to reduce many airborne particulates (Thornburg, 2000; MEHRC, 1997; ASHRAE, 1992). Note that increasing filtration can reduce airflow (called pressure drop), which can subsequently reduce the efficiency of the unit due to increased resistance. Prior to any increase of filtration, each AHU should be evaluated by a ventilation engineer to ascertain whether it can maintain function with more efficient filters.

## Conclusions/Recommendations

In view of the findings at the time of the visit, the following recommendations are made:

1. Ensure exhaust vents on AHUs are reconfigured so they are not located directly below fresh air intakes.
2. Routinely inspect roof drains and clear perimeter of any obstructions.
3. Seal holes in exterior masonry.
4. Seal remaining open utility holes on the interior of the building.
5. In order to eliminate fumes, particulate and carbon monoxide from entering the building, consider providing signs in bus bays to remind vehicle operators of Massachusetts anti-idling laws.
6. Consider cleaning carpeting annually (or semi-annually in soiled high traffic areas).
7. Routinely inspect custodial sinks and floor drains. Pour water into drains as necessary.
8. Consider increasing the dust-spot efficiency of HVAC filters. Prior to any increase of filtration, each piece of air handling equipment should be evaluated by a ventilation engineer as to whether it can maintain function with more efficient filters.
9. Since it was reported that the possibility exists that HCC could potentially occupy the vacant space on the first floor in the future, the following guidelines should be followed with respect to any renovations conducted in an occupied building:

**Recommendations related to Ongoing Renovations**

1. Use the procedures outlined in the most current edition of the "IAQ Guidelines for Occupied Buildings Under Construction" published by the Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA) to prevent building

occupant exposure to dusts, gases, fumes, and other pollutants created during renovations/construction (SMACNA, 1995). Also included as Appendix A is MDPH guidance "Methods Used to Reduce/Prevent Exposure to Construction/Renovation Generated Pollutants in Occupied Buildings". The MDPH has prepared this guidance document in order to prevent/reduce the migration of renovation-generated pollutants into occupied areas.

2. Building occupants should be aware of construction activities, which may be conducted in close proximity to their work areas. Establish communications between all parties involved with building renovations to prevent potential IAQ problems. Develop a forum for occupants to express concerns about renovations as well as a program to resolve IAQ issues.

3. Develop a notification system for building occupants immediately adjacent to construction activities to report construction/renovation related odors and/or dusts problems to the building administrator. Have these concerns relayed to the contractor in a manner to allow for a timely remediation of the problem.

4. When possible, schedule projects which produce large amounts of dusts, odors and emissions during unoccupied periods or periods of low occupancy.

5. Disseminate scheduling itinerary to all affected parties, this can be done in the form of meetings, newsletters or weekly bulletins.

6. Obtain Material Safety Data Sheets (MSDS) for all construction materials used during renovations and keep them in an area that is accessible to all individuals during periods of building operations as required by the Massachusetts Right-To-Know Act (MGL, 1983).

7. Consult MSDS' for any material applied to the effected area during renovation(s) including any sealant, carpet adhesive, tile mastic, flooring and/or roofing materials. Provide proper ventilation and allow sufficient curing time as per the manufacturer's instructions concerning these materials.

8. Use *local exhaust ventilation and isolation techniques* to control for renovation pollutants. Precautions should be taken to avoid the re-entrainment of these materials into the building's HVAC system. The design of each system must be assessed to determine how it may be impacted by renovation activities. Specific HVAC protection requirements pertain to the return, central filtration and supply components of the ventilation system. This may entail shutting down systems (when possible) during periods of heavy construction and demolition, ensuring systems are isolated from contaminated environments, sealing ventilation openings with plastic and utilizing filters with a higher dust spot efficiency where needed (SMACNA, 1995).

9. Seal utility holes, spaces in roof decking and temporary walls to eliminate pollutant paths of migration.

10. Seal construction barriers with polyethylene plastic and duct tape to create a secondary barrier to prevent migration of renovation generated pollutants into occupied areas. These barriers should be inspected regularly to ensure integrity.

11. If possible, relocate susceptible persons and those with pre-existing medical conditions (e.g., hypersensitivity, asthma) away from areas of renovations.

12. Implement prudent housekeeping and work site practices to minimize exposure to renovation pollutants. This may include constructing barriers, sealing off areas and temporarily relocating furniture and supplies. To control for dusts, a high efficiency

particulate air filter (HEPA) equipped vacuum cleaner in conjunction with wet wiping of all surfaces is recommended.

13. Consider changing HVAC system filters more regularly in areas impacted by renovation activities. Examine the feasibility of acquiring more efficient filters for these units.

14. Continue working with the construction contractor and consultant to monitor indoor air quality.

## References

IICRC. 2005. Carpet Cleaning FAQ 4 Institute of Inspection, Cleaning and Restoration Certification. Institute of Inspection Cleaning and Restoration, Vancouver, WA.

MGL. 1983. Hazardous Substances Disclosure by Employers. Massachusetts General Laws. M.G.L. c. 111F.

MGL. 1986. Stopped motor vehicles; Operation of Engine; Time Limit; Penalty. Massachusetts General Laws. M.G.L. c. 90:16A.

SMACNA. 1995. IAQ Guidelines for Occupied Buildings Under Construction. 1st ed. Sheet Metal and Air Conditioning Contractors' National Association, Inc., Chantilly, VA.

**Picture 1**

**Ceiling-Mounted Fresh Air Diffuser**

**Picture 2**

**Ceiling-Mounted Exhaust Vent**

**Picture 3**

**Rooftop AHU, Note Close Proximity of Exhaust Vent to Fresh Air Intake**

**Picture 4**

**Accumulation of Debris and Silt Around Roof Drain**

**Picture 5**

**Holes in Masonry**

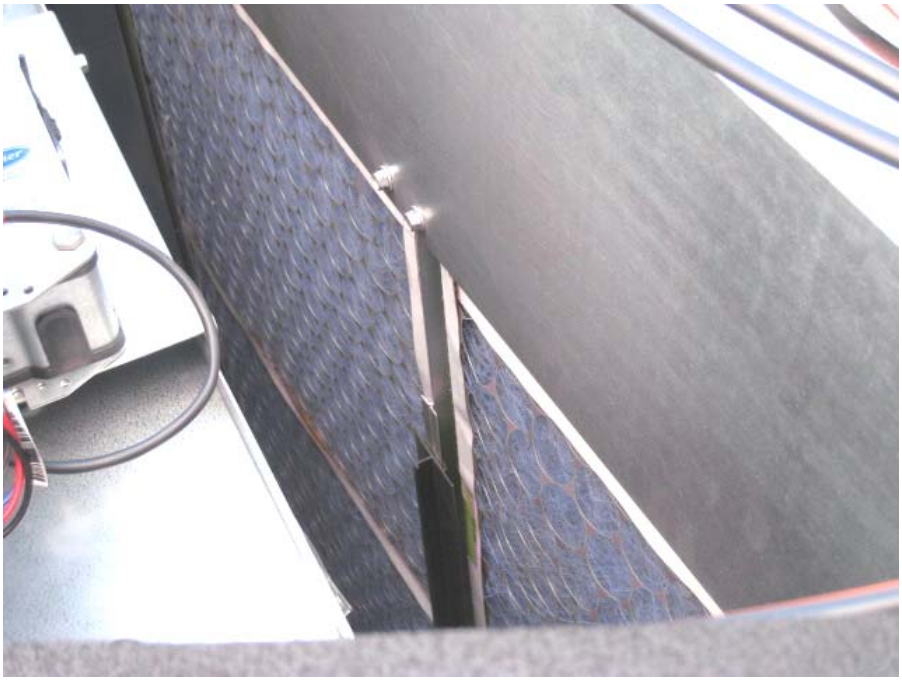
**Picture 6**


**Bus Bays Under Construction**

**Picture 7**

**Note Proximity of Bus Bays (Arrow) to Building**

**Picture 8**



**Fibrous Mesh Filters Installed in Rooftop AHUs**