**INDOOR AIR QUALITY ASSESSMENT**

**Committee for Public Council Services**

**35 Congress Street**

**Salem, Massachusetts**



Prepared by:

Massachusetts Department of Public Health

Bureau of Environmental Health

Indoor Air Quality Program

November 2018

# Background

|  |  |
| --- | --- |
| Building: | Committee for Public Council Services (CPCS) |
| Address: | 35 Congress Street Salem, MA |
| DCAMM Project Manager: | Virginia Platt, Project Manager, Division of Capital Asset Management and Maintenance (DCAMM) |
| Reason for Request: | Post-occupancy assessment |
| Date of Assessment: | November 9, 2018 |
| Massachusetts Department of Public Health/Bureau of Environmental Health (MDPH/BEH) Staff Conducting Assessment: | Jason Dustin, Environmental Analyst/Inspector, Indoor Air Quality (IAQ) Program |
| Building Description: | The CPCS space is located in a building constructed in the mid-1800s as a large commercial textile factory. The space has been completely renovated. The space is composed of private offices, open work areas, and conference rooms. Most areas have carpet tiles and dropped ceiling tiles. |
| Windows: | Some windows are openable. |

# Methods

Please refer to the IAQ Manual for methods, sampling procedures, and interpretation of results (MDPH, 2015).

# Results

The following is a summary of indoor air testing results (Table 1).

* ***Carbon dioxide levels*** were below the MDPH guideline of 800 parts per million (ppm) in the majority of areas assessed.
* ***Temperature*** was within or just below the MDPH recommended range of 70°F to 78°F in all areas.
* ***Relative humidity*** was slightly below the MDPH recommended range of 40% to 60% in all areas as is typical during the heating season in the Northeast.
* ***Carbon monoxide*** levels were non-detectable (ND) in all indoor areas assessed.
* ***Fine particulate matter (PM2.5)*** concentrations measured were below the National Ambient Air Quality Standard (NAAQS) level of 35 micrograms per cubic meter (μg/m3) in all occupied areas.

# Discussion

## Ventilation

A heating, ventilating, and air conditioning (HVAC) system has several functions. First it provides heating and, if equipped, cooling. Second, it is a source of fresh air. Finally, an HVAC system will dilute and remove normally occurring indoor environmental pollutants by not only introducing fresh air, but by filtering the airstream and ejecting stale air to the outdoors via exhaust ventilation. Even if an HVAC system is operating as designed, point sources of respiratory irritation may exist and cause symptoms in sensitive individuals.

The HVAC system in this space consists of large rooftop air handling units (AHUs) that draw in fresh air from intakes on the roof. Supply air is ducted to ceiling-mounted supply diffusers throughout the space. Return air is brought back to the AHUs through return vents.

To maximize air exchange, the MDPH recommends that both supply and exhaust ventilation operate continuously during periods of occupancy. In order to have proper ventilation with a mechanical supply and exhaust system, the systems must be balanced to provide an adequate amount of fresh air to the interior of a room while removing stale air from the room. It is recommended that HVAC systems be re-balanced every five years to ensure adequate air systems function (SMACNA, 1994). The HVAC system balancing was completed prior to this assessment.

The thermostat fan settings for the AHUs should be inspected to ensure they are set to “Fan On” rather than “Auto”. This is especially important during temperate weather in spring and fall where heating or cooling may not be called for frequently. Intermittent fresh air supply will likely increase occupant complaints regarding IAQ.

A few offices were noted to have supply vents only. Doors appeared to be slightly undercut to allow for some exhausting of stale air.

## Microbial/Moisture Concerns

No water-damaged building materials or musty odors were noted during this assessment.

## Other Conditions

Hand sanitizers, scented cleaning products, and air fresheners were noted in some areas of the office space. These products can cause irritation of the eyes, nose, and respiratory system of some people.

Most flooring is covered with carpet tile. The Institute of Inspection, Cleaning and Restoration Certification (IICRC), recommends that carpeting be cleaned annually (or semi-annually in soiled high traffic areas) (IICRC, 2012).

Some occupants expressed concerns with discomfort due to cooler temperatures. A large number of people had personal heaters running in their offices. Most areas were on the lower end (or below) of the comfort recommendations.

The majority of gaps around utilities pipes and openings appeared to be sealed very well. However, one area near C305 was noted to have a large gap in the ceiling tiles around a support column (Picture 1). This may serve as a pathway for odors, moisture, and particulates to travel from unconditioned areas.

# Conclusions/Recommendations

Based on the observations made during the visit, the following is recommended:

1. Operate the HVAC system to provide for continuous fresh air ventilation during occupied hours. Inspect all thermostats to ensure that they are set for “fan on” instead of the “auto” setting.
2. Reduce or eliminate the use of scented cleaners, hand sanitizers, and personal air fresheners.
3. Seal large gap around support column and ceiling tiles near C305.
4. Regularly vacuum carpeting with a HEPA-filtered vacuum cleaner. Clean carpeting at least once per year according to IICRC recommendations (IICRC 2012).
5. Continue to change filters for HVAC equipment 2-4 times a year. Continue to use pleated filters of MERV 8 (or higher), which are adequate in filtering out pollen and mold spores (ASHRAE, 2012), if these can be used with current equipment.
6. Consider raising the temperature settings of all thermostats to increase occupant comfort and reduce the need for personal heaters in the space. Consider adjusting the start time of occupied temperatures to better reflect the early work hours of this space and ensure it is warmed up prior to occupant arrival.
7. If complaints arise from occupants in offices with supply only ventilation, consider installing passive vents in the door or wall until permanent return vents can be installed.
8. Consider adopting a balancing schedule of every 5 years for all mechanical ventilation systems, as recommended by ventilation industrial standards (SMACNA, 1994).
9. Refer to resource manuals and other related IAQ documents for further building-wide evaluations and advice on maintaining public buildings. Copies of these materials are located on the MDPH’s website: <http://mass.gov/dph/iaq>.

# References

ASHRAE. 2012. American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) Standard 52.2-2012 -- Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size (ANSI Approved).

IICRC. 2012. Institute of Inspection Cleaning and Restoration Certification. Institute of Inspection, Cleaning and Restoration Certification. Carpet Cleaning: FAQ. Retrieved from <https://www.iicrc.org/general/custom.asp?page=SANSIIICRCS100>.

MDPH. 2015. Massachusetts Department of Public Health. “Indoor Air Quality Manual: Chapters I-III”. Available at: <http://www.mass.gov/eohhs/gov/departments/dph/programs/environmental-health/exposure-topics/iaq/iaq-manual/>.

SMACNA. 1994. HVAC Systems Commissioning Manual. 1st ed. Sheet Metal and Air Conditioning Contractors’ National Association, Inc., Chantilly, VA.

**Picture 1**

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**Gaps around support column and ceiling tiles**

| **Location** | **Carbon****Dioxide****(ppm)** | **Carbon Monoxide****(ppm)** | **Temp****(°F)** | **Relative****Humidity****(%)** | **PM2.5****(µg/m**3**)** | **TVOCs****ppm** | **Occupants****in Room** | **Windows****Openable** | **Ventilation** | **Remarks** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Intake** | **Exhaust** |
| Background (outside) | 471 | ND  | 55 | 39 | 16 | ND | - | - | - | - | Windy, overcast |
| Reception | 583 | ND | 69 | 37 | 9 | ND | 3 | N | Y | Y | Carpet tiles |
| Interview C | 597 | ND | 70 | 37 | 9 | ND | 0 | N | Y | Y |  |
| Interview D | 587 | ND | 70 | 35 | 8 | ND | 0 | N | Y | Y |  |
| Interview A | 582 | ND | 70 | 36 | 6 | ND | 0 | N | Y | Y |  |
| Open cubes near C309 | 586 | ND | 70 | 35 | 7 | ND | 3 | Y | Y | Y |  |
| Open cubes near C305 | 552 | ND | 69 | 36 | 8 | ND | 2 | Y | Y | Y | Plants, gaps around pole |
| Wellness | 572 | ND | 69 | 36 | 4 | ND | 0 | Y | Y | Y |  |
| Suite 311 | 564 | ND | 69 | 37 | 3 | ND | 1 | N | Y | N |  |
| 312 | 566 | ND | 69 | 36 | 4 | ND | 0 | N | Y | N |  |
| 313 | 576 | ND | 68 | 37 | 6 | ND | 0 | N | Y | N |  |
| 315 | 560 | ND | 68 | 36 | 2 | ND | 0 | N | Y | Y |  |
| 314 | 565 | ND | 68 | 37 | 2 | ND | 0 | Y | Y | Y |  |
| 323 | 598 | ND | 68 | 37 | 3 | ND | 1 | Y | Y | Y |  |
| 322 | 645 | ND | 68 | 38 | 3 | ND | 1 | N | Y | Y |  |
| 324 | 663 | ND | 68 | 38 | 2 | ND | 0 | N | Y | Y |  |
| 327 | 607 | ND | 68 | 37 | 6 | ND | 0 | N | Y | Y | CPs |
| 325 | 637 | ND | 68 | 37 | 1 | ND | 1 | N | Y | Y |  |
| 326 | 649 | ND | 69 | 38 | 1 | ND | 0 | N | Y | Y | PH |
| 336 | 605 | ND | 70 | 37 | 2 | ND | 2 | N | Y | Y | PH |
| 335 | 580 | ND | 69 | 38 | 1 | ND | 1 | N | Y | Y |  |
| 337 | 619 | ND | 69 | 37 | 1 | ND | 0 | N | Y | Y |  |
| Hall C/D | 584 | ND | 69 | 38 | 3 | ND | 1 | Y | Y | Y | PC |
| 346 | 591 | ND | 68 | 37 | 1 | ND | 1 | Y | Y | Y | Plants, candle |
| 345 | 597 | ND | 68 | 37 | 2 | ND | 0 | N | Y | Y | HS |
| 349 | 565 | ND | 68 | 37 | 3 | ND | 0 | N | Y | Y |  |
| 338 | 617 | ND | 69 | 39 | 2 | ND | 1 | N | Y | Y | PH, AF |
| 347 | 832 | ND | 70 | 43 | 2 | ND | 2 | N | Y | Y | DEM, PH |
| 371 | 650 | ND | 69 | 37 | 3 | ND | 1 | Y | Y | Y | White noise device, plants |
| Alcove 105 | 620 | ND | 69 | 36 | 2 | ND | 0 | Y | Y | Y | Strong perfume odor |
| 357 | 634 | ND | 70 | 36 | 2 | ND | 1 | N | Y | Y | PH, cold complaint |
| 358 | 587 | ND | 69 | 36 | 2 | ND | 1 | N | Y | Y | DEM |
| 360 conference | 563 | ND | 69 | 36 | 3 | ND | 0 | Y | Y | Y | Media room |
| 363 break | 551 | ND | 69 | 36 | 2 | ND | 0 | N | Y | Y | Vinyl flooring |
| Conference | 540 | ND | 70 | 34 | 2 | ND | 0 | N | Y | Y |  |
| 354 | 571 | ND | 70 | 35 | 3 | ND | 0 | N | Y | Y | HS, DEM |
| 353 | 585 | ND | 70 | 35 | 4 | ND | 0 | N | Y | Y |  |
| 355 | 564 | ND | 69 | 35 | 3 | ND | 0 | N | Y | Y |  |
| 351 | 628 | ND | 69 | 36 | 2 | ND | 0 | N | Y | Y |  |
| 356 | 582 | ND | 69 | 35 | 3 | ND | 0 | N | Y | Y | Stored supplies |
| 350 | 617 | ND | 69 | 38 | 2 | ND | 1 | N | Y | Y | HS |
| 352 | 578 | ND | 69 | 36 | 4 | ND | 0 | N | Y | Y |  |
| 342 | 611 | ND | 69 | 36 | 3 | ND | 0 | N | Y | Y |  |
| 343 | 595 | ND | 69 | 36 | 4 | ND | 0 | N | Y | Y |  |
| 340 | 570 | ND | 69 | 35 | 3 | ND | 0 | N | Y | Y | Stored items |
| Break 339 | 631 | ND | 69 | 36 | 4 | ND | 0 | N | Y | Y |  |
| 344 | 616 | ND | 69 | 36 | 4 | ND | 0 | N | Y | Y |  |
| 331 | 591 | ND | 69 | 37 | 4 | ND | 0 | N | Y | Y |  |
| 333 | 604 | ND | 69 | 37 | 3 | ND | 0 | N | Y | Y | AI, PH |
| 329 | 642 | ND | 69 | 37 | 4 | ND | 0 | N | Y | Y | Stored items, non-ducted return |
| 334 | 648 | ND | 69 | 36 | 3 | ND | 0 | N | Y | Y |  |
| 328 | 720 | ND | 70 | 38 | 3 | ND | 1 | N | Y | Y | PH |
| 330 | 617 | ND | 70 | 36 | 3 | ND | 0 | N | Y | Y |  |
| 319 Break | 693 | ND | 70 | 36 | 4 | ND | 2 | N | Y | Y |  |
| 320 | 650 | ND | 70 | 36 | 4 | ND | 0 | N | Y | Y |  |
| 317 | 645 | ND | 70 | 35 | 3 | ND | 0 | N | Y | Y |  |
| 321 | 628 | ND | 70 | 35 | 4 | ND | 0 | N | Y | Y |  |
| 316 | 653 | ND | 70 | 36 | 4 | ND | 0 | N | Y | Y |  |
| 318 | 641 | ND | 70 | 36 | 4 | ND | 0 | N | Y | Y | AI, stored boxes, etc. |
| Inner reception office | 668 | ND | 71 | 36 | 3 | ND | 0 | N | Y | Y | HS |