**INDOOR AIR QUALITY ASSESSMENT**

**Post-Occupancy Assessment**

**Massachusetts Rehabilitation Commission &**

**Department of Developmental Services**

**55 Technology Drive**

**Lowell, Massachusetts**



Prepared by:

Massachusetts Department of Public Health

Bureau of Environmental Health

Indoor Air Quality Program

January 2018

# Background

|  |  |
| --- | --- |
| Building: | Massachusetts Rehabilitation Commission (MRC) & Department of Developmental Services (DDS) |
| Address: | 55 Technology Drive, Lowell, MA |
| DCAMM Project Manager: | Paul Burke, Senior Project Manager, Division of Capital Asset Management and Maintenance (DCAMM) |
| Reason for Request: | Post-occupancy assessment |
| Date of Assessment: | December 19, 2017 |
| 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 MRC/DDS space is located in a two-story brick building constructed in 1985. The space is composed of private offices, open work areas and conference rooms and houses approximately 65 people. Most areas have carpet tile and dropped ceiling tiles. |
| Windows: | Windows are not 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 or close to 800 parts per million (ppm) in all areas assessed.
* ***Temperature*** was within the recommended range of 70°F to 78°F in all areas.
* ***Relative humidity*** was below the 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 except one area.
* ***Total Volatile Organic Compounds (TVOCs)*** were ND in all 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 consists of large rooftop air handling units (AHUs) that draw in fresh air from intakes on the roof. The space utilizes variable air volume (VAV) boxes with ducted supply diffusers and a ceiling plenum return system.

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).

## Microbial/Moisture Concerns

No areas of active or historic water damage were noted in the office space.

Indoor plants were observed in some areas. Plants can be a source of pollen and mold, which can be respiratory irritants to some individuals. Plants should be properly maintained and equipped with drip pans and should be located away from air diffusers to prevent the aerosolization of dirt, pollen and mold.

## Other Conditions

As mentioned previously, one office area (#241) had PM 2.5 particulate levels slightly above 35 micrograms per cubic meter. This was attributed to the use of a personal humidifier with added fragrance. Aerosolized fragrances can have irritant effects in the respiratory system of some people.

Hand sanitizers and scented cleaning products were also noted in some areas. These products can also 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).

# Conclusions/Recommendations

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

1. Continue to operate the HVAC system to provide for continuous fresh air ventilation during occupied hours.
2. Reduce or eliminate the use of scented cleaners, hand sanitizers, personal air fresheners and humidifiers.
3. Properly maintain plants, including drip pans, to prevent water damage to porous materials. Plants should also be located away from air diffusers to prevent the aerosolization of dirt, pollen, and mold.
4. Clean carpeting at least once per year according to the IICRC.
5. Consider setting up a balancing schedule to have the HVAC system balanced every five years.
6. For buildings in New England, periods of low relative humidity during the winter are often unavoidable. Therefore, scrupulous cleaning practices should be adopted to minimize common indoor air contaminants whose irritant effects can be enhanced when the relative humidity is low. To control for dusts, a high efficiency particulate arrestance (HEPA) filter equipped vacuum cleaner in conjunction with wet wiping of all surfaces is recommended. Avoid the use of feather dusters. Drinking water during the day can help ease some symptoms associated with a dry environment (throat and sinus irritations).
7. 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

IICRC. 2012. Institute of Inspection Cleaning and Restoration Certification. Institute of Inspection, Cleaning and Restoration Certification. Carpet Cleaning: FAQ. Retrieved from <http://www.iicrc.org/consumers/care/carpet-cleaning>.

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.

| **Location** | **Carbon**  **Dioxide**  **(ppm)** | **Carbon Monoxide**  **(ppm)** | **Temp**  **(°F)** | **Relative**  **Humidity**  **(%)** | **PM2.5**  **(µg/m3)** | **TVOCs**  **(ppm)** | **Occupants**  **in Room** | **Windows**  **Openable** | **Ventilation** | | | **Remarks** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Intake** | **Exhaust** | |
| Background | 328 | ND | 44 | 37 | 31 | ND | - | - | - | | - | Overcast |
| Foyer | 682 | ND | 70 | 33 | 11 | ND | 4 | N | Y | | Y |  |
| 207 | 554 | ND | 70 | 24 | 9 | ND | 3 | N | Y | | Y |  |
| 208 | 575 | ND | 70 | 23 | 10 | ND | 2 | N | Y | | Y | NC |
| 209 | 557 | ND | 71 | 22 | 12 | ND | 1 | N | Y | | Y | Carpet tile |
| 210 | 564 | ND | 72 | 22 | 10 | ND | 2 | N | Y | | Y | Carpet tile |
| 206 | 669 | ND | 72 | 22 | 9 | ND | 3 | N | Y | | Y |  |
| 211 | 572 | ND | 71 | 21 | 11 | ND | 2 | N | Y | | Y |  |
| 212 | 583 | ND | 71 | 22 | 8 | ND | 2 | N | Y | | Y |  |
| 4 MRC | 620 | ND | 72 | 22 | 7 | ND | 1 | N | Y | | Y |  |
| 215 | 572 | ND | 72 | 21 | 11 | ND | 0 | N | Y | | Y |  |
| 218 Break room | 721 | ND | 72 | 21 | 12 | ND | 3 | N | Y | | Y |  |
| Reception | 811 | ND | 73 | 22 | 9 | ND | 4 | N | Y | | Y | CPs |
| Mail room | 744 | ND | 72 | 20 | 10 | ND | 2 | N | Y | | Y | CPs, HS, PC |
| 251 | 693 | ND | 73 | 20 | 16 | ND | 0 | N | Y | | Y | Carpet tile, plant |
| Open work area- front near 256 | 739 | ND | 73 | 20 | 11 | ND | 4 | N | Y | | Y | Carpet tile |
| Open work area- middle near 266 | 687 | ND | 73 | 20 | 14 | ND | 4 | N | Y | | Y | Carpet tile, HS, CP |
| Open work area- rear near 247 | 712 | ND | 73 | 20 | 10 | ND | 0 | N | Y | | Y |  |
| 638 | 647 | ND | 74 | 19 | 11 | ND | 3 | N | Y | | Y | Air freshener smell |
| 244 | 670 | ND | 73 | 20 | 9 | ND | 0 | N | Y | | Y |  |
| 243 | 653 | ND | 73 | 19 | 18 | ND | 0 | N | Y | | Y | CP, carpet tile |
| 286 | 672 | ND | 73 | 19 | 12 | ND | 2 | N | Y | | Y | Carpet tile |
| 242 | 762 | ND | 73 | 21 | 9 | ND | 1 | N | Y | | Y | HS, carpet |
| 241 | 682 | ND | 73 | 21 | 48 | ND | 1 | N | Y | | Y | Humidifier with fragrance |
| 240 | 657 | ND | 73 | 22 | 19 | ND | 0 | N | Y | | Y | Carpet tile, AI |
| 239 | 705 | ND | 73 | 22 | 12 | ND | 1 | N | Y | | Y | Carpet |
| 238 | 607 | ND | 72 | 20 | 10 | ND | 0 | N | Y | | Y | HS |
| 309 | 656 | ND | 72 | 22 | 7 | ND | 3 | N | Y | | Y | Carpet tile |
| 233 | 610 | ND | 72 | 22 | 8 | ND | 2 | N | Y | | Y | Plants, carpet, CPs |
| 232 | 585 | ND | 72 | 21 | 9 | ND | 0 | N | Y | | Y | Plant, AI |
| 234 | 572 | ND | 72 | 22 | 11 | ND | 0 | N | Y | | Y | Carpet |
| 231 | 576 | ND | 72 | 21 | 5 | ND | 0 | N | Y | | Y | Carpet |
| 229 | 617 | ND | 72 | 25 | 9 | ND | 1 | N | Y | | Y |  |
| 225 | 597 | ND | 72 | 21 | 7 | ND | 2 | N | Y | | Y | Local exhaust |