

## I. Overview

Infrastructure Ontario Property Services (IOPS) has developed a comprehensive Heating, Ventilation, and Air Conditioning (HVAC) survey of system capabilities for buildings currently occupied by the Ministry of the Attorney General (MAG). The survey was developed to assist MAG's transition during re-occupancy into the workplace due to the COVID-19 pandemic. The survey takes into account a report provided by ECOH Management Inc. (ECOH) titled 'Infection Control in Ontario Courthouses'. The ECOH report summarized recommendations, based on infection control practices relating to COVID-19 mitigation within workplaces specific to MAG staff members. The survey further incorporated additional information, in the form of a general HVAC questionnaire, provided by Public Services Health & Safety Association (PSHSA) from MAG to IOPS on June 12, 2020. Questions within the survey aim to reflect current building system conditions and capabilities at owned and leased buildings.

Through this approach to review and assess industry recommendations, IOPS provides the following summary of the building's ability and capability to meet recommended practices (the "Report"). This Report further summarizes our due diligence and preparations to ensure the HVAC systems are operating optimally and are continuously monitored.

## II. Current HVAC Standards and Procedures

IOPS continues to manage the MAG portfolio within owned and leased buildings according to applicable ASHRAE and industry standards and codes. Landlords are responsible to operate all buildings in accordance with their lease agreements and the applicable ASHRAE industry standards and codes.

Buildings are operated in accordance with the applicable standards outlined by the following:

1. Ontario Building Code;
2. American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE); and
3. Building Owners and Managers Association (BOMA) Canada.

With respect to COVID-19, IOPS will continue to monitor and respond to best practices from accredited organizations and make the necessary building operational adjustments, as practical and when required at owned buildings. IOPS will continue to work with landlords to incorporate identified best practices from accredited organizations.

### III. HVAC Survey Parameters

The results presented below were obtained through a comprehensive HVAC survey completed by IOPS field staff, IOPS sub contractors, Public-Private Partnership (P3) provider or third-party landlords. Surveys were sent to the appropriate building maintenance operator to complete the survey based on their knowledge of buildings. A full assessment of the entire MAG occupied premises was not completed at the time of the survey.

The survey sought to ascertain the HVAC conditions including, but not limited to the following: the current air filter rating, average carbon dioxide (CO<sub>2</sub>) levels (ventilation) within the buildings, relative humidity (RH), and other indoor air quality (IAQ) parameters. Measurements of these indoor air quality parameters were obtained through building automation systems (BAS) and field validation.

### IV. HVAC Survey Findings

A summary of key survey results are listed below:

#### *Air Filters*

- The building has air filter(s) with MERV-13.

#### *Humidity*

- Building operates between 40% and 60% RH during the cooling season.
- Further measures may be required to maintain 40% and 60% RH during the heating season.

#### *Ventilation*

- Current system does not have the ability to monitor CO<sub>2</sub>.
- Landlord has indicated the AHU schedule cannot be adjusted.
- The washroom exhaust fan schedule cannot be adjusted.

#### *Summary HVAC Survey Findings*

- IOPS will follow up with the landlord with regard to CO<sub>2</sub> monitoring, CO<sub>2</sub> readings, heating season RH and AHU schedule.

## V. 10-Point HVAC Readiness Plan

The 10-point plan outlined below is an initiative that is currently being implemented across the IO portfolio to ensure the HVAC systems are operating at an optimal level in accordance with the plan detailed below and evolving recommendations before re-entry. The operational initiatives include both daily rounds (owned buildings) and preventive maintenance (PM) activities, such as increased air filter changes, adjusting/reviewing building HVAC operating schedules to optimize outdoor air intake and performing continuous monitoring of selected IAQ parameters. This will be targeted for completion within the owned buildings before re-entry and where timelines are feasible, and efforts will continue with landlords to have these measures completed where feasible. Operational performance of the HVAC systems will be monitored on an ongoing basis throughout occupancy and as recommendations evolve.

Requests have been made to the landlord to ensure optimal comfort parameters are achieved. IOPS is continuing engagement with the landlord to promote similar implementation of the 10 Point HVAC Readiness Plan where systems are capable.

The 10-Point HVAC Plan is outlined below:

1. Clean, inspect and maintain AHUs systems (including roof top units, exhaust and return fans).
  - This measure is to ensure the operational effectiveness of the AHUs on an ongoing basis through PMs.
2. Replace air filters including inspection and repair as required of filter racks to minimize air leakage.
  - Air filters will be inspected and/or replaced before re-entry.
  - The frequency of air filter replacements will be changed to a 60-day frequency and filter racks will be inspected at the time of the filter change.
3. Inspection/testing/repair of all air dampers, where applicable, and replace faulty dampers/actuators as required.
  - Where BAS monitoring is available, actuators and dampers will be monitored and tested on an ongoing basis.
  - Physical inspection of dampers and actuators will be conducted during each air filter change.
4. Bypass heat recovery systems where applicable and feasible.
  - The bypass of the heat recovery system will minimize recirculation of unconditioned air throughout the system.
5. Maximize outdoor air and reduce/eliminate recirculation. As reasonable and where possible, maximize outdoor air supply as operationally feasible while maintaining CO<sub>2</sub> levels below 800 ppm under normal and predicted maximum occupant loading and adhering to comfort conditions.
6. Complete PM for full cooling season start-up/maintenance of cooling systems including cooling towers, where applicable.
  - Completing the cooling season start-up maintenance provides a full inspection and identification of any potential issues with the HVAC cooling system and provides opportunity for system optimization outlined in the recommendations.
  - Comprehensive cooling tower monitoring and maintenance program is currently in place.
7. Run AHUs 2 hours prior to and post occupancy while maximizing outdoor air.
  - Adjusting the schedule of the building to 2 hours prior and post occupancy provides increased air exchange and purging of the building environment.

8. Run washroom exhaust fans according to the extended AHU schedule.
  - Provides increased air exchange in the washroom facilities, where system is capable.
9. Testing of operational sequences of BAS for HVAC systems including minor reprogramming as required (e.g. maximizing outdoor air and reduction/elimination of recirculation), where applicable and feasible.
  - BAS sequencing/schedules will be tested prior to re-entry.
  - Daily checks of the BAS system are completed by onsite staff, reprogramming will be completed as conditions dictate.
10. Monitor and trend temperature, RH and CO<sub>2</sub> levels on a continuous basis. Use individual data loggers (portable) where BAS capability does not exist.
  - Continuous monitoring of the BAS system allows for ongoing monitoring of building conditions, IAQ and allows for early intervention and action of changing conditions.

## VI. Continuous Monitoring

The continuous monitoring of building operational performance is accomplished by performing data trending and monitoring of the BAS system to ensure the building is operating within recommended parameters. IOPS will continue to work with landlords to request that these activities are undertaken on a continual basis.

## VII. Report Limitations

This Report is intended to provide a point-in-time view of the operation of the HVAC systems and is based upon data or information provided by others, including responses through surveys completed by third parties, including landlords and P3 providers. IOPS, in providing this Report, has relied upon such data or information, and did not conduct any independent physical testing, sampling or intrusive investigation. IO continues to evaluate and implement systems and technology to enhance its visibility and reporting of HVAC system performance and operation.

Neither Infrastructure Ontario, nor anyone acting on its behalf, makes any representation, warranty or guarantee, express or implied, as to the accuracy, completeness, condition, or suitability of the Report or any information contained therein, for the purposes or needs of MAG.

This report is intended for MAG's sole use. Where MAG elects to disclose, publish, or disseminate this Report to anyone other than its employees, it shall do so at its sole risk.

**VIII. Glossary of Terms:**

Acronym	Definition
AHU	Air Handling Unit
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
BAS	Building Automation System
BOMA	Building Owners and Managers Association
CO <sub>2</sub>	Carbon Dioxide
ECOH	ECOH Management Inc.
HVAC	Heating, Ventilation, and Air Conditioning
IAQ	Indoor Air Quality
IO	Infrastructure Ontario
IOPS	Infrastructure Ontario Property Services
MAG	Ministry of the Attorney General
MERV	Minimum Efficiency Reporting Value
P3	Public-Private Partnership
PPE	Personal Protective Equipment
PSHSA	Public Services Health and Safety Association
PM	Preventive Maintenance
ppm	Parts per Million
RH	Relative Humidity

**IX. Reference Materials:**

ASHRAE <https://www.ashrae.org/news/ashraejournal/guidance-for-building-operations-during-the-covid-19-pandemic> and [https://ashrae.iwrapper.com/ViewOnline/Standard\\_62.1-2019](https://ashrae.iwrapper.com/ViewOnline/Standard_62.1-2019)

BOMA <https://www.boma.org/coronavirus>

Public Health Agency of Canada <https://www.canada.ca/en/public-health/services/publications/diseases-conditions/know-facts-about-coronavirus-disease-covid-19.html>

Health Canada Indoor Air Quality in Office Buildings: A Technical Guide <http://publications.gc.ca/collections/Collection/H46-2-93-166Erev.pdf>