

# HAZARDOUS MATERIALS SURVEY AND 2023 REASSESSMENT TUNNEL SYSTEM, OTTAWA, ON



Project No.: Z2021101HZ / CCC-230252-00

Prepared for:

University of Ottawa

Prepared by:

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Date:

March 13, 2024

McINTOSH PERRY

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## REASSESSMENT SURVEY 2023

McIntosh Perry Limited (MPL) was retained by the University of Ottawa, to complete to a hazardous materials survey of Marchand Residence located at University of Ottawa, Ottawa, Ontario. The survey was conducted on December 1<sup>st</sup>, 2020. The reassessment was completed on August 16th , 2023.

The purpose of the reassessment was to evaluate the condition and quantity of previously reported asbestos-containing materials (ACM) and develop corrective action plans as required for the purposes of long-term management.

The assessment and reassessment determined the following findings and recommendations.

### Summary of the Reassessment Findings:

- ACM Mechanical Pipe Straight Insulation was observed to be in Good Condition in Sections 2-2 (Room C001) and 2-3 of the subject building.
- ACM Mechanical Pipe Fitting/Elbow Insulation was observed to be in Good and Poor Condition in select areas of the subject building.
- ACM Parging on Concrete Wall was previously observed to have been removed, however may be present in other areas of the subject building.
- Water damaged materials were observed in select locations during the site survey.
- No mould affected materials were observed during the site survey.

### Summary of Recommendations:

- Perform a reassessment of asbestos materials on an annual basis.
- Perform a pre-construction assessment and remove all asbestos-containing materials (ACM) prior to alterations or maintenance work if ACM may be disturbed by the work.
- Follow appropriate safe work procedures when handling or disturbing asbestos.
- Sample any presumed ACM prior to alteration or maintained work if presumed ACM may be disturbed by the work.

## EXECUTIVE SUMMARY

McIntosh Perry Limited (MPL) was retained by the University of Ottawa, to complete a Hazardous Materials Survey for the tunnel system located at the University of Ottawa, Ottawa, Ontario. The survey was conducted on December 1<sup>st</sup>, 2020. The Reassessment Survey was completed on August 16th, 2023.

The purpose of the survey was to determine the presence of building materials containing Designated Substances and other hazardous materials, as defined under the Ontario Occupational Health and Safety Act. Designated Substances are eleven chemical agents prescribed under Ontario Regulation 490/09. In addition, a visual assessment was conducted for the presence of polychlorinated biphenyls (PCBs), radioactive materials, ozone depleting substances (ODSs), other halocarbons and mould.

Based on the assessment conducted by MPL, the following ACMs were previously identified or suspected to be present in the building:

Table A: Summary of Asbestos-Containing Materials Identified

Material Description	Friable?	Location	Type of Asbestos
Mechanical Pipe Insulation	Friable	Throughout Surveyed Area	Chrysotile
Parging on Pipe Fittings	Friable	Throughout Surveyed Area	Chrysotile
Cementitious Coating	Non-Friable	Throughout Surveyed Area	Chrysotile

Note: Please refer to the complete report for specific details and recommendations.

All repairs or removal of asbestos-containing materials must be conducted according to Ontario Regulation 278/05, Regulation respecting Asbestos on Construction Projects and in Buildings and Repair Operations - made under the Occupational Health and Safety Act. Asbestos containing waste must also be handled and disposed of according to Ontario Regulation 347/90 as amended – made under the Environmental Protection Act. Any suspect building materials encountered that were not assessed as part of this survey, should be assumed to contain asbestos until proven otherwise by analytical testing;

Sub-trades working with or in close proximity to asbestos-containing material should be informed of its presence.

Given that asbestos containing materials (ACMs) have been identified and will likely remain in place, an Asbestos Management Plan (AMP) is therefore required and an inventory of ACMs must be kept on site. All ACMs must be routinely inspected to ensure no damage has occurred, and the inventory must be updated once in each 12-month period and as may be required based on expected changing site conditions, abatement and/or renovation activities.

Based on the assessment conducted by MPL, the following Designated Substances and Hazardous Materials were previously identified or suspected to be present in the building:

Table B: Summary of Designated Substances & Hazardous Materials Identified

Material Description	Location
Lead Paint	Throughout Surveyed Area
Mercury Vapour	Specific Equipment
Silica	Throughout Surveyed Area
PCBs	Specific Equipment
Radioactive Materials	Specific Equipment
Mould/Water Damaged Materials	Specific Areas Only

Note: Please refer to the complete report for specific details and recommendations.

Designated Substances are regulated under Ontario Regulation 490/09 — Designated Substances, made under the Ontario Health and Safety Act, which applies to controlling designated substances in the workplace.

In addition to Ontario Regulation 490/09, the following guidelines must also be adhered to when conducting work activities that involve disturbance of the above-mentioned materials:

- Guideline: Lead on Construction Projects, issued April 2011 by the Occupational Health and Safety branch of the Ministry of Labour
- Guideline: Silica on Construction Projects issued April 2011 by the Occupational Health and Safety branch of the Ministry of Labour.
- Environmental Abatement Council of Canada (EACC) Lead Abatement Guidelines.

Prior to any renovations or demolition activities within building, designated substances and hazardous materials must be decommissioned by a licensed contractor such that they are contained and not released to the environment during decommissioning as per O. Reg. 347/09- made under the Environmental Protection Act.

Any suspect building materials encountered that were not assessed as part of this survey, should be assumed to contain designated substances until proven otherwise by analytical testing.

This report should be made available to contractors tendering on any renovation or demolition work. In turn, all contractors requesting tenders from subcontractors shall furnish this report to subcontractors.

This executive summary is not to be used alone. This report should be reviewed in its entirety.

March 13, 2024

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via email: [martine.bergeron@uottawa.ca](mailto:martine.bergeron@uottawa.ca)

Attention: Martine Bergeron, Senior Specialist, Occupational Health and Safety

Re: University of Ottawa, Ottawa, Ontario  
Hazardous Materials Survey and 2023 Reassessment  
McIntosh Perry Limited Reference No. Z2021101HZ / CCC-230252-00

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## 1.0 INTRODUCTION

In accordance with your instructions, McIntosh Perry Limited (MPL) carried out a Hazardous Materials Survey for the tunnel system located at the University of Ottawa, Ottawa, Ontario. The site is situated below the University of Ottawa campus between King Edward Avenue and the transitway; tunnel spaces that are considered part of a building (ex. mechanical rooms in the basement that the tunnels pass through, those with room numbers) were assessed under the building survey and are not a part of this report. The survey of the tunnel system was conducted on December 1<sup>st</sup>, 2020. The Reassessment Survey was completed on August 16th, 2023.

The purpose of the survey was to determine the presence of building materials containing Designated Substances and other hazardous materials, as defined under the Ontario Occupational Health and Safety Act. Designated Substances are eleven chemical agents prescribed under Ontario Regulation 490/09. In addition, a visual assessment was conducted for the presence of polychlorinated biphenyls (PCBs), radioactive materials, ozone depleting substances (ODSs), other halocarbons and mould.

MPL completed the following,

- Visual review of the building to identify materials which could contain Designated Substances and hazardous materials;
- Review of previously completed Hazardous Materials Survey(s) and historical building record(s); and,
- Recommendations for appropriate action where required.

## 2.0 PROPERTY DESCRIPTION

The surveyed area is a series of underground tunnels connecting the main buildings of the University of Ottawa campus, extending approximately 2km in length. The area was initially constructed in 1950 with several renovations since. The surveyed area was observed to be constructed with reinforced concrete walls, roof, and floors. Tunnel spaces that are considered part of a building (ex. mechanical rooms that the tunnels pass through, those with room numbers) were assessed under the building survey and are not a part of this report.

## 3.0 FINDINGS & RECOMMENDATIONS

### Designated Substances

### 3.1 Asbestos

#### *Findings*

A total of twelve (12) bulk samples were collected during the survey and sent to an accredited laboratory for analysis. A summary of potential asbestos-containing samples previously collected along with the sample location, type and friability are presented in Table 1.

Laboratory certificates of analysis for asbestos are included in Appendix C.

Table 1:  
Asbestos Laboratory Results

Sample ID	Location	Material	Type and Content	Friability
BS 1.1	Tunnel 5.2	Mechanical Pipe Insulation – Fitting	60% Chrysotile	Friable
BS 1.2	Tunnel 5.2	Mechanical Pipe Insulation – Fitting	Stop Positive – Not Analyzed	Friable
BS 1.3	Tunnel 5.2	Mechanical Pipe Insulation – Fitting	Stop Positive – Not Analyzed	Friable
BS 2.1	Tunnel 3.2	Mechanical Pipe Insulation – Elbow	60% Chrysotile	Friable
BS 2.2	Tunnel 3.2	Mechanical Pipe Insulation – Elbow	Stop Positive – Not Analyzed	Friable
BS 2.3	Tunnel 3.2	Mechanical Pipe Insulation – Elbow	Stop Positive – Not Analyzed	Friable
BS 3.1	Tunnel 9.3	Parging on Pipe Ends	60% Chrysotile	Friable
BS 3.2	Tunnel 9.3	Parging on Pipe Ends	Stop Positive – Not Analyzed	Friable
BS 3.3	Tunnel 9.3	Parging on Pipe Ends	Stop Positive – Not Analyzed	Friable



Sample ID	Location	Material	Type and Content	Friability
BS 4.1	Tunnel 11.8	Mechanical Pipe Insulation – Elbow	60% Chrysotile	Friable
BS 4.2	Tunnel 11.8	Mechanical Pipe Insulation – Elbow	Stop Positive – Not Analyzed	Friable
BS 4.3	Tunnel 11.8	Mechanical Pipe Insulation – Elbow	Stop Positive – Not Analyzed	Friable

N/A – Not Applicable

VFT – Vinyl Floor Tiles

Stop Positive – Material considered being asbestos-containing as per O. Reg. 278/05.

Please refer to Appendix E – Asbestos-Containing Materials Checklist for material conditions, quantities (where applicable), and recommended actions.

The following building materials (if present) were investigated for asbestos content:

### 3.1.1 Fireproofing

No fireproofing was observed in the surveyed area.

### 3.1.2 Mechanical Pipe Insulation

#### 3.1.2.1 Mechanical Pipe Straight Insulation

Air-cell mechanical pipe straight insulation was previously observed and previously sampled in Sections 2-2 (Room C001) and 2-3 of the surveyed area. The laboratory analytical results of the samples collected indicate that this material contains 20% Chrysotile Asbestos.

#### 3.1.2.2 Mechanical Piping Elbows/Fittings Insulation

Mechanical pipe elbow/fitting insulation was observed throughout the surveyed area. The laboratory analytical results of mechanical piping insulation samples previously collected indicate that this material contains 60% Chrysotile asbestos. This material is considered to be friable and was observed in good, fair and, in select areas, poor condition.

#### 3.1.2.3 Mechanical Piping Hangers Insulation

No mechanical pipe hanger insulation was observed in the surveyed area.

#### 3.1.2.4 HVAC Duct Insulation

No HVAC duct insulation was observed in the surveyed area.

#### 3.1.2.5 Other Mechanical Insulation

No other mechanical insulation was observed in the surveyed area.

### ***3.1.3 Flexible Duct Connector***

No flexible duct connectors were observed in the surveyed area.

### ***3.1.4 Heat Shield or Heat Shield Insulation***

No potential asbestos-containing heat shield insulation were observed in the surveyed area.

### ***3.1.5 Texture Finishes***

No texture finishes were observed in the surveyed area.

### ***3.1.6 Plaster***

No plaster was observed in the surveyed area.

### ***3.1.7 Paper***

Tar paper was previously observed and previously sampled in the surveyed area. The laboratory analytical results of the samples collected indicate that this material contains 15% Chrysotile Asbestos. This material was removed with demolition of the tunnel section as part of the City of Ottawa Light Rapid Transit project and was not observed elsewhere in the tunnel system.

### ***3.1.8 Drywall Joint Compound***

No drywall joint compound was observed in the surveyed area.

### ***3.1.9 Ceiling Tiles***

No ceiling tiles were observed in the surveyed area.

### ***3.1.10 Vinyl Floor Tiles***

No vinyl floor tiles were observed in the surveyed area.

### ***3.1.11 Vinyl Sheet Flooring***

No vinyl sheet flooring was observed in the surveyed area.

### ***3.1.12 Parquet Flooring***

No parquet flooring was observed in the surveyed area.

### ***3.1.13 Brick Mortar***

No brick mortar was observed in the surveyed area.

### ***3.1.14 Concrete Block Mortar***

No concrete block mortar was observed in the surveyed area.

### **3.1.15 Ceramic Wall / Floor Tile Grout**

No ceramic wall/floor tile grout was observed in the surveyed area.

### **3.1.16 Transite (Asbestos Cement)**

No transite materials were observed in the surveyed area.

### **3.1.17 Caulking**

No caulking materials were observed in the surveyed area.

### **3.1.18 Cementitious Coating**

Concrete wall parging was previously observed and previously sampled in the surveyed area. The laboratory analytical results of the samples collected indicate that this material contains 2% Chrysotile Asbestos. This particular material was removed with demolition of the tunnel section as part of the City of Ottawa Light Rapid Transit project, however, similar coatings may be present elsewhere in the tunnel system and must be treated as asbestos-containing unless additional bulk sampling and analysis proves otherwise.

### **3.1.19 Glazing**

No glazing materials were observed in the surveyed area.

### **3.1.20 Fire Doors**

No fire doors were observed within the surveyed area.

### **3.1.21 Roofing Material**

No roofing material was observed in the surveyed area.

### **Recommendations**

- Asbestos-containing materials identified to be in poor condition must be repaired/removed immediately, following Type 2 asbestos abatement work procedures as detailed in O. Reg. 278/05 and disposed of as asbestos waste under O. Reg. 347;
- Materials identified to contain asbestos that are in good condition and do not pose a risk to workers or occupants can be managed in place. Prior to renovation/demolition activities that may disturb the ACMs, these materials must be removed following appropriate Type 1/2/3 asbestos abatement work procedures as detailed in O. Reg. 278/05 and disposed of as asbestos waste under O. Reg. 347;
- Please refer to Appendix E – Asbestos-Containing Materials Checklist for material conditions, quantities (where applicable), and recommended actions;
- Prior to renovation/demolition of materials which are assumed to be asbestos-containing (suspect materials which were not sampled, i.e., roofing materials, brick mortar, concrete block mortar, ceramic

wall/floor tile grout), these materials must either be tested for asbestos content or removed following appropriate asbestos abatement work procedures (Type 1/2/3) as detailed in O. Reg. 278/05 and disposed of as asbestos waste under O. Reg. 347;

- All repairs or removal of asbestos-containing materials must be conducted according to Ontario Regulation 278/05, Regulation respecting Asbestos on Construction Projects and in Buildings and Repair Operations - made under the Occupational Health and Safety Act. Asbestos containing waste must also be handled and disposed of according to Ontario Regulation 347/90 as amended – made under the Environmental Protection Act. Any suspect building materials encountered that were not assessed as part of this survey, should be assumed to contain asbestos until proven otherwise by analytical testing;
- Sub-trades working with or in close proximity to asbestos-containing material should be informed of its presence; and
- Given that asbestos containing materials (ACMs) have been identified and will likely remain in place, an Asbestos Management Plan (AMP) is therefore required and an inventory of ACMs must be kept on site. All ACMs must be routinely inspected to ensure no damage has occurred, and the inventory must be updated once in each 12-month period and as may be required based on expected changing site conditions, abatement and/or renovation activities.

## 3.2 Lead

### Findings

#### 3.2.1 Paint Finishes

A total of two (2) paint samples from the surveyed area were previously collected and analyzed for lead content. Results of bulk sampling testing, including testing previously completed by others, are summarized in Table 2 and the laboratory certificate of analysis can be found in Appendix C.

Table 2:  
Lead Sampling Locations and Laboratory Results

Sample I.D.	Location	Material	Colour	Lead Concentration Weight by Conc. (%)
PB1	Tunnel 5.1	Floor Paint	Red	<0.0081
PB2	Tunnel 5.1	Wall Paint	Yellow	0.16
Previously Identified Lead Paint Finishes				
300-LBP-020707-01	Tunnel 11-2	Wall & Ceiling Paint	Yellow	0.12
300-LBP-020707-02	Tunnel 4-2	Wall & Ceiling Paint	Yellow	0.10

Sample I.D.	Location	Material	Colour	Lead Concentration Weight by Conc. (%)
300-LBP-020707-03	Tunnel 4-2	Floor Paint	orange	<0.01

The paint finishes highlighted in blue in the above table were determined to contain low concentrations of lead which are less than or equal to 0.1%. These paint finishes were observed to be in good condition with the exception of select areas that were observed in poor condition.

The paint finishes highlighted in pink in the above table are considered lead-containing paints or surface coatings with concentrations greater than 0.1% lead by weight. These paint finishes were observed to be in good condition with the exception of the porch, which was observed in poor condition.

All remaining paints tested were below the laboratory limit of detection for lead. However, all other paints throughout the surveyed area that are not mentioned in this report must be considered to be lead-containing unless sampling and analysis proves otherwise.

Laboratory certificate of analysis for the paint sample is also included in Appendix C.

### 3.2.2 Battery Packs

MPL did not identify battery packs within the surveyed area.

Lead may also be present in the following materials in the building:

- Solder used on copper domestic water lines;
- Solder used in bell fittings for cast iron pipes;
- Solder used in electrical equipment;
- Ceramic tile glaze; and
- Concrete and mortar products, etc.

### Recommendations

Paints identified to contain lead that are in good condition and do not pose a risk to workers or occupants can be managed in place.

Detailed worker protection protocols are outlined in the OMOL Guideline "Lead on Construction Projects" dated April 2011. Generally, the removal of the lead-based paint with the use of a chemical gel or paste, or a power tool equipped with a HEPA filter is considered a Type 1 operation. The removal of lead-based paint by scraping or sanding using non-powered hand tools is considered a Type 2 operation. The removal of lead-based paint using abrasive blasting, or power tools without a HEPA filter, is considered a Type 3 operation, and requires the most stringent worker protection protocols (similar to asbestos). Furthermore, high temperature cutting or welding would also require Type 3 Operations under the Guideline for Lead on Construction Projects.

If this type of work is required, it may be prudent to chemically remove the lead paint in selected locations prior to performing any high temperature cutting or welding.

All lead materials that are removed must follow the Ministry of Labour and Environmental Abatement Council of Ontario Lead Guidelines.

Please refer to Appendix F –Hazardous Materials Checklist for equipment conditions, quantities (where applicable), and recommended actions.

Precautions should be taken as required during major renovations and demolition projects to ensure that workers' exposure levels to airborne lead does not exceed 0.05 mg/m<sup>3</sup>. This can be achieved by:

- providing workers with proper training;
- providing the workers with respiratory protection;
- wetting the surface of the materials to prevent dust emissions; and,
- providing workers with hygiene facilities to properly wash prior to exiting the work area.

Sub-trades working with or in close proximity to lead based paint should be informed of its presence.

All waste material must be handled and disposed of according to the Revised Regulation of Ontario 347/90 as amended – made under the Environmental Protection Act. Lead waste generated may also be subject to Leachate Criteria (Schedule 4) of this regulation.

### 3.3 Mercury

#### *Findings*

#### **3.3.1 Thermostat Switches**

MPL observed thermostats suspected of containing liquid mercury throughout the surveyed area.

#### **3.3.2 Fluorescent Light Tubes**

MPL identified fluorescent light fixtures throughout the surveyed area containing 2 to 4 fluorescent light tubes per fixture. Mercury is likely to be present in vapor form in the fluorescent light tubes.

#### **3.3.3 Pressure Gauges and Float Switches**

MPL did not identify pressure gauges containing liquid mercury throughout the surveyed area.

#### *Recommendations*

Please refer to Appendix F – Hazardous Materials Checklist for equipment conditions, quantities (where applicable), and recommended actions.

Precautions must be taken to prevent mercury liquid/vapours from becoming airborne during building demolition. Exposure to mercury is regulated under Ontario Regulation 490/09, Designated Substances - made

under the Occupational Health and Safety Act.” Prior to renovations to the building, all mercury containing fluorescent light tubes must be removed and stored in a safe, secure location and/or properly disposed of in accordance with R.R.O. 1990, Regulation 347 General – Waste Management, made under the Environmental Protection Act.

### 3.4 Silica

#### *Findings*

Silica is expected to be present in building materials such as concrete, brick, mortar and ceramic tiles located throughout the structures. Free crystalline silica ( $\alpha$ -Quartz) may be a component in ceiling tiles and gypsum board. Silica (including free crystalline silica) may also be a component of concrete and brick surfaces noted in the building.

#### *Recommendations*

Please refer to Appendix F –Hazardous Materials Checklist for equipment conditions, quantities (where applicable), and recommended actions.

Precautions should be taken as required during major renovations and demolition projects on concrete (i.e. coring through concrete slabs, demolition of masonry, etc.) to ensure that workers’ exposure levels to airborne silica does not exceed 0.05 mg/m<sup>3</sup>.

This can be achieved by:

- providing workers with proper training;
- providing the workers with respiratory protection;
- wetting the surface of the materials to prevent dust emissions; and,
- providing workers with facilities to properly wash prior to exiting the work area.

Demolition work that is likely to impact silica-containing materials should be carried out in accordance with the requirement detailed in the Ontario Ministry of Labour document entitled “Guideline: Silica on Construction Projects”, dated April 2011.

#### Other Hazardous Materials

### 3.5 Polychlorinated Biphenyls (PCBs)

#### *Findings*

#### **3.5.1 Light Ballasts**

The surveyed area is illuminated by LED and fluorescent lights. At the time of the site visit, MPL could not safely assess the light ballasts. As such, PCB-containing ballasts may be present within the building.

### 3.5.2 Transformers

MPL did not observe any PCBs containing electrical transformers within the surveyed area.

#### *Recommendations*

Please refer to Appendix F – Hazardous Materials Checklist for equipment conditions, quantities (where applicable), and recommended actions.

Prior to any renovations, all light ballasts and HID lamps containing or suspected of containing PCBs that will be affected by the work, must be decommissioned by a licensed contractor such that PCBs are contained and not released to the environment during decommissioning and properly disposed of.

## 3.6 Ozone Depleting Substances (ODSs) and Other Halocarbon

#### *Findings*

A visual assessment for equipment potentially containing ODSs and other halocarbons was conducted. MPL did not observe any equipment which contain or are suspected of containing ODSs or other halocarbons.

#### *Recommendations*

Since no ozone depleting substances were observed or suspected to be present during the site survey, no further action is required.

## 3.7 Radioactive Materials

#### *Findings*

A visual assessment of the surveyed area was conducted to determine if any electrical components containing radioactive materials were present. MPL observed smoke detectors throughout the surveyed area which contain small quantities of radioactive material.

#### *Recommendations*

Please refer to Appendix F – Hazardous Materials Checklist for equipment conditions, quantities (where applicable), and recommended actions.

The radioactive sources in smoke alarms are sealed and contained within a metal case inside the smoke detector and must not be damaged or tampered with. These materials do not pose a hazard as long as they remain contained and properly disposed at the time of removal or replacement.

Prior to any renovations or demolition of the building, all equipment containing radioactive materials must be decommissioned by a licensed contractor such that radioactive materials are contained and not released to the environment during decommissioning as per O.Reg. 347/09.



### 3.8 Underground and Above Ground Storage Tanks (USTs and ASTs)

#### *Findings*

A visual survey of the surveyed area was conducted to determine if any USTs and ASTs were present. No USTs and ASTs were present within the surveyed area.

#### *Recommendations*

Since no underground and/or above ground storage tanks (USTs and ASTs) were observed or suspected to be present during the site survey, no further action is required.

### 3.9 Mould

#### *Findings*

#### **3.9.1 Mould**

A visual survey of the surveyed area was conducted to determine if any mould was present. MPL did not identify any areas with mould growth.

#### **3.9.2 Water Damage**

A visual survey of the surveyed area was conducted to determine if any water damaged was present. MPL identified select areas throughout the surveyed area, where materials were affected by water damage.

#### *Recommendations*

Please refer to Appendix F – Hazardous Materials Checklist for equipment conditions, quantities (where applicable), and recommended actions.

This report should be made available to contractors tendering on any renovation or demolition work. In turn, all contractors requesting tenders from subcontractors shall furnish this report to subcontractors.

## 4.0 GENERAL CONSIDERATIONS AND LIMITATIONS

The information presented in this report is based on information provided by others, direct visual observation made by personnel with McIntosh Perry Limited (MPL), and the results of laboratory testing as identified herein.

It should be noted that there might be designated substances in locations not visible during our investigation. In the event such material is encountered during demolition operations in the building, this material should be tested and dealt with accordingly.

The findings detailed in this report are based upon the information available at the time of preparation of the report. No investigative method eliminates the possibility of obtaining imprecise or incomplete information. Professional judgement was exercised in gathering and analyzing the information obtained and in the formulation of our conclusions and recommendations.

MPL does not certify or warrant the environmental status of the property nor the building on the property.

Please note that the passage of time affects the information provided in the report. Environmental conditions of a site can change. Opinions relating to the site conditions are based upon information that existed at the time that the conclusions were formulated.

The client expressly agrees that it has entered into this agreement with MPL, both on its own behalf and as agent on behalf of its employees and principals.

The client expressly agrees that MPL's employees and principals shall have no personal liability to the client in respect of a claim, whether in contract, tort and/or any other cause of action in law. Accordingly, the client expressly agrees that it will bring no proceedings and take no action in any court of law against any of MPL's employees or principals in their personal capacity.

We trust that we have detailed our findings clearly and that we have satisfactorily addressed the scope of work you require at this time. In the event you wish us to review our findings with you, or require our services further in this regard, please do not hesitate to contact our office.

Yours truly,

MCINTOSH PERRY LIMITED



Pegah Parichehreh, M.Sc.  
Project Technician  
Hazardous Materials/ Environmental Health & Safety



John Tufts, B.Sc.  
Project Manager  
Hazardous Materials/ Environmental Health & Safety

# APPENDIX A

## Regulatory Requirements

## REGULATORY REQUIREMENTS

In Ontario, there is a total of eleven Designated Substances. These substances have been regulated under Ontario Regulation 490/09 — *Designated Substances*, made under the Ontario Health and Safety Act, which applies to controlling designated substances in the workplace.

In addition to the Ontario Regulation 490/09 noted above, the following were observed for this survey:

Guideline: Lead on Construction Projects, issued April 2011 by the Occupational Health and Safety branch of the Ministry of Labour

Guideline: Silica on Construction Projects issued April 2011 by the Occupational Health and Safety branch of the Ministry of Labour.

The Occupational Health and Safety Act (OHSA), R.S.O. 1990, c.0.1, s.30 (1) specifies that: "Before beginning a project, the owner shall determine whether any Designated Substances are present at the project site and shall prepare a list of all Designated Substances that are present at the site.

Section 30 of The Act requires that the list of Designated Substances be provided to prospective contractors and subcontractors who may do work on a site and come into contact at the site with Designated Substances.

The Ministry of Labour has designated the following substances:

- Acrylonitrile
- Arsenic
- Asbestos
- Benzene
- Coke Oven Emissions
- Ethylene Oxide
- Isocyanates
- Lead
- Mercury
- Silica
- Vinyl Chloride

Ontario Regulation 278/05 (O. Reg. 278/05), the Regulation respecting Asbestos on Construction Projects and in Buildings and Repair Operations, made under the Occupational Health and Safety Act (OHSA), requires owners of a building to identify Asbestos-containing Materials (ACMs) prior to potential disturbance of the materials.

In addition, an owner of a building is required to have an Asbestos Management Plan (AMP) if ACMs (friable or non-friable) are present in the building and are to remain in place. An inventory of ACMs must be kept on site. All ACMs must be routinely inspected to ensure no damage has occurred, and the inventory must be updated once in each 12-month period and as may be required based on expected changing site conditions, abatement and/or renovation activities. Removal of all asbestos-containing materials is required prior to building demolition.

In addition to the Designated Substances, the building was also surveyed for the presence of other hazardous materials such as polychlorinated biphenyls (PCBs), radioactive materials, ozone depleting substances (ODSs), other halocarbons, and mould.

We understand that this survey has been conducted to comply with the regulatory requirements of Ontario Regulation 278/05.

## APPENDIX B

### Survey Methodology & Background Information

## SURVEY METHODOLOGY

For the purpose of this survey, not all Designated Substances or suspect hazardous material were sampled. Selective sampling was carried out only for substances that were suspected to be present or those deemed to have a likely source of origin in the survey areas.

Materials that were homogeneous in nature and/or similar in appearance to other materials tested were considered to be of similar composition. The likelihood of ACMs being present in inaccessible areas such as above gypsum board ceilings or behind gypsum wallboards was determined by assessing the presence of asbestos-containing systems in adjacent areas. Equipment such as boilers, motors, blowers, electrical panels, fire doors etc., were not de-energized or disassembled to examine internal components or materials. These items should be considered to contain hazardous materials until proven otherwise.

During the survey, representative samples of suspect building materials were collected and sent to CAELA accredited independent laboratory for analysis. Laboratory Certificate of Analysis are attached in Appendix C.

Other potential hazardous materials were identified by visual observation and/or by reviewing Material Safety Data Sheets (MSDS) and/or safety labels where available.

### Investigated Areas

The survey included all accessible areas within the tunnel system as required under our scope of work. No destructive investigations were performed as part of this survey. Photographs of the areas investigated can be found in Appendix D.

The assessment was directed on the interior structure and finishes of the building. It did not consider current or past owner or occupant articles within the building (i.e. contents, furniture, etc.) and does not report on possible contaminants in the soil under and surrounding the building, or contents of vessels, drums, etc. that may be concealed.

### Sampling and Assessment Methodologies

Sampling was conducted as part of this assessment. Results for asbestos and lead samples can be found in the Findings & Recommendation Section 3.0.

A historical review of previous designated substance survey reports and abatement reports was examined as part of this survey. Due to concerns regarding certain historical analytical results, mainly in 2008 and prior years, confirmatory re-sampling was conducted for selected materials previously identified not to contain asbestos. However, building materials previously identified to be asbestos-containing were not re-sampled. The reports are listed as follows,

- Designated Substance Survey by Conestoga-Rovers & Associates (dated February 2008, reference # 045870(80));
- Asbestos Sampling Report by EHS Environmental (dated October 27, 2015 reference # 04-0033-15-034);

### Asbestos

#### *Background Information on Asbestos*

Asbestos is a generic name that has been given to a group of naturally occurring fibrous minerals. In the past, asbestos was commonly used as a component in building materials such as insulation, fireproofing and acoustic or decorative panels. Although there are many types of asbestos, the three main forms of commercial importance in Ontario are chrysotile, amosite and crocidolite.

An Asbestos-Containing Material (ACM) is defined by O. Reg. 278/05 as a material that contains 0.5% or more asbestos by dry weight. ACMs are placed into two general classes, “friable” and “non-friable” ACMs. Friable ACMs are those materials that when dry can be crumbled, pulverized and reduced to powder by hand pressure. Typical friable ACMs include acoustical or decorative texture coats, fireproofing and thermal insulation. Non-friable ACMs are much more durable as they are held together by a binder such as cement, vinyl or asphalt. Typical non-friable ACMs include floor tiles, fire blankets, roofing materials and cementitious products such as wallboards, pipes or siding.

It has been recognized that hazardous situations may exist in buildings where asbestos-containing materials are found. This is especially true where asbestos fibres may become airborne as a result of material ageing, physical damage, and water damage or air movement.

In contrast, there is little reason for concern if the asbestos is in good condition, has not been damaged and is not in a location where it is likely to be disturbed.

### *Asbestos Survey Methodology*

The asbestos survey included the identification of potential friable and non-friable asbestos-containing materials within the surveyed areas of the subject building.

The likelihood of ACMs being present in inaccessible areas such as above gypsum wallboard ceilings and walls was determined by assessing the presence of asbestos-containing materials in adjacent areas.

Fiberglass insulation was not submitted for analysis as it can be identified visually as non-asbestos material.

Building materials suspected of containing asbestos were identified and representative sampling and laboratory testing of these materials was conducted. The number of bulk material samples collected from a homogeneous area was in accordance with Table 1. O. Reg. 278/05 s. 3 (3) below. Building materials suspected of containing asbestos were collected using wetting techniques and hand sampling tools.

Table 1 - O. Reg. 278/05 s. 3(3): Minimum Asbestos Bulk Material Sample Requirements

Item	Type of material	Size of area of homogeneous material	Minimum number of bulk material samples to be collected
1.	Surfacing material, including without limitation, material that is applied to surfaces by spraying, by troweling or otherwise, such as acoustical plaster on ceilings and fireproofing materials on structural members	Less than 90 square metres	3
		90 or more square metres, but less than 450 square metres	5
		450 or more square metres	7
2.	Thermal insulation, except as described in item 3	any size	3

3.	Thermal insulation patch	Less than 2 linear metres or 0.5 square metres	1
4.	Other material	Any size	3

Preliminary identification of the samples was made using polarized light microscopy (PLM), with confirmation of presence and type of asbestos made by dispersion staining optical microscopy. This analytical procedure follows the U.S. Environmental Protection Agency Test Method EPA/600/R-93/116 Method for the Determination of Asbestos in Bulk Building Materials, June 1993.

All bulk samples were analysed for asbestos content by EMSL Canada Inc. (EMSL), an independent laboratory. EMSL is an independent laboratory accredited by National Institute of Standards and Technology/National Voluntary Laboratory Accreditation (NIST/NVLAP) (Lab Code #200877-0).

Vinyl floors tiles were analyzed using the phase light microscopy (PLM) method of analysis. However, given the composition of vinyl floor products, the PLM analysis method may be prone to yielding false negative analytical results. Therefore, prior to removal or replacement, vinyl floor products previously identified to be negative, should undergo additional analysis by Transmission Electron Microscopy (TEM) to confirm asbestos content, if any.

Materials identified to contain asbestos were assessed on the relative possibility of fibre release into the air due to a combination of their condition and accessibility.

### *Evaluation of ACMs Based on Condition*

In evaluating an ACM's condition, the following criteria was applied:

- Good – Material shows no signs of damage and/or is encapsulated. Asbestos-containing material could remain in place until eventual building demolition or major renovation.
- Fair – Material shows signs of minor damage (<5% damage) or otherwise near the end of useful life. This includes minor shrinking, cracking, delamination and/ or other damage. Material should be monitored closely and scheduled to be repaired, encapsulated or removed.
- Poor – Damage is greater than 5% to any ACM material and is highly recommended to be removed, repaired or encapsulated.

*Note: The above evaluation criteria was also applied to other hazardous materials where applicable. Please refer to the Asbestos and Hazardous Materials Checklist in Appendix E & F for further details.*

## Lead

### *Background Information on Lead*

Lead was a common additive in exterior and hard-wearing paint applications. Lead was used to prolong shelf life of paint and to increase its flexibility and durability to wear and weather. Acute exposure to lead by inhalation or ingestion may cause headaches, fatigue, nausea, abdominal cramps and joint pain. Chronic exposures can cause reduced haemoglobin production and reduced lifespan. It has also been known to impact the body's central and peripheral nervous systems and brain function and has been linked to learning disabilities in children.



Currently in Ontario, there is no regulatory limit that determines what concentration of lead constitutes a “lead containing material”. On October 21, 2010, Health Canada, under the *Hazardous Products Act*, stated that the lead content in surface-coating materials, furniture, toys and other articles for children, should not exceed 90 mg/kg (0.009%, 90 ppm). However, this is intended for the importation or sale of products within Canada. Therefore, this is not to be misconstrued as a limit established to define a lead-containing material or a limit with respect to lead on construction projects.

The Environmental Abatement Council of Canada (EACC) has also developed the “*Lead Guideline for Construction, Renovation, Maintenance or Repair*” dated October 2014, which discusses the classification, handling, disturbance and removal of lead-containing materials. For the purpose of this guideline, paints or surface coatings containing less than or equal to 0.1% lead by weight (1000 mg/kg or 1000 ppm) are considered low-level lead paints or surface coatings. If these materials (and their respective surfaces) are disturbed in a non-aggressive manner and performed using adequate dust control procedures, then worker protection from the inhalation of lead is not required.

Furthermore, paints or surface coatings containing greater than 0.1% lead by weight are considered lead-containing paints or surface coatings. If these materials (and their respective surfaces) are disturbed, appropriate lead abatement procedures must always be followed.

Exposure to lead-containing materials is regulated under Ontario Regulation 490/09, *Designated Substances* - made under the Occupational Health and Safety Act. Care must be taken to prevent lead-containing particles from becoming airborne during the disturbance of lead-containing surfaces (i.e., during renovation or demolition projects). All lead abatement work must follow procedures outlined in the Guideline Lead on Construction Projects, issued in September 2004 (amended in April 2011) by the Occupational Health and Safety branch of the Ministry of Labour (Type 1-3). Similarly, the lead abatement work procedures outlined in the EACC Lead Guideline for Construction, Renovation, Maintenance or Repair (October 2014) may also be implemented (Class 1-3).

Lead is known to have been used in solder on copper plumbing fixtures, in lead conduit pipes, in lead-calcium battery plates, ammunition, and in nuclear and X-ray shielding devices. However, these materials were not sampled during this investigation, but were noted where applicable.

To verify lead content in paints, representative bulk samples of paint and finishes suspected of containing lead were collected. Bulk samples were scraped down to the building base structure, with all possible layer’s present, placed in sealed plastic bags and labeled; and then submitted to an independent laboratory for analysis. Samples were treated with a dilute nitric acid sample digestion prior to filtration. Analysis utilized for lead detection in filtered samples was inductively coupled plasma optical emission spectrometry (ICP-OES).

## Mercury

### *Background Information on Mercury*

Mercury is known to cause poisoning in humans through the inhalation of vapours, ingestion of contaminated materials or skin absorption through direct contact with the liquid.

Precautions must be taken to prevent mercury vapours from becoming airborne during renovations or demolition of the building. Exposure to airborne mercury is regulated under the Revised O. Reg. 490/09 as amended – Regulation respecting Mercury – made under the Occupational Health and Safety Act; and under

O. Reg. 558, which amended O. Reg. 347/90 (General - Waste Management), mercury is classified as a Schedule 2(b) Hazardous Waste Chemical. Its hazardous waste number is U151.

Mercury is found in products such as thermostats, temperature and pressure gauges, fluorescent lamps and batteries. Mercury in products can be released to the environment through breakage, or disposal at the end of a product's useful life. Improper disposal of these mercury products poses a health and environmental risk to everyone. In addition, the disposal of mercury-containing products can create wastes that are often classified as hazardous. Wastes that leach mercury in concentrations exceeding Ontario Regulation 347/90 (General - Waste Management) limits are also considered hazardous.

The mercury in thermostat switch contains approximately 3-4 grams of mercury in a glass ampoule, typically attached to a metal coil. Mercury-containing switches have been used in thermostats for over 40 years.

Mercury is an essential component in fluorescent lamps and HID lamps. The mercury is in a vapour form and in the phosphor coating on the lamp tube. Estimates of the mercury content contained in compact, 4 foot, and 8-foot lamps are 10 mg, 23 mg, and 46 mg respectively.

Most fluorescent lamps qualify as hazardous waste when removed from service and are therefore prohibited from disposal in the solid waste stream. Fluorescent lamps would be classified as 146T on your facility Generator Registration Report under O. Reg. 347/90 - General Waste Management, as amended by O. Reg. 558/00. Under this regulation, if the leachate results exceed 0.1 milligrams of mercury per litre for a given waste, then the facility must treat the waste as hazardous waste. Most fluorescent and HID lamps will exceed the leachate toxicity limit; therefore, these wastes must be registered and treated as hazardous waste or sent for recycling.

## Silica

### *Background Information on Silica*

Silica is expected to be present in building materials such as concrete, brick, mortar and ceramic tiles located throughout the structures. Free crystalline silica ( $\alpha$ -Quartz) may be a component in ceiling tiles and gypsum board. Silica (including free crystalline silica) may also be a component of concrete and brick surfaces noted in the building.

Exposure to airborne silica is regulated under Ontario Regulation 490/09, *Designated Substances* - made under the Occupational Health and Safety Act.

## Polychlorinated Biphenyls (PCBs)

### *Background Information on PCBs*

Polychlorinated Biphenyls (PCBs) were commonly used as dielectric insulating fluid in electrical equipment such as transformers and capacitors, and in the fluorescent and HID lamp ballasts. The production of PCBs in the North America started in 1929 and was banned at the beginning of 1979. After 1981, no manufacturers produced fluorescent and HID lamps with PCB-containing ballasts.

PCBs are not a designated substance under the Occupational Health and Safety Act.

### *PCB Regulations (SOR/2008-273)*

The *PCB Regulations* (the Regulations) set specific deadlines for ending the use of PCBs in concentrations at or above 50 mg/kg, eliminating all PCBs and equipment containing PCBs currently in storage and limiting the period of time PCBs can be stored before being destroyed. The Regulations also establish sound practices for the better management of the remaining PCBs in use (i.e. those with content of less than 50 mg/kg), until their eventual elimination, to prevent contamination of dielectric fluids and dispersion of PCBs in small quantities into other liquids.

## Ozone Depleting Substances (ODSs) and Other Halocarbons

### *Background Information on ODSs*

Within Ontario, the general use of ozone depleting substances (ODSs) and other halocarbons is controlled through Regulation 463/10 of the Environmental Protection Act. Production of ODSs in the form of hydrochlorofluorocarbons (HCFCs) and chlorofluorocarbons (CFCs) ceased in Canada in 1993 as a result of their ozone-depleting characteristics. Importation of CFCs into Canada ceased in 1997 and total ban was placed on their use since 2010. The use of these materials is still permitted in existing equipment, but equipment must be serviced by a licensed contractor such that CFCs are contained and not released to the environment during servicing or operation.

## Radioactive Materials

There are two types of smoke detectors commonly found in building (residential, institutional, commercial, industrial, etc). Photoelectric-type smoke detectors detect smoke using an optical sensor, whereas ionization-type smoke detectors use an ionization chamber containing radioactive material. The ionization type is cheaper and is particularly common in older buildings. A typical modern detector contains about 1.0 microcurie of the radioactive element americium, a decrease from 3 microcurie in 1978. The use of sealed radioactive material sources in fire detection systems is still permitted and regulated by the Canadian Nuclear Safety Commission (CNSC) and the Canadian Nuclear Safety Act. The radioactive sources in smoke alarms are sealed and contained within a metal case inside the smoke detector and must not be damaged or tampered with.

## Mould & Water Damage

Mould growth inside buildings is due to excess moisture caused by leakages, condensation or capillary movement of water into the building. Toxic moulds such as *Stachybotrys chartarum* and some species of *Aspergillus* spp. are greenish-black, wet and slimy moulds that grow on soaking wet cellulose-based materials. They are often found near water leaks or where drying is very slow and can form after flooding if insufficient cleanup and drying occurred. They will generally not occur if materials are kept dry.

MPL conducted a general visual assessment for any obvious signs of visible mould and/or water damage. Based on our visual observations, the following guidelines were used in providing our recommendations for remedial action where required:

- Institute of Inspection Cleaning and Restoration Certification (IICRC) S520 Standard and Reference for Professional Mould Remediation,
- The Canadian Construction Association (CCA) Mould Guidelines for the Canadian construction industry (CCA document 82-2004)

- Environmental Abatement Council of Canada (EACC) Mould Abatement Guidelines.

## Other Designated Substances

*Select Designated Substances (acrylonitrile, arsenic, coke oven emissions, ethylene oxide, isocyanates, benzene, or vinyl chloride) are not expected to be present in the building in matrix or sufficient quantities to cause an exceedance of Ministry of Labour exposure guidelines. As such, no sampling was conducted for these materials.*

### Vinyl Chloride

Vinyl chloride (monomer) is likely to be present in stable form within poly vinyl-chloride (PVC) piping and conduits and as a component of interior finishes. Such building materials are not considered to be hazardous in their current matrix/composition.

### Acrylonitrile

Acrylonitrile or ACN (also known as vinyl cyanide) is an explosive, flammable liquid used in the manufacture of acrylic fibres, rubber-like materials and pesticide fumigants. Acrylonitrile was not noted and would not be expected to be present in the project specific area/surveyed area/subject building.

### Arsenic

Arsenic is used in metallurgy for hardening copper, lead and alloys, in pigment production, in the manufacture of certain types of glass, in insecticides, fungicides and rodenticides, as a by-product in the smelting of copper ores, and as a dopant material in semiconductor manufacturing. Arsenic or arsenic compounds were not noted and are not expected to be present in the project specific area/surveyed area/subject building.

### Benzene

Benzene or benzol is a colourless liquid. It is used as an intermediate in the production of styrene, phenol, cyclohexane, and other organic chemicals, and in the manufacture of detergents, pesticides, solvents, and paint removers. It is also found in gasoline. Benzene may be present in stable form in roofing materials, paints and adhesives located throughout the subject building. Such building materials are not considered to be hazardous in their current matrix/composition.

### Coke Oven Emissions

Coke oven emission is benzene soluble fraction of total particulate matter of the substances emitted into the atmosphere from metallurgical coke ovens.

### Ethylene Oxides

Ethylene oxide is a colourless gas liquefying below 12°C. It is used generally as a fumigant and sterilizing agent for medical equipment. It is used generally as a fumigant and sterilizing agent for medical equipment.

### Isocyanates

Isocyanates compounds may be present in stable form in paint finishes, varnishes, and polyurethane plastics, synthetic rubbers, foams and adhesives. Such building materials are not considered to be hazardous in their current matrix/composition.

In order to reduce the potential for exposure to workers or occupants, any suspect hazardous building material(s) that are not detailed within this survey due to inaccessibility and/or are discovered during renovation/demolition activities, must be properly assessed and/or tested prior to their disturbance.

## APPENDIX C

### Laboratory Analytical Reports



# EMSL Canada Inc.

22 Antares Drive Suite 102 Ottawa, ON K2E 7Z6  
 Phone/Fax: (343) 882-6076 / (343) 882-6077  
<http://www.EMSL.com> / [ottawalab@EMSL.com](mailto:ottawalab@EMSL.com)

EMSL Canada Order 672002152  
 Customer ID: 55CTCS25B  
 Customer PO: 0Z2-021101  
 Project ID: Ottawa DSS

**Attn:** Krista Buckner  
 McIntosh Perry Consulting Engineers Ltd  
 115 Walgreen Rd RR 3  
 Carp, ON K0A 1L0

**Phone:** (613) 836-2184  
**Fax:**  
**Collected:** 12/ 1/2020  
**Received:** 12/02/2020  
**Analyzed:** 12/08/2020

**Proj:** University of Ottawa 0Z2-021102 "Ottawa DSS" (Ottawa DSS)

## Test Report: Asbestos Analysis of Bulk Materials for Ontario Regulation 278/05 via EPA600/R-93/116 Method

<b>Client Sample ID:</b> 1.1		<b>Lab Sample ID:</b> 672002152-0001				
<b>Sample Description:</b> Tunnel 5.2/Pipe Insulation						
TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	12/08/2020	Gray/Yellow	5.0%	35.0%	60% Chrysotile	
<b>Client Sample ID:</b> 1.2		<b>Lab Sample ID:</b> 672002152-0002				
<b>Sample Description:</b> Tunnel 5.2/Pipe Insulation						
TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	12/08/2020				Positive Stop (Not Analyzed)	
<b>Client Sample ID:</b> 1.3		<b>Lab Sample ID:</b> 672002152-0003				
<b>Sample Description:</b> Tunnel 5.2/Pipe Insulation						
TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	12/08/2020				Positive Stop (Not Analyzed)	
<b>Client Sample ID:</b> 2.1		<b>Lab Sample ID:</b> 672002152-0004				
<b>Sample Description:</b> Tunnel 3.2/Pipe Insulation						
TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	12/08/2020	Gray	0.0%	40.0%	60% Chrysotile	
<b>Client Sample ID:</b> 2.2		<b>Lab Sample ID:</b> 672002152-0005				
<b>Sample Description:</b> Tunnel 3.2/Pipe Insulation						
TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	12/08/2020				Positive Stop (Not Analyzed)	
<b>Client Sample ID:</b> 2.3		<b>Lab Sample ID:</b> 672002152-0006				
<b>Sample Description:</b> Tunnel 3.2/Pipe Insulation						
TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	12/08/2020				Positive Stop (Not Analyzed)	
<b>Client Sample ID:</b> 3.1		<b>Lab Sample ID:</b> 672002152-0007				
<b>Sample Description:</b> Tunnel 9.3/Pipe Insulation						
TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	12/08/2020	Brown/Gray	5.0%	35.0%	60% Chrysotile	



# EMSL Canada Inc.

22 Antares Drive Suite 102 Ottawa, ON K2E 7Z6  
Phone/Fax: (343) 882-6076 / (343) 882-6077  
<http://www.EMSL.com> / [ottawalab@EMSL.com](mailto:ottawalab@EMSL.com)

EMSL Canada Order 672002152  
Customer ID: 55CTCS25B  
Customer PO: 0Z2-021101  
Project ID: Ottawa DSS

## Test Report: Asbestos Analysis of Bulk Materials for Ontario Regulation 278/05 via EPA600/R-93/116 Method

**Client Sample ID:** 3.2 **Lab Sample ID:** 672002152-0008  
**Sample Description:** Tunnel 9.3/Pipe Insulation

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	12/08/2020					Positive Stop (Not Analyzed)

**Client Sample ID:** 3.3 **Lab Sample ID:** 672002152-0009  
**Sample Description:** Tunnel 9.3/Pipe Insulation

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	12/08/2020					Positive Stop (Not Analyzed)

**Client Sample ID:** 4.1 **Lab Sample ID:** 672002152-0010  
**Sample Description:** Tunnel 11.8/Pipe Insulation

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	12/08/2020	Gray	0.0%	40.0%	60% Chrysotile	

**Client Sample ID:** 4.2 **Lab Sample ID:** 672002152-0011  
**Sample Description:** Tunnel 11.8/Pipe Insulation

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	12/08/2020					Positive Stop (Not Analyzed)

**Client Sample ID:** 4.3 **Lab Sample ID:** 672002152-0012  
**Sample Description:** Tunnel 11.8/Pipe Insulation

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	12/08/2020					Positive Stop (Not Analyzed)

### Analyst(s):

Ewa Krupinska PLM (4)

### Reviewed and approved by:

Simon Parent, Laboratory Manager  
or Other Approved Signatory

None Detected = <0.1%. EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client. Samples received in good condition unless otherwise noted. This report must not be used to claim product endorsement by NVLAP of any agency or the U.S. Government

Samples analyzed by EMSL Canada Inc. Ottawa, ON NVLAP Lab Code 201040-0

Initial report from: 12/08/2020 17:18:52



**EMSL Canada Inc.**

2756 Slough Street, Mississauga, ON L4T 1G3

Phone/Fax: (289) 997-4602 / (289) 997-4607

<http://www.EMSL.com>[torontolab@emsl.com](mailto:torontolab@emsl.com)

EMSL Canada Or	552015908
CustomerID:	55CTCS25B
CustomerPO:	0Z2-021102
ProjectID:	Ottawa DSS

Attn: **Krista Buckner**  
**McIntosh Perry Consulting Engineers Ltd**  
**115 Walgreen Rd RR 3**  
**Carp, ON K0A 1L0**

Phone: (613) 836-2184  
Fax:  
Received: 12/3/2020 11:19 AM  
Collected: 12/1/2020

Project: **University of Ottawa 0Z2-021102 "Ottawa DSS - 62 Henderson"****Test Report: Lead in Paint Chips by Flame AAS (SW 846 3050B/7000B)\***

<i>Client SampleDescription</i>	<i>Collected</i>	<i>Analyzed</i>	<i>Weight</i>	<i>RDL</i>	<i>Lead Concentration</i>
PB1 552015908-0001	12/1/2020	12/7/2020 Site: Red/Brown - Tunnel 5.1	0.2460 g	0.0081 % wt	<0.0081 % wt
PB2 552015908-0002	12/1/2020	12/7/2020 Site: Yellow - Tunnel 5.1	0.2440 g	0.0082 % wt	0.16 % wt

Rowena Fanto, Lead Supervisor  
or other approved signatory

EMSL maintains liability limited to cost of analysis. Interpretation and use of test results are the responsibility of the client. This report relates only to the samples reported above, and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. The report reflects the samples as received. Results are generated from the field sampling data (sampling volumes and areas, locations, etc.) provided by the client on the Chain of Custody. Samples are within quality control criteria and met method specifications unless otherwise noted.

Analysis following Lead in Paint by EMSL SOP/Determination of Environmental Lead by FLAA. Reporting limit is 0.008% wt based on the minimum sample weight per our SOP. "<" (less than) result signifies the analyte was not detected at or above the reporting limit. Measurement of uncertainty is available upon request. Definitions of modifications are available upon request.

Samples analyzed by EMSL Canada Inc. Mississauga, ON AIHA-LAP, LLC - ELLAP #196142

Initial report from 12/10/2020 09:02:26

## APPENDIX D

### Site Photographs



Photo 1: View of typical finishes observed in the tunnel system at the University of Ottawa.



Photo 2: View of asbestos-containing mechanical pipe elbow insulation observed in Tunnel 6-4.



Photo 3: View of asbestos-containing mechanical fitting insulation observed in Tunnel 6-5.



Photo 4: View of asbestos-containing mechanical pipe elbow insulation in Tunnel 3-2, observed to be in poor condition.



Photo 5: View of asbestos-containing mechanical pipe insulation in Tunnels 2-7, observed to be in poor condition.



Photo 6: View of asbestos-containing mechanical pipe insulation in Tunnels 9-3, observed to be in poor condition.





Photo 7: View of water damage observed on the ceiling in Tunnel 3-2.



Photo 8: View of water damage observed on the ceiling in Tunnel 3-2.



Photo 9: View of water damage observed on the ceiling in the Tunnels during 2023 Reassessment.



Photo 10: View of water damage observed on the ceiling in Tunnel 10-2.



Photo 11: View of mercury containing thermostats observed throughout the tunnel system.



## APPENDIX E

### Asbestos-Containing Materials Checklists

Tunnel Section	Area	Type of ACM	Description	Asbestos Confirmed/ Suspected	Friable/Non-Friable	Damaged/ Deteriorated	Accessibility	Level of Work Near Material	Approx. Quantity	Unit	Recommended Action	Estimated Abatement Cost	Comments
2-1	Underground parking to Tabaret	Pipe Elbows/fittings	North end	Confirmed	Friable	Good Condition	Easy		4	C	Manage in Place		
2-2	Tabaret, C001	Air-Cell Mechanical Insulation	White	Confirmed	Friable	Good Condition	Easy		40	LF	Manage in Place		Reference # 045870(80)
2-2	Tabaret, C001	Pipe Elbows/fittings	North end	Confirmed	Friable	Good Condition	Moderate		10	C	Manage in Place		Two are difficult to see but lower elbows are marked ACM
2-3	Tabaret	Air-Cell Mechanical Insulation	White	Confirmed	Friable	Good Condition	Easy		105	LF	Manage in Place		Reference # 045870(80)
2-3	Tabaret	Pipe Elbows/fittings	Middle section	Confirmed	Friable	Good Condition	Easy		8	C	Manage in Place		
2-4	Tabaret to 110 Séraphin-Marion	Pipe Elbows/fittings	North end	Confirmed	Friable	Good Condition	Easy		6	C	Manage in Place		
2-5	110 Séraphin-Marion	Pipe Elbows/fittings	North end	Confirmed	Friable	Good Condition	Easy		3	C	Manage in Place		
2-6	110 Séraphin-Marion to Hagen	Pipe Elbows/fittings	Half at north end, half throughout middle	Confirmed	Friable	Good Condition	Easy		18	C	Manage in Place		
2-7	Hagen	Pipe Elbows/fittings	South end, before tunnel narrows	Confirmed	Friable	Poor Condition	Easy		1	C	Remove Following Type 2 (Glovebag) Abatement Procedures	\$ 250.00	
2-7	Hagen	Pipe Elbows/fittings	South end, before tunnel narrows	Confirmed	Friable	Good Condition	Easy		4	C	Manage in Place		
3-2	Simard to Parking, along Waller St S	Pipe Elbows/fittings	North end, eye-level, small pipe elbow	Confirmed	Friable	Poor Condition	Easy		1	C	Repair or Remove Following Type 2 Abatement Procedures	\$ 250.00	
3-2	Simard to Parking, along Waller St S	Pipe Elbows/fittings	North end	Confirmed	Friable	Good Condition	Easy		1	C	Manage in Place		
3-3	Simard	Pipe Elbows/fittings	East end	Confirmed	Friable	Good Condition	Easy		4	C	Manage in Place		
3-4	Simard	Pipe Elbows/fittings	3 at north end, 8 at bend	Confirmed	Friable	Good Condition	Easy		11	C	Manage in Place		
5-1	University Pvt beside Perez	Pipe Elbows/fittings	7 at east end, 2 near east end	Confirmed	Friable	Good Condition	Easy		9	C	Manage in Place		
5-2	Perez to Thompson	Pipe Elbows/fittings	North of bend, near floor, small pipe fitting	Confirmed	Friable	Fair Condition	Easy		1	C	Repair or Remove Following Type 2 Abatement Procedures	\$ 250.00	
5-2	Perez to Thompson	Pipe Elbows/fittings	3 at east end, 2 at bend, one just north of bend	Confirmed	Friable	Good Condition	Moderate		6	C	Manage in Place		Two at bend difficult to see but visually similar to others in area
5-3	Perez, 009A	Pipe Elbows/fittings	Near north end	Confirmed	Friable	Good Condition	Easy		4	C	Manage in Place		
6-2	Jock-Turcot, 0030C	Pipe Elbows/fittings	1 at west end, 3 at bend, 2 at south end	Confirmed	Friable	Good Condition	Easy		6	C	Manage in Place		
6-3	Jock-Turcot to Montpetit	Pipe Elbows/fittings	Near west end	Confirmed	Friable	Good Condition	Easy		4	C	Manage in Place		
6-4	Montpetit to Fauteux	Pipe Elbows/fittings	3 at west end, 6 near middle, 2 at east end	Confirmed	Friable	Good Condition	Moderate		11	C	Manage in Place		Five from west/east end difficult to see but visually similar to

Tunnel Section	Area	Type of ACM	Description	Asbestos Confirmed/ Suspected	Friable/Non-Friable	Damaged/ Deteriorated	Accessibility	Level of Work Near Material	Approx. Quantity	Unit	Recommended Action	Estimated Abatement Cost	Comments
6-5	Fauteux	Pipe Elbows/fittings	South end	Confirmed	Friable	Good Condition	Moderate		8	C	Manage in Place		One difficult to see but visually similar to others in area
7-3	Jock-Turcot	Pipe Elbows/fittings	West end, near ceiling, pipe elbow	Confirmed	Friable	Poor Condition	Easy		1	C	Repair or Remove Following Type 2 Abatement Procedures		
7-3	Jock-Turcot	Pipe Elbows/fittings	East end	Confirmed	Friable	Good Condition	Easy		2	C	Manage in Place		
9-2	Vanier to CAREG	Parging on Pipe Ends	Throughout	Confirmed	Friable	Good Condition	Easy		14	C	Manage in Place		
9-3	Vanier	Parging on Pipe Ends	Under Hagen	Confirmed	Friable	Poor Condition	Easy		1	C	Repair or Remove Following Type 2 Abatement Procedures	\$ 250.00	
9-3	Vanier	Parging on Pipe Ends	Middle section, waist level, parging around hanger	Confirmed	Friable	Poor Condition	Easy		2	C	Repair or Remove Following Type 2 Abatement Procedures	\$ 250.00	
9-3	Vanier	Parging on Pipe Ends	3 at east end, 3 near west end	Confirmed	Friable	Good Condition	Easy		6	C	Manage in Place		
9-3	Vanier	Pipe Elbows/fittings	Near bend	Confirmed	Friable	Fair Condition	Easy		1	C	Repair or Remove Following Type 2 Abatement Procedures	\$ 250.00	
9-3	Vanier	Pipe Elbows/fittings	Near bend	Confirmed	Friable	Good Condition	Easy		6	C	Manage in Place		
9-4	transway to Vanier	Pipe Elbows/fittings	East end	Confirmed	Friable	Good Condition	Easy		10	C	Manage in Place		
10-2	Marion to D'Iorio	Pipe Elbows/fittings	Central	Confirmed	Friable	Good Condition	Easy		7	C	Manage in Place		
10-3	Marion, 001B	Pipe Elbows/fittings	North end, north bend, near ceiling, pipe elbow	Confirmed	Friable	Fair Condition	Easy		2	C	Repair or Remove Following Type 2 Abatement Procedures	\$ 250.00	
10-3	Marion, 001B	Pipe Elbows/fittings	4 at north end, 4 at north bend, 16 at intersection	Confirmed	Friable	Good Condition	Moderate		-	C	Manage in Place		Several difficult to see but visually similar to others in area
11-5	Protection to Colonel By	Pipe Elbows/fittings	3 at north end, 2 at south end	Confirmed	Friable	Fair Condition	Easy		5	C	Repair or Remove Following Type 2 Abatement Procedures	\$ 250.00	
11-7	Protection	Pipe Elbows/fittings	North end	Confirmed	Friable	Good Condition	Easy		3	C	Manage in Place		
11-8	D'Iorio to Protection	Pipe Elbows/fittings	West end, waist level, pipe elbow	Confirmed	Friable	Poor Condition	Easy		2	C	Repair or Remove Following Type 2 Abatement Procedures	\$ 250.00	
11-8	D'Iorio to Protection	Pipe Elbows/fittings	West end	Confirmed	Friable	Good Condition	Easy		6	C	Manage in Place		
11-9	D'Iorio, 026D	Pipe Elbows/fittings	Middle section	Confirmed	Friable	Good Condition	Easy		6	C	Manage in Place		

Tunnel Section	Area	Type of ACM	Description	Asbestos Confirmed/ Suspected	Friable/Non-Friable	Damaged/ Deteriorated	Accessibility	Level of Work Near Material	Approx. Quantity	Unit	Recommended Action	Estimated Abatement Cost	Comments
All	Throughout	Cementitious Coating		Suspected	-	Good Condition	Easy		-	-	Manage in Place		Concrete wall parging was previously confirmed to contain 2% Chrysotile asbestos in the section of the tunnel that was demolished as part of the City of Ottawa Light Rapid Transit project; similar coatings may be present elsewhere and should be tested prior to any work

## APPENDIX F

### Hazardous Containing Materials Checklists

Tunnel Section	Area	DS Type	Component	Colour	Condition	Manufacturer	Quantity #	Unit	Suspected/ Confirmed	Recommended Action	Estimated Abatement Cost	Comments
3-2	Simard to Parking, along Waller St S	Water Damage	Concrete, Mortar, Etc.		Poor Condition	N/A	12	SF	Confirmed	Should be replaced as part of regular maintenance.		Near north end
10-2	Marion to D'Iorio	Water Damage	Concrete, Mortar, Etc.		Poor Condition	N/A	15	SF	Confirmed	Should be replaced as part of regular maintenance.		
All	Throughout Surveyed Area	Lead	Wall Paint	Yellow	Poor Condition	N/A	-	-	Confirmed	Paint must be removed and/or stabilized following Class 1/2 or Type 1/2 lead Procedures as per MOL and EACO Guidelines.		Areas of poor condition found througho ut, particular ly in less frequent ed areas like Tunnels 3 and 6
All	Throughout Surveyed Area	Polychlorinate d Biphenyls (PCBs)	Light Ballast	N/A	Good Condition	N/A	-	-	Suspected	Manage in Place		
All	Throughout Surveyed	Mercury	Fluorescent Light Tubes	N/A	Good Condition	N/A	-	-	Confirmed	Manage in Place		
All	Throughout Surveyed Area	Mercury	Thermostat	N/A	Good Condition	N/A	-	-	Confirmed	Manage in Place		In sections 2-4, 2-5, 2-6, 2-7, 3-1, and 6-4, Ref. No. 045870 (80)

Tunnel Section	Area	DS Type	Component	Colour	Condition	Manufacturer	Quantity #	Unit	Suspected/ Confirmed	Recommended Action	Estimated Abatement Cost	Comments
All	Throughout Surveyed Area	Radioactive Material	Smoke Detector	N/A	Good Condition	N/A	-	-	Confirmed	Manage in Place		
All	Throughout Surveyed Area	Silica	Concrete, Mortar, Etc.	N/A	Good Condition	N/A	-	-	Confirmed	Manage in Place		

## APPENDIX G

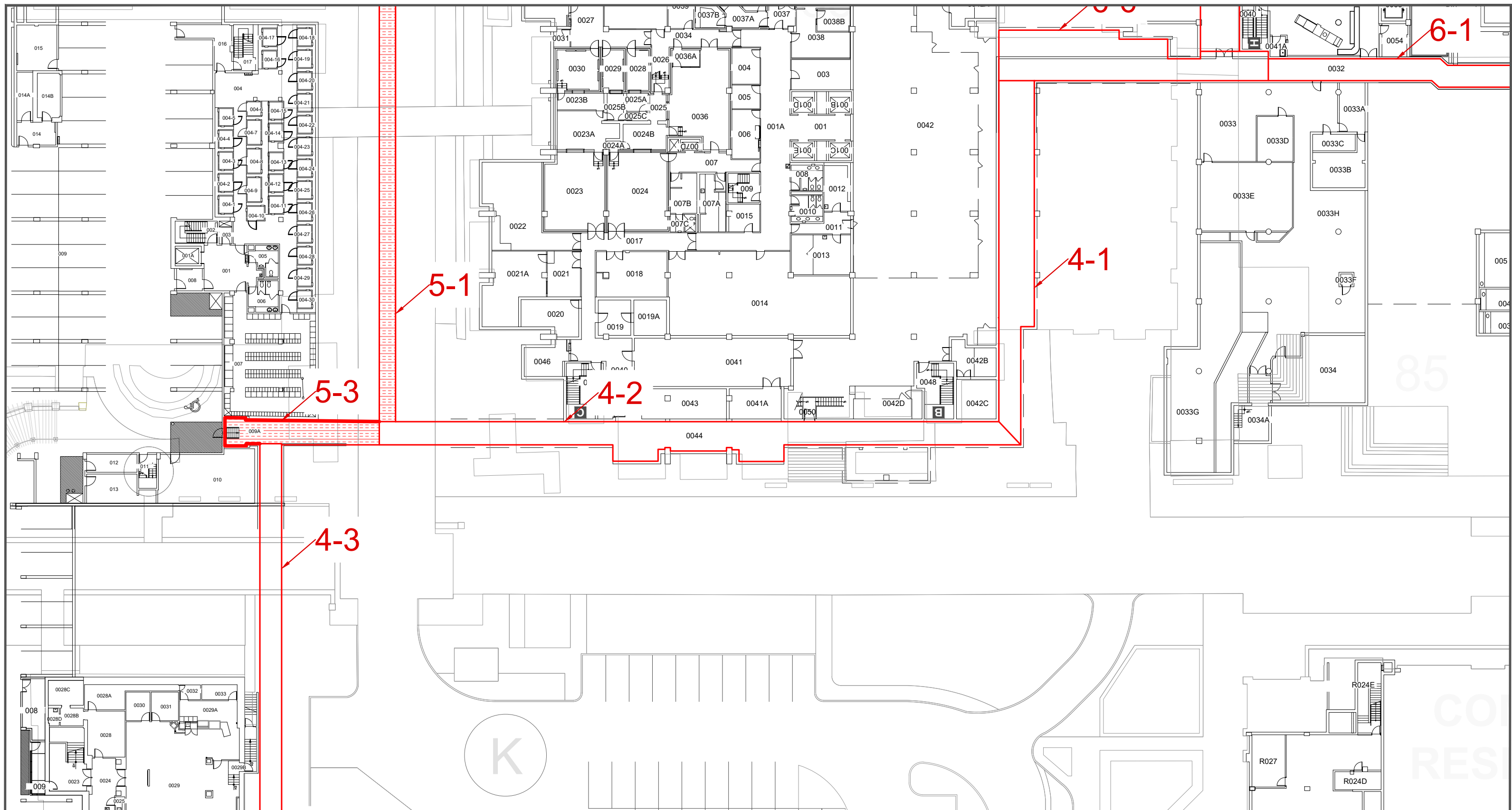
### Site Sampling & Location Plans











**McINTOSH PERRY**  
6240 HIGHWAY 7 SUITE 200 WOODBRIDGE ON L4H 4G3  
Tel: 905.856.5200 Fax: 905.695.0221  
Toll Free: 1.888.348.8991 [www.mcintoshperry.com](http://www.mcintoshperry.com)

**Legend:**

- ▲ Asbestos Bulk Sample
- Lead Paint Sample <LOD
- Lead Paint Sample >LOD

 ACM Mechanical Insulation

**NOTES:**

THE CONTRACTOR SHALL CHECK AND VERIFY ALL DIMENSIONS,  
REPORT ALL ERRORS AND OMISSIONS TO THE CONSULTANTS, PRIOR  
TO PROCEEDING WITH ANY WORKS.

CLIENT: UNIVERSITY OF OTTAWA

PROJECT: TUNNEL SYSTEM  
DESIGNATED SUBSTANCE SURVEY

TITLE: SAMPLE LOCATIONS  
TUNNEL 4

SCALE: 1:400

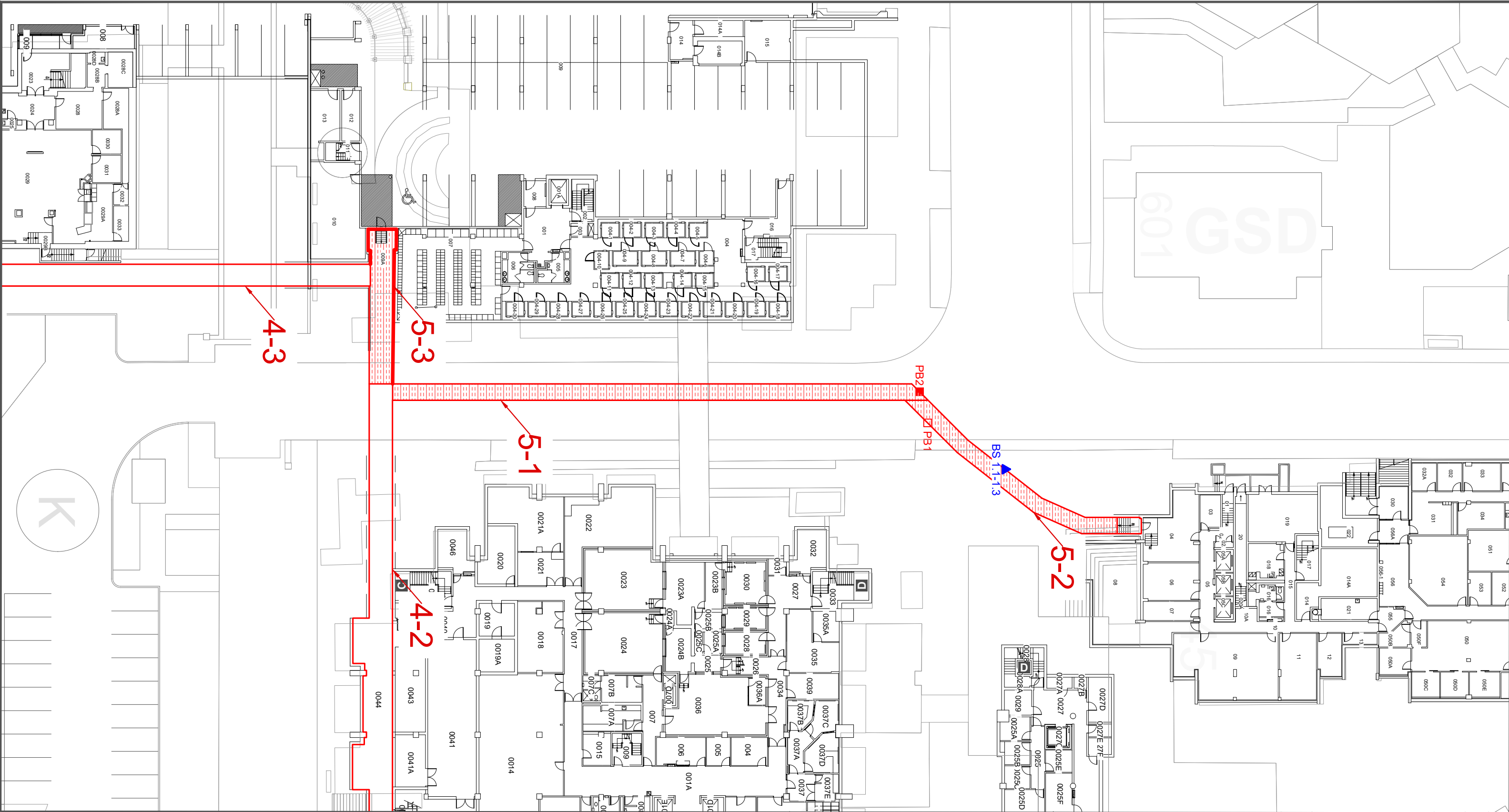
DATE:	DECEMBER 21, 2020
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DRAWN: K.B.

CHECKED:	J.T.
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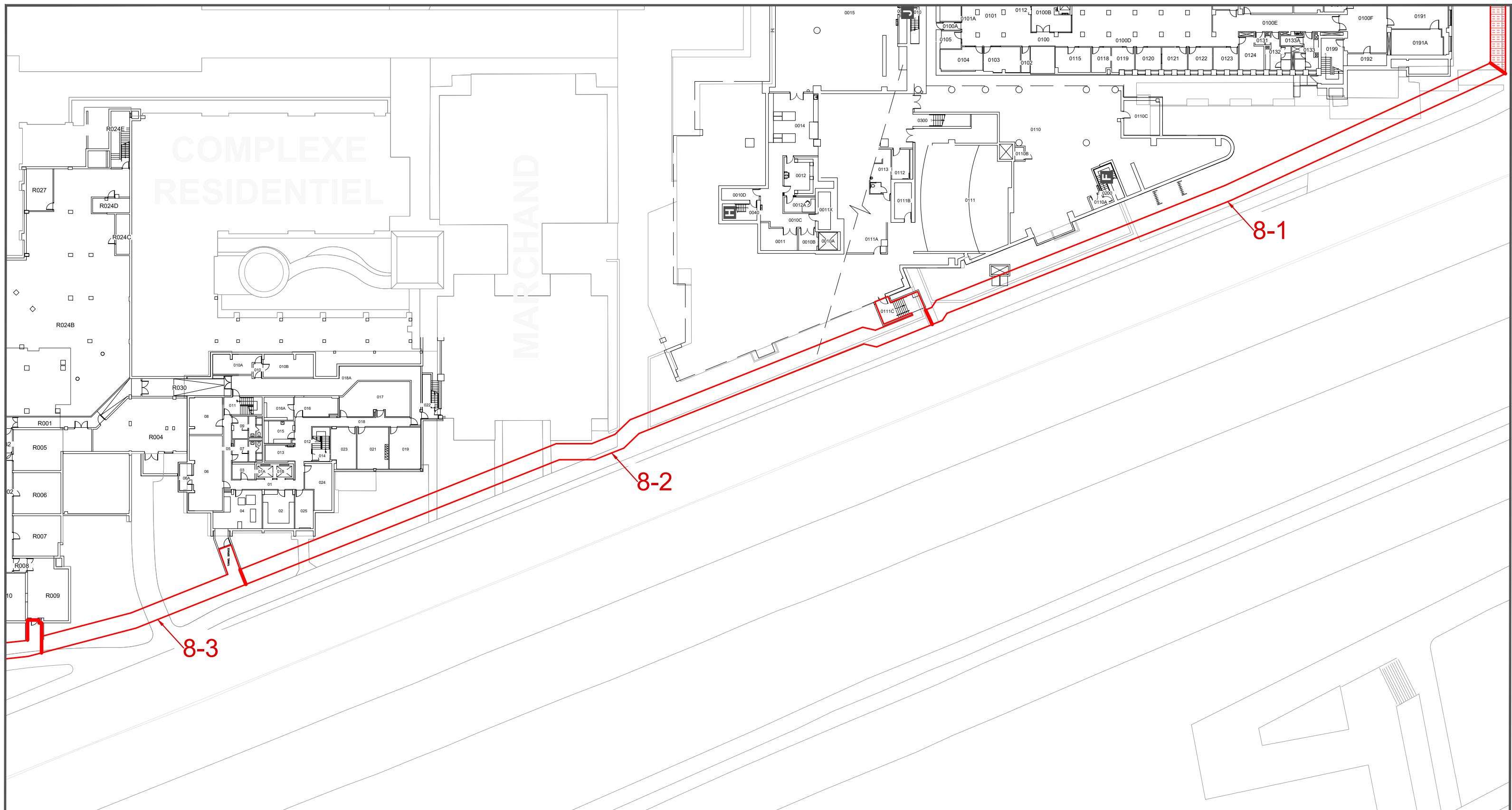




<div>McINTOSH PERRY</div> <div>6240 HIGHWAY 7 SUITE 200 WOODBRIDGE ON L4H 4G3</div> <div>Tel: 905.856.5200 Fax: 905.695.0221</div> <div>Toll Free: 1.888.348.8991 www.mcintoshperry.com</div> <div>THE CONTRACTOR SHALL CHECK AND VERIFY ALL DIMENSIONS, REPORT ALL ERRORS AND OMISSIONS TO THE CONSULTANTS, PRIOR TO PROCEEDING WITH ANY WORKS.</div>	<div>Legend:</div> <div>▲Asbestos Bulk Sample</div> <div>□Lead Paint Sample &lt;LOD</div> <div>■Lead Paint Sample &gt;LOD</div> <div>▨ACM Mechanical Insulation</div> <div>NOTES:</div>	CLIENT: UNIVERSITY OF OTTAWA	TITLE: SAMPLE LOCATIONS TUNNEL 5					
		PROJECT: TUNNEL SYSTEM DESIGNATED SUBSTANCE SURVEY	SCALE: 1:400	DATE: DECEMBER 21, 2020				
			DRAWN: K.B.	CHECKED: J.T.	DRAWING NUMBER: A4		REV.:	







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6240 HIGHWAY 7 SUITE 200 WOODBRIDGE ON L4H 4G3  
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Toll Free: 1.888.348.8991 [www.mcintoshperry.com](http://www.mcintoshperry.com)

**Legend:**

▲ Asbestos Bulk Sample  
□ Lead Paint Sample <LOD  
■ Lead Paint Sample >LOD

 ACM Mechanical Insulation

NOTES:

THE CONTRACTOR SHALL CHECK AND VERIFY ALL DIMENSIONS, REPORT ALL ERRORS AND OMISSIONS TO THE CONSULTANTS, PRIOR TO PROCEEDING WITH ANY WORKS.

CLIENT: UNIVERSITY OF OTTAWA

PROJECT: TUNNEL SYSTEM  
DESIGNATED SUBSTANCE SURVEY

TITLE: SAMPLE LOCATIONS  
TUNNEL 8

SCALE: 1:500

DATE:  
DECEMBER 21, 2020

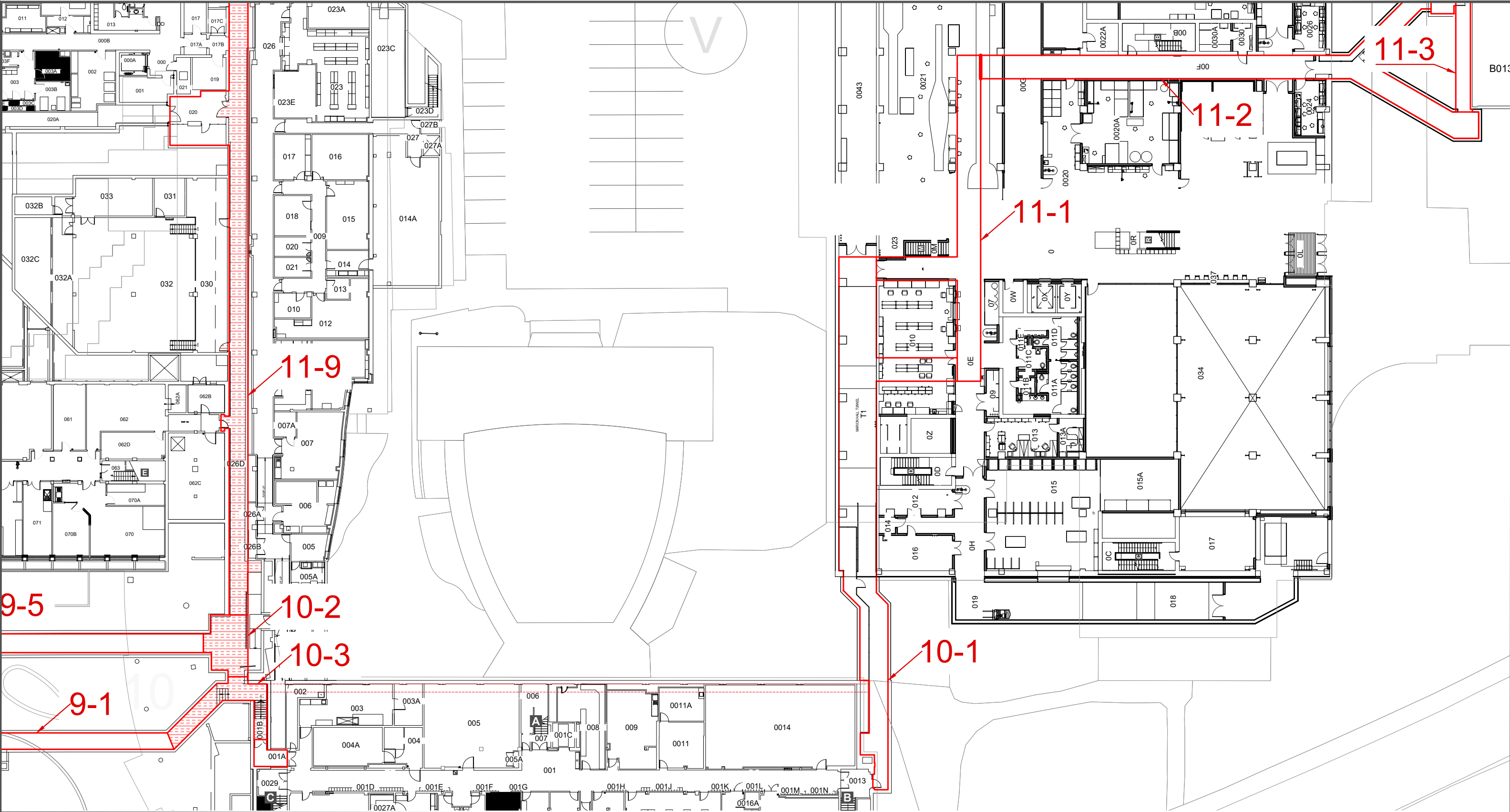
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CHECKED:	J.T.
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REV. NO.	DESCRIPTION	DATE	BY	APPD.
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<div>McINTOSH PERRY</div> <div>6240 HIGHWAY 7 SUITE 200 WOODBRIDGE ON L4H 4G3</div> <div>Tel: 905.856.5200 Fax: 905.695.0221</div> <div>Toll Free: 1.888.348.8991 www.mcintoshperry.com</div> <div>THE CONTRACTOR SHALL CHECK AND VERIFY ALL DIMENSIONS, REPORT ALL ERRORS AND OMISSIONS TO THE CONSULTANTS, PRIOR TO PROCEEDING WITH ANY WORKS.</div>	<div>Legend:</div> <div>▲Asbestos Bulk Sample</div> <div>□Lead Paint Sample &lt;LOD</div> <div>■Lead Paint Sample &gt;LOD</div> <div>NOTES:</div>	<div>🇺🇸 ACM Mechanical Insulation</div>	CLIENT:	UNIVERSITY OF OTTAWA	TITLE:		SAMPLE LOCATIONS TUNNEL 10												
			PROJECT:	TUNNEL SYSTEM DESIGNATED SUBSTANCE SURVEY	SCALE:	I:400	DATE:	DECEMBER 21, 2020											
					DRAWN:	K.B.	CHECKED:	J.T.					DRAWING NUMBER: A9			REV.:			

