APPENDIX E:
DESIGNATED SUBSTANCES AND HAZARDOUS MATERIALS ASSESSMENT

Stantec

Designated Substances and Hazardous Materials Assessment, Highway 401, Planning Preliminary Design and Class Environmental Assessment, City of Brockville (G.W.P. 4003-19-00)

Final Report

April 26, 2021

Prepared for:

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Executive Summary

The Ontario Ministry of Transportation (MTO) retained Stantec Consulting Ltd. (Stantec) to complete the Planning Preliminary Design and Class Environmental Assessment (EA) for Highway 401 within the City of Brockville.

The Study Area in the City of Brockville, includes the following structures:

- Highway 401/Stewart Boulevard Interchange (Site 16-121)
- Highway 401/Buells Creek Culvert (Site 16-237/C)
- Highway 401/CNR Overhead (Site 16-122)
- Highway 401/Ormond Street Overpass (Site 16-123)
- Highway 401/North Augusta Road Interchange (Site 16-124)

The purpose of the assessment was to identify a list of potential designated substances and hazardous materials that may require special attention prior to the Highway 401 rehabilitation and pavement reconstruction in the City of Brockville. The designated substances and hazardous materials assessment report outlines the requirements of the Ontario *Occupational Health and Safety Act* (OHSA). The designated substances assessment list includes those substances designated under the OHSA and includes (but was not limited to) asbestos, lead, mercury and silica as the most likely to be present. In addition to designated substances, the hazardous materials considered in this report included polychlorinated biphenyls (PCBs).

This DSHMA report has been prepared as part of the preliminary design phase to document the background review process.

Based on the visual assessment, presumed designated substances and hazardous materials were identified to be present. **Table 1** below provides a summary of the materials found and recommendations on their management.

Table 1: Summary of Findings

Materials	Comments
Arsenic	Arsenic may be present in paints and adhesives, but at concentrations that are not expected to be a concern.
Asbestos	The following materials were observed to be present but not sampled, and are listed as presumed asbestos-containing materials (PACMs): • Electrical conduit • Drainpipes • Asphalt – North Augusta Road, Ormond Street, Stewart Boulevard • Road patch – North Augusta Road • Expansion joint caulking The condition of these materials is unknown as there was no access (refer to **Appendix D**). These materials were inaccessible and could not be sampled due to the high-speed traffic in the area. As these materials are known to have been manufactured with asbestos, they should be presumed to be asbestos containing unless proven otherwise by laboratory analysis.
Lead	Paint applications were observed in the form of road paint and as safe access to the road could not be gained, no paint applications were collected for analysis. Lead may also be present in the following materials: • Older electrical wiring materials and sheathing • Solder used in bell fittings for cast iron pipes • Solder used in electrical equipment • Vent and pipe flashings.
Silica	The presence of silica may be present in materials such as asphalt, cement and concrete.
Benzene	None identified. May be present in paints, adhesives and asphalt.
Other Designated Substances	Acrylonitrile, coke oven emissions, ethylene oxides, isocyanates, and vinyl chloride are not typically a concern in materials, and therefore these substances were not investigated.
Mercury	Equipment suspected to contain mercury was not observed. Mercury may be present in paints and adhesives.
Polychlorinated Biphenyls (PCBs)	Four high intensity streetlights suspected to contain PCBs were observed at the Highway 401/Ormond Street Overpass (Site 16-123). PCBs may be also present in other items in limited amounts (e.g. plastics, molded rubber parts, applied dried paints, coatings or sealants, caulking, adhesives, paper, sound-deadening materials, insulation, or felt and fabric products such as gaskets).

The statements made in this Executive Summary text are subject to the same limitations included in this report and are to be read in conjunction with the remainder of this report.

Recommendations pertaining to the handling, removal, disposal and management of identified designated substances and hazardous materials are provided within this report.

1.0 INTRODUCTION

The Ontario Ministry of Transportation (MTO) retained Stantec Consulting Ltd. (Stantec) to complete the Planning Preliminary Design and Class Environmental Assessment (EA) for Highway 401 within the City of Brockville.

The purpose of the assessment was to identify a list of potential designated substances and hazardous materials that may require special attention prior to the Highway 401 rehabilitation and/or replacement of various structures and pavement reconstruction within the City of Brockville. The designated substances and hazardous materials assessment report outlines the requirements of the Ontario *Occupational Health and Safety Act* (OHSA). The designated substances assessment list includes those substances designated under the OHSA and includes (but was not limited to) asbestos, lead, mercury and silica as the most likely to be present. In addition to designated substances, the hazardous materials considered in this report included polychlorinated biphenyls (PCBs).

This DSHMA report has been prepared as part of the preliminary design phase to document the background review process.

The site work was conducted by Michael Shortt on November 18, 2020.

1.1 UNDERSTANDING OF THE PROJECT

The MTO commissioned this assessment as a measure of due diligence in maintaining compliance with provincial regulations pertaining to the identification of designated substances and hazardous materials prior to the Project. The following sites (Study Area) are included in this report.

Table 2: Site Identification

Site(s)	Structure
Site 16-121	Highway 401/Stewart Boulevard Interchange
Site 16-237/C	Highway 401/Buells Creek Culvert
Site 16-122	Highway 401/CNR Overhead
Site 16-123	Highway 401/Ormond Street Overpass
Site 16-124	Highway 401/North Augusta Road Interchange

2.0 SCOPE

The scope of work for this assessment involved the following:

- A review of existing information, including site drawings, previous assessment documentation and discussions with site personnel, where available
- A visual assessment of readily accessible areas for the presence of designated substances and hazardous materials
- Evaluation and interpretation of field findings to develop conclusions and recommendations pertaining to designated substances and hazardous materials identified to be present.

2.1 LIMITATIONS

This report reflects observations made within areas accessed. The assessment for the presence of designated substances and hazardous materials is visual in nature and is conducted pertaining to readily visible surfaces within accessible spaces only. Concealed spaces are assessed via existing access panels, where present. Destructive investigation was not conducted to access concealed areas. Sampling of suspect asbestos-containing materials (ACMs) and suspect lead-containing (LCPs) was not completed due to access restrictions pertaining to operational roadways.

MTO has reported that asbestos was not used in asphalt on highways paved by the MTO and therefore Highway 401 asphalt is not considered to be an asbestos-containing material. Asphalt on roads paved by the local municipality is considered to be a presumed asbestos-containing material.

Due to limitations on the agreed to scope of work for this project, as well as physical limitations in accessing concealed areas and limitations with working in operational roads, there are specific limitations to the information that can be provided to each designated substance and hazardous materials considered in this DSHMA report. As outlined below, the presence (and the asbestos content) of some structure materials can neither be confirmed or denied.

- Sub-grade materials (e.g., asbestos cement drainage pipe)
- Insulation material present inside walls (e.g., suspected ACMs inside concrete structures)

The presence of mercury or mercury-containing equipment in inaccessible areas or as internal parts of equipment, are not assessed.

Conclusions and recommendations regarding the presence of PCBs are based on limited observations and information provided regarding lighting renovations and is presented to provide guidance regarding the likelihood that PCB-containing equipment is or is not present. The exact extent and/or number of fluorescent lamp ballasts containing PCBs, if any, are not commented on. However, the number of fluorescent light fixtures with lamp ballasts that may contain PCBs will be documented.

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In general, the assessment for the presence of other designated substances and hazardous materials is visual in nature and is conducted pertaining to readily visible surfaces within accessible accessed spaces only. The potential presence of hazardous materials in inaccessible areas which are not assessed includes but is not limited to: spaces inside concrete structures and buried materials.

Should a material become exposed during the construction activities that is suspected to contain asbestos, lead or other designated substances, it should be sampled to confirm the presence or absence of the designated substance and handled accordingly.

3.0 DESIGNATED SUBSTANCES AND HAZARDOUS MATERIALS

The results of the visual assessment for each of the considered designated substances and hazardous materials are provided in the following sub-sections. Refer to **Appendix A** for regulatory framework and relevant legislation with respect to designated substances and hazardous materials.

Selected site photographs are provided in **Appendix B**.

3.1 SITE DESCRIPTION

The Study Area consists of the five sites in the City of Brockville located within the MTO right-of-way, as shown in **Appendix C**. The Study Area includes Highway 401/Stewart Boulevard Interchange (Site 16-121), Highway 401/Buells Creek Culvert (Site 16-237/C), Highway 401/CNR Overhead (Site 16-122), Highway 401/Ormond Street Overpass (Site 16-123), Highway 401/North Augusta Road Interchange (Site 16-124). The typical structural components and finishes associated with these structures consist of concrete slab with asphalt surfacing and steel supports and concrete retaining walls.

3.2 DOCUMENT REVIEW

The following documentation was reviewed prior to preparing the DSHMA report:

- *Highway Standards Branch, Provincial Engineering Memorandum, Design and Contract Standards Office #2014-05*, Dated October 20, 2014

3.3 PROJECT-SPECIFIC LIMITATIONS

The Study Area was not accessible due to the high-speed traffic hazards. A visual assessment for the presence of designated substances and hazardous materials was undertaken from a safe distance. Below are the site specific limitations for each area assessed. A site plan showing the Study Area is provided in **Appendix C**.

Site 16-121 – Highway 401/Stewart Boulevard Interchange

Highways closures and Stewart Boulevard were not available at the time of the assessment. The assessment was limited to a visual assessment from the sidewalks and banks of the highway and Stewart Boulevard. As safe access to the roads could not be gained, no representative samples were collected for analysis. Materials visually observed are presumed to contain asbestos.

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Site 16-122 – Hwy 401/CNR Overhead

Highway closures for Highway 401 and the rails track were not available at the time of the assessment. As such access was limited to a visual inspection from the commercial parking lot located north of the tracks.

Site 16-123 – Ormond Street Overpass

Highway closures for Highway 401 and Ormond Street were not available at the time of the assessment. As such the assessment was limited to a visual assessment from the sidewalks and banks of the highway.

Site 16-124 – North Augusta Road Interchange

Highway closures for North Augusta Road and Highway 401 beneath the bridge were not available at the time of the assessment. As such the assessment was limited to a visual assessment from the sidewalks on the northeast and southeast banks.

Site 16-237/C - Highway 401/Buells Creek Culvert

This area was accessed from the north side of the Highway 401, no suspect materials were observed to be sampled.

3.4 ARSENIC

3.4.1 Methodology

A visual assessment was undertaken in order to check for the presence of materials that may contain arsenic. Arsenic can be present in pressure treated lumbers, creosote, paints and hot mixed asphalt.

3.4.2 Findings

Arsenic may be present in paints and hot mixed asphalt, but at concentrations that are not expected to be a concern.

3.4.3 Recommendations

Recommendations outlined in 3.6.3 of this report, regarding the handling of lead, will also be sufficient for the handling of arsenic in paints.

3.5 ASBESTOS

A site plan showing the locations of presumed asbestos-containing materials (PACMs) is provided in **Appendix C**.

A summary of occurrences of PACMs is provided in **Appendix D**. Each occurrence includes the following information:

- Study Area component that contains PACM
- Location of the PACM within the Study Area
- PACM description
- Estimated quantity
- Friability
- Condition

The evaluation criterion for assessing ACMs is provided in **Appendix E**.

3.5.1 Methodology

A visual assessment of accessible areas was undertaken in order to check for the presence of materials suspected of containing asbestos. Locations to collect discrete bulk asbestos samples of suspect materials were identified. Samples of representative materials were not collected as part of this assessment for health and safety reasons, as road closures would be required.

A visual assessment of the condition and accessibility was completed for each occurrence of an ACM. The Public Services and Procurement Canada (PSPC) document entitled *Asbestos Management Standard* (June 5, 2017, updated October 24, 2018) was used as the basis for the criteria that was applied in evaluating the presence of ACMs, where applicable.

Sampling was not undertaken during the assessment. Refer to Section 3.3 for sampling limitations.

MTO has reported that asbestos was not used in asphalt on highways paved by the MTO and therefore Highway 401 asphalt is not considered to be an asbestos-containing material. Asphalt on roads paved by the local municipality should be presumed to be asbestos-containing unless proven otherwise by laboratory analysis.

3.5.2 Findings

3.5.2.1 Presumed Asbestos-Containing Materials

The following materials were observed to be present and are listed as presumed asbestos-containing materials (PACMs):

- Electrical conduit
- Drainpipes
- Expansion joint caulking
- Asphalt – North Augusta Road, Ormond Street, Stewart Boulevard
- Road patch – North Augusta Road

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The condition of these materials is unknown as there was no access (refer to **Appendix D**). These materials were inaccessible and could not be sampled due to the high-speed traffic in the area. As these materials are known to have been manufactured with asbestos, they should be presumed to be asbestos containing unless proven otherwise by laboratory analysis.

3.5.2.2 Non-Asbestos-Containing Materials

MTO has reported that asbestos is not present in asphalt on highways paved by the MTO and therefore this material is not considered to be an asbestos-containing material and was not sampled.

3.5.3 Recommendations

Based on the visual assessment, the locations of PACMs are provided in **Appendix D**. Stantec recommends the following with regards to meeting the requirements of O. Reg. 278/05:

- Should disturbance of PACMs be required during the Project, undertake testing of these materials to determine their asbestos content. Confirmed asbestos materials should be handled accordingly.
- Should a material suspected to contain asbestos fibres become uncovered during the Project, all work in the areas that may disturb the material should be stopped. Samples of the suspect material should be submitted for laboratory analysis to determine if asbestos fibres are present. Confirmed asbestos materials should be handled accordingly.

3.6 LEAD

3.6.1 Methodology

A visual assessment of accessible areas was undertaken in order to check for the presence of materials that may contain lead. These materials included paint applications, wiring and plumbing etc.

3.6.2 Findings

The following paint applications were observed to be present. As safe access could not be acquired, paint sampling was not undertaken.

Site 16-121 – Highway 401/Stewart Boulevard Interchange

- Yellow coloured road paint
- White coloured road paint

Site 16-122 – Hwy 401/CNR Overhead

- Paint applications not observed

Site 16-123 – Ormond Street Overpass

- Yellow coloured road paint
- White coloured road paint

Site 16-124 – North Augusta Road Interchange

- Yellow coloured road paint
- White coloured road paint

Site 16-237/C - Highway 401/Buells Creek Culvert

- Paint applications were not observed

Lead may also be present in the following materials:

- Other coating applications not tested
- Older electrical wiring materials and sheathing
- Solder used in bell fittings for cast iron pipes
- Solder used in electrical equipment
- Vent and pipe flashings.

3.6.3 Recommendations

Work that may disturb any lead-containing materials should follow the recommendations provided in the documents entitled

- *Environmental Abatement Council of Ontario (EACO) Lead Guideline for Construction, Maintenance or Repair,* dated October 2014
- *Ministry of Labour (MOL) Lead Guideline for Construction, Renovation* Maintenance or Repair, issued October 2014

This document outlines the following with respect to lead: legal requirements, health effects, controlling the lead hazard, classification on work and measures and procedures for working with lead.

3.7 SILICA

3.7.1 Methodology

A visual assessment for the presence of silica within the Study Area was conducted. The presence of silica in construction materials such as concrete, cement, and asphalt. was noted.

3.7.2 Findings

Silica is expected to be present in the concrete, cement and asphalt found in the Study Area.

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3.7.3 Recommendations

The classification of work determines the appropriate respirators, measures, and procedures that should be followed to protect workers from silica exposure. Precautions should be taken as required during concrete work for replacement of the structure (i.e., coring through concrete slabs, demolition of masonry or concrete units, brick, etc.) where dust may be generated.

Work that may disturb silica-containing materials, such as the Highway 401 rehabilitation and pavement reconstruction, should follow the recommendations provided in the document entitled:

- *Guideline: Silica on Construction Projects,* issued by the Ministry of Labour (MOL), dated April 2011

The Guideline outlines: legal requirements, health effects, controlling the silica hazard, classification on work and measures, and procedures for working with silica.

3.8 BENZENE

3.8.1 Methodology

A visual assessment was undertaken in order to check for the presence of materials suspected of containing benzene. Benzene can be found as a constituent of hydrocarbon-based mixtures and is present in paints, adhesives and asphalt.

3.8.2 Findings

Benzene may be present in paints, adhesives and asphalt.

3.8.3 Recommendations

Benzene as a constituent of hydrocarbon-based mixtures is not expected to be a worker exposure concern.

3.9 OTHER DESIGNATED SUBSTANCES: ACRYLONITRILE, COKE OVEN EMISSIONS, ETHYLENE OXIDES, ISOCYANATE, VINYL CHLORIDE

3.9.1 Methodology

Designated substances including acrylonitrile, coke oven emissions, ethylene oxides, isocyanates, and vinyl chloride are not typically a concern in materials, and therefore these substances were not investigated. However, some common sources are shown below.

- Acrylonitrile may be present in stable form in paints and adhesives
- Uncured Isocyanate may be present in paint finishes, varnishes, polyurethane plastics, synthetic rubbers, foams and adhesives

- Vinyl chloride (monomer) is generally likely to be present in stable form within the PVC piping and conduits, where applicable

3.9.2 Findings

None identified.

3.10 MERCURY

3.10.1 Methodology

A visual assessment for the presence of mercury-containing equipment was conducted.

3.10.2 Findings

Equipment suspected to be mercury-containing was observed on site 16-123. Four high intensity light were observed on the under pass. Mercury may be present in paints and adhesives.

3.10.3 Recommendations

Mercury vapour within light fixtures poses no risk to workers or occupants provided the mercury containers remain intact and undisturbed. Complete removal of mercury-containing equipment is required prior to activities that may disturb the equipment. Prior to work that would disturb the light tubes, they must be removed and stored in a safe, secure location or disposed of following the requirements of *R.R.O. 1990, Regulation 347 General - Waste Management,* as amended (R.R.O. 1990, Reg. 347) under the EPA.

Recommendations outlined in 3.6.3 of this report, regarding the handling of lead, will also be sufficient for the handling of mercury in paints and adhesives.

3.11 POLYCHLORINATED BIPHENYLS

3.11.1 Methodology

A visual review for the presence of PCBs in electrical equipment is completed. Equipment that is generally suspected of containing PCBs includes lamp ballasts, transformers, hydraulic systems, compressors, switchgear and capacitors.

No sampling of dielectric fluids was undertaken as part of this assessment.

3.11.2 Findings

Four high intensity streetlights suspected to contain PCBs were observed at Site 16-123 Ormond Street Overpass.

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Polychlorinated Biphenyls may be also present in dielectric fluid filled electrical equipment such as motors or pumps, capacitors or transformers. Although they may also be present in other items in limited amounts (e.g. plastics, molded rubber parts, applied dried paints, coatings or sealants, caulking, adhesives, paper, sound-deadening materials, insulation, or felt and fabric products such as gaskets), PCBs are not expected to be present in those materials in concentrations that would necessitate the requirement for PCB-specific handling procedures, separate removal and/or disposal considerations for renovation or demolition. As such, these items were not considered in our assessment.

3.11.3 Recommendations

Fluorescent lamp ballasts that may contain PCBs can be managed in place, where these items are operating and in good condition.

When decommissioned, verify the PCB content of fluorescent lamp ballasts as per the Environment Canada publication Identification of Lamp Ballasts Containing PCBs, 1991. Handle, store and dispose of PCB-containing ballasts in accordance with Federal Regulation SOR/2008-273, under CEPA and R.R.O. 1990, Reg. 362.

Should another material suspected to contain PCBs become uncovered during demolition activities (i.e., dielectric fluids, hydraulic fluids), all work in the areas that may disturb the material should be stopped. Samples of the suspect material should be submitted for laboratory analysis to determine if PCBs are present. Confirmed PCBs should be handled in accordance with Federal Regulation SOR/2008-273 and R.R.O. 1990, Reg. 362, under the EPA.

4.0 CLOSURE

This report has been prepared for the sole benefit of the Ontario Ministry of Transportation. The report may not be used by any other person or entity without the express written consent of Stantec Consulting Ltd. and the Ontario Ministry of Transportation

Any use which a third party makes of this report, or any reliance on decisions based on it, is the responsibility of such third parties. Stantec Consulting Ltd. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

The information and conclusions contained in this report are based upon work undertaken by trained professionals and technical staff in accordance with generally accepted engineering and scientific practices current at the time the work was performed. Conclusions presented in this report should not be construed as legal advice.

The conclusions presented in this report represent the best technical judgment of Stantec Consulting Ltd. based on the data obtained from the work.

The conclusions are based on the site conditions encountered by Stantec Consulting Ltd. at the time the work was performed at the specific assessment and can only be extrapolated to an undefined limited area around these locations. The extent of the limited area depends on structure construction and conditions, weather, structure usage and other factors. Due to the nature of the investigation and the limited data available, Stantec Consulting Ltd. cannot warrant against undiscovered environmental liabilities.

If any conditions become apparent that differ significantly from our understanding of conditions as presented in this report, we request that we be notified immediately to reassess the conclusions provided herein.

We trust that the above is satisfactory for your purposes at this time. Should you have any questions or concerns, or require additional information, please do not hesitate to contact the Stantec Project Manager at your convenience.

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Closure
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This report was prepared by Irina Vysotskaia and reviewed by Linda Fleet and Martin Ling.

Regards,

STANTEC CONSULTING LTD.

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APPENDICES

Appendix A DESIGNATED SUBSTANCES AND HAZARDOUS MATERIALS BACKGROUND INFORMATION AND REGULATORY FRAMEWORK

Designated Substances

Asbestos

Asbestos is typically found in plaster, mechanical insulation, gaskets, thermal insulation on pipes, refractory material, roofing felts, floor tiles, ceiling tiles and parging, heat resistant panels, incandescent light fixture reflector plates, and any other material requiring a high degree of durability or thermal resistance. The common use of potential (breakable by hand) asbestos-containing materials (ACMs) in construction ceased voluntarily in the mid-1970s; however, the spray application of asbestos-containing fireproofing was not prohibited until 1986.

Asbestos-containing materials are grouped into two classifications, friable and non-friable materials. Friable ACMs are those that can easily be crumbled or broken apart by mere hand pressure. When these materials break apart asbestos fibres are then released into the atmosphere. Non-friable ACMs or “manufactured products” are materials that by the nature of their manufacturing/construction do not readily allow the release of asbestos fibres. These materials should not be cut or shaped with power tools, since this procedure may allow for the release of the asbestos fibres. Some materials or “manufactured products”, such as plaster, drywall and ceiling tiles that are considered to be non-friable in an undisturbed state can become friable when damaged or disturbed. These are often referred to as “potentially” friable materials.

Ontario Regulation 490/09 Designated Substances (O. Reg. 490/09), as amended, under the *Ontario Occupational Health and Safety Act* (OHSA) primarily regulates worker exposure to asbestos during manufacturing of asbestos-containing products, but also includes requirements related to respiratory equipment, measurement of airborne fibres, and medical surveillance of exposed workers.

Ontario Regulation R.R.O 1990, Regulation 833, Control of Exposure to Biological or Chemical Agents, as amended (R.R.O. 1990, Reg. 833) made under the OHSA, sets the same time weighted average limit (TWA) value based on 8-hour workdays.

Ontario Regulation 278/05 Designated Substance - Asbestos on Construction Projects and in Buildings and Repair Operations (O. Reg. 278/05), as amended, made under the OHSA defines an ACM as a material that contains 0.5% per cent or more asbestos by dry weight. Ontario Regulation 278/05 requires that an Asbestos Management Program (AMP) be implemented in structures that have been identified to contain asbestos.

The general waste management regulation for the province of Ontario *R.R.O. 1990, Regulation 347 General - Waste Management,* as amended (R.R.O. 1990, Reg. 347) sets out the requirements for the proper disposal of asbestos waste in Ontario. The waste must be placed in a double sealed container, properly labelled, free of cuts, tears or punctures and disposed of at a licensed waste station which has been properly notified of the shipment(s) of asbestos waste. Asbestos waste must be hauled in a vehicle operating under a Certificate of Approval (CofA) from the Ontario Ministry of the Environment,

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Conservation and Parks (MECP). The vehicle must have a trained operator as well as an asbestos spill kit. The asbestos waste must be immediately buried at the licensed landfill operation operating under a CofA from the MECP.

The transport of asbestos waste to the disposal site is covered by the federal *Transportation of Dangerous Goods Act.* Asbestos waste is to be transported in a proper vehicle with appropriate placards and transportation numbering.

Lead

Lead may be used in its pure metallic form or combined chemically with other elements to form lead compounds. Metallic lead is used to make products such as electric storage batteries, ammunition, lead solder, radiation shields, pipes, and sheaths for electric cables. Metallic lead is sometimes combined with other metals such as copper, tin and antimony as lead alloys for use in the manufacture of a variety of metal products.

Organic lead compounds contain a lead atom covalently bonded to carbon. Common examples of organic lead compounds include lead “soaps” such as lead oleates, high pressure lubricants, and anti-knock agents in gasoline.

Inorganic lead compounds (or lead salts) result when lead is combined with an element other than carbon. Examples are lead oxide, lead chromate, lead carbonate and lead nitrate. Inorganic lead compounds may occur as solids or in solutions, and are used in insecticides, pigments, paints, frits, glasses, plastics, and rubber compounds.

Lead may affect the health of workers if it is in a form that may be inhaled, ingested or absorbed through the skin. Lead dust consists of small, solid particles of metallic lead or lead compounds that are generated by sanding, grinding, polishing, and sawing operations. Lead fume is produced in significant amounts when solid lead or materials containing lead are heated to temperatures above 500^{o} C, as in welding and flame cutting or burning.

The United States Department of Housing and Urban Development (HUD) set a criterion of lead-based paint as 0.5% lead (by weight) or 5,000 parts per million (ppm) for evaluating whether lead is a hazard in a residential setting.

In Canada, the Surface Coating Materials Regulations (SOR/2005-109) under the Federal Hazardous Products Act provides a concentration of lead that must not be exceeded in surface coatings that are presently sold in this country. This value has recently been reduced from 600 ppm to 90 ppm. However, it is important to note that there is not a direct correlation between the concentration of lead in a material to the potential occupational exposure if the material is disturbed.

O. Reg. 490/09 (which does not apply to construction projects) and R.R.O. 1990 Reg. 833, an occupational exposure limit (OEL) for airborne lead dust or fumes has been set at the TWA value of 0.05 milligram per cubic metre of air (mg/m^3) for workers. The TWA represents the time-weighted average concentration for a conventional 8-hour workday and a 40-hour workweek, to which it is believed that nearly all workers may be repeatedly exposed, day after day, without adverse health effects.

The *Environmental Abatement Council of Ontario* (EACO) document entitled *Lead Guideline for Construction, Renovation* Maintenance or Repair, issued October 2014 sets out guidelines for operations involving the handling, application, removal, and disturbance or clean-up of lead-containing materials. The guideline is intended for the environmental abatement industry, construction industry and painting industry in general and is based on industry standard best-practices for lead abatement and dust control measures.

The Ontario Ministry of Labour (MOL) document entitled *Guideline: Lead on Construction Projects,* issued by the MOL in April 2011, states that the removal of lead paint is not required unless work on these materials are likely to produce airborne lead dust or fumes, for example during welding, torch cutting, sanding and sand blasting. If these operations are likely to occur during structural rehabilitation of the structures, it is recommended that the removal of lead paint be carried out in accordance with procedures outlined in the proposed regulation.

Although the TWA and some other requirements under O. Reg. 490/09 and R.R.O. 1990 Reg. 833 do not apply to construction projects, procedures that provide the equivalent level of protection should be implemented on such projects where exposure to lead is possible.

Ontario's Waste Management (R.R.O. 1990, Reg. 347) under the *Environmental Protection Act* (EPA) provides directives for the disposal of hazardous materials such as lead.

Mercury

Mercury is commonly found in structures, as it is contained in mercury vapour lighting, and electrical mercury switches. If mercury is exposed to the air, odourless vapours are formed. The regulated occupational exposure limit for airborne mercury is 0.025 mg/m^3 (8-hour TWA) as prescribed in (O. Reg. 490/09) and R.R.O. 1990 Reg. 833.

In Canada, the Surface Coating Materials Regulations (SOR/2005-109) under the Federal Hazardous Products Act provides a concentration of mercury that must not be exceeded in surface coatings that are presently sold in this country. This value was set at 10 ppm in 2005. However, it is important to note that there is not a direct correlation between the concentration of mercury in a material to the potential occupational exposure if the material is disturbed.

Mercury is hazardous if it is inhaled or absorbed through the skin, therefore exposure controls (including both respiratory protection and skin protection) are important to consider.

DESIGNATED SUBSTANCES AND HAZARDOUS MATERIALS ASSESSMENT, HIGHWAY 401, PLANNING PRELIMINARY DESIGN AND CLASS ENVIRONMENTAL ASSESSMENT, CITY OF BROCKVILLE (G.W.P. 4003-19-00)

Appendix A Designated Substances and Hazardous Materials Background Information and Regulatory Framework
April 26, 2021

Mercury disposal should be through a scrap dealer (elemental mercury), recycling firm for mercury vapour and returned to the manufacturer for light tubes and fixtures.

Mercury is included in O. Reg. 490/09 and applies to every employer and worker at a workplace where mercury is present, produced, processed, used, handled, or stored and at which the worker is likely to inhale, ingest, or absorb mercury (the maximum TWA for airborne mercury is 0.025 mg/m^3). Requirements related to exposure to mercury are detailed, including those relating to worker safety and the use of personal protective equipment.

Ontario's Waste Management (R.R.O. 1990, Reg. 347) under the *Environmental Protection Act* (EPA) provides directives for the disposal of hazardous materials such as mercury.

Silica

Silica, also referred to as free crystalline silica, is found in concrete, cement, mortar, ceramic wall and floor tiles, stucco finishes and acoustic ceiling tiles. Prolonged exposure to, and inhalation of free crystalline silica, may result in respiratory disease known as silicosis, which is characterized by progressive fibrosis of the inner lung tissue and marked shortness of breath or impaired lung function. The maximum TWA for airborne Silica dust is 0.05 mg/m^3 (O. Reg. 490/09 and R.R.O. 1990, Reg. 833).

Silica is included in O. Reg. 490/09 and the regulation provides information on the application of the regulation as well as allowable exposure levels, where the maximum TWA for airborne Silica dust is 0.05 mg/m^3. The assessment and control program and medical surveillance requirements are for non-construction projects as defined in O. Reg. 490/09. Refer to the document entitled *Guideline: Silica on Construction Projects,* issued by the MOL in April 2011 for safe silica work practices and personal protective equipment (PPE).

Acrylonitrile

Acrylonitrile is a clear liquid that may be colourless or yellow and that readily reacts with other chemicals to produce long, chain-like molecules (polymers). Acrylonitrile-based polymers are used to produce nitrile rubbers, plastics, acrylic fibres, coatings and adhesives. Workers are typically exposed to acrylonitrile at manufacturing facilities that produce the aforementioned products through inhaling its vapour, direct skin contact, or through ingestion. Although acrylonitrile may be present in some of the structure materials, including adhesives and coatings, the chemical will likely be bonded in the polymer form. Therefore, it is not expected that an adverse exposure to acrylonitrile will occur unless the structure materials are heated to extreme temperatures. Acrylonitrile vapours may become released from the acrylonitrile-based polymers during a process where high temperatures are applied.

The TWA for a worker with respect to Acrylonitrile is 2 ppm as prescribed in O. Reg. 490/09 and R.R.O. 1990 Reg. 833. The short-term exposure limit (STEL) for Acrylonitrile is 10 ppm for any 15-minute exposure period.

Arsenic

The presence of arsenic in the paint coating on interior and exterior finishes is possible. As the painted surfaces will be handled as per the proposed lead regulation, it is not expected that arsenic concentrations in the air will exceed the TWA for a worker to arsenic (10 µg/m^3) as prescribed by O. Reg. 490/09 and R.R.O. 1990, Reg. 833. The STEL for arsenic is 50 µg/m^3 for any 15-minute exposure period.

Benzene

Historically, benzene has been produced as a by-product of coal gasification and metallurgical coke production in steel making. The light oil product from such processes contains benzene, toluene, ethyl benzene and xylene, and these components are separated by distillation. Today, most benzene is produced from the refining of petroleum.

Benzene has applications as a solvent in synthetic rubber manufacturing and processing, and in paints, varnishes, stains, adhesives, roofing materials and sealants. The use of benzene in tire and other rubber goods manufacturing and as a solvent and component of paints and adhesives has declined considerably as a result of concerns about workplace exposure. Nevertheless, it is often present in trace quantities in petroleum and aromatic solvents, some of which have replaced benzene in many uses. Benzene is also a minor component of gasoline mixtures sold in Canada.

The TWA for a worker to benzene is 0.5 ppm as prescribed by O. Reg. 490/09 and R.R.O. 1990, Reg. 833. It is possible that benzene was present in the paints, adhesives and roofing materials used during the original construction of many structures. However, over time, the benzene component typically volatilizes out of the paints, solvents and bitumens and is released into the ambient air. Therefore, it is likely that only trace levels of benzene presently exist in these materials. It is not expected that benzene emissions from any existing materials on site will exceed the allowable TWA. The STEL for benzene is 2.5 ppm for any 15-minute exposure period.

Coke Oven Emissions

Coke oven emissions are found in the exhaust from the burning process of coke and are typically not a concern in road structures. The TWA for a worker with respect to coke oven emissions is 150 µg/m^3 as prescribed by O. Reg. 490/09 and R.R.O. 1990, Reg. 833.

Ethylene Oxides

Ethylene oxide is a common by product of fumigation or sterilization procedures.

The TWA for a worker with respect to ethylene oxides is 1 ppm as prescribed in O. Reg. 490/09 and R.R.O. 1990, Reg. 833. The STEL for ethylene oxides is 10 ppm for any 15-minute exposure period.

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April 26, 2021

Isocyanates

Isocyanates are a class of chemicals used in the manufacture of certain types of plastics, foams and roof insulation. The isocyanate (-CNO) group reacts very readily with certain other types of molecules, a property responsible for the usefulness of isocyanates in industry. Due to the high reactivity of the isocyanate group, exposure to isocyanates can result in primary irritation, sensitization and hypersensitivity reactions. The respiratory system, the eyes and the skin are the main areas affected by exposure. Isocyanates in their initial form are found as a vapour, a mist, or a dust which become airborne and then taken into the body. Once the isocyanates are chemically bonded to other chemicals during manufacturing processes, the isocyanates are not readily available to become airborne unless heated. Therefore, isocyanate exposure is not expected to be a concern as long as the burning of plastics, foams, and insulation is not carried out.

The TWA for a worker with respect to isocyanates, organic compounds is 5 parts per billion (ppb) as prescribed in O. Reg. 490/09 and R.R.O. 1990, Reg. 833. The STEL for isocyanates, organic compounds is 20 ppb for any 15-minute exposure period.

Vinyl Chloride

Vinyl chloride is found in many applications such as plumbing pipes and protective coatings on insulated pipes. Vinyl chlorides in the above materials are bound in a solid matrix and are unlikely to become airborne such that it would exceed the maximum allowable TWA of 1 ppm, as prescribed in O. Reg. 490/09 and R.R.O. 1990, Reg. 833.

Hazardous Materials

Polychlorinated Biphenyls (PCBs)

The use of PCBs in electrical equipment such as transformers and capacitors, including capacitors found in fluorescent lamp ballasts, was common up to 1980. R.R.O 1990 Regulation 362 Waste Management – PCB's (R.R.O. 1990, Reg. 362) under the EPA, prohibits the use of PCBs in electrical equipment installed after July 1, 1980.

The TWA for a worker with respect to PCBs is 0.05 mg/m^3 as prescribed in R.R.O. 1990, Reg. 833.

As of September 5, 2008, under Subsection 93(1) of the *Canadian Environmental Protection Act,* (CEPA), Federal PCB regulations have been published by the Canada Gazette Part II (SOR/2008-273) that impose specific deadlines for the elimination of all PCBs in concentrations at or above 50 milligrams/kilogram (mg/kg). The regulation requires the elimination of all PCBs and PCB-containing materials currently in-use and in storage and limits the period of time PCB materials can be stored before being eliminated. Other aspects of the regulation govern the labelling and reporting of stored PCB materials and equipment as well as improved practices for the management of PCBs that remain in use (i.e., those with PCB concentrations less than 50 mg/kg) until their eventual elimination.

The federal PCB Regulations (SOR/2008-273) impose end-of-use deadlines for equipment or product containing PCBs. As of December 31, 2025, the following will require removal and disposal:

- Electrical capacitors, electrical transformers, electromagnets (not used in the handling of food and/or feed), heat transfer equipment, hydraulic equipment, vapour diffusion pumps and bridge bearings containing PCBs in a concentration of at least 50 mg/kg but less than 500 mg/kg and was in use on September 5, 2008, and is not located at a child care facility, hospital, senior citizens' care facility, preschool, primary or secondary school, drinking water treatment plant, or food or feed processing plant.
- Light ballasts, pole-top electrical transformers and their pole-top auxiliary electrical equipment containing PCBs in a concentration of 50 mg/kg or more and was in use on September 5, 2008.
- Current transformers, potential transformers, circuit breakers, reclosers and bushings that are located at an electrical generation, transmission or distribution facility containing PCBs in a concentration of 500 mg/kg or more and was in use on September 5, 2008.

Appendix B SITE PHOTOGRAPHS

Photo 1: Highway 401/Stewart Boulevard Interchange (Site 16-121) in the City of Brockville, Ontario.

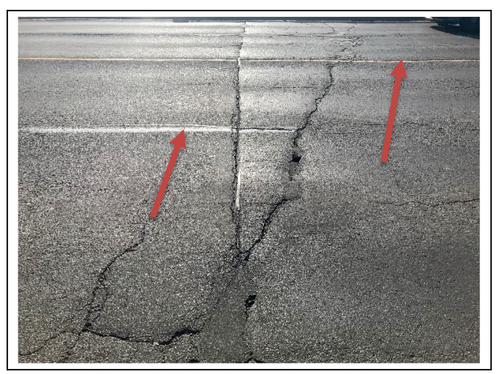


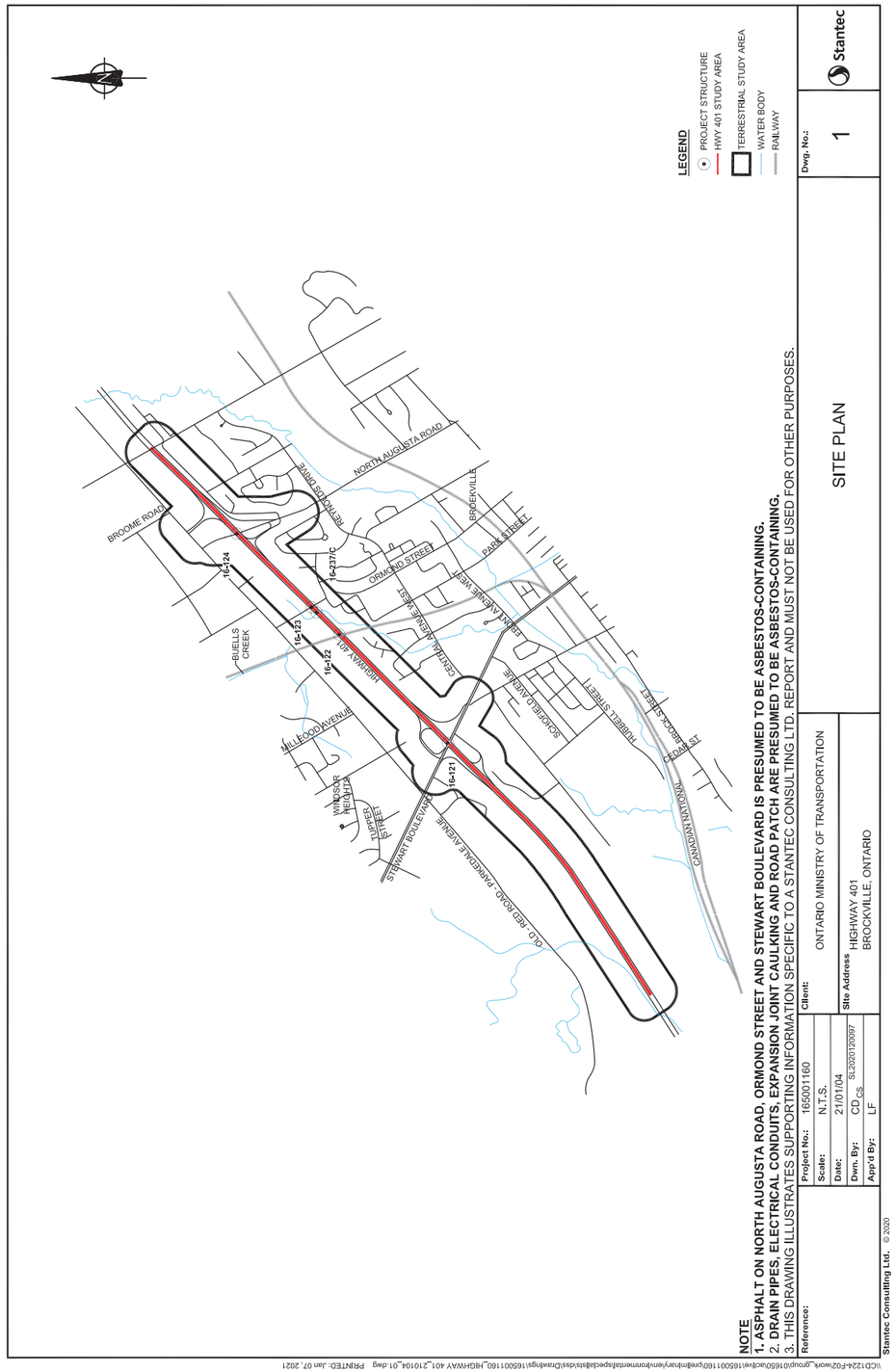
Photo 2: Potentially lead containing white and yellow coloured paint at Highway 401/Stewart Boulevard Interchange (Site 16-121).

Photo 3: Lighting at Highway 401/Ormond Street Overpass (Site 16-123) suspected to contain PCB ballasts and asphalt suspected to be asbestos-containing.

Photo 4: Presumed asbestos-containing drain pipes at Highway 401/North Augusta Road Interchange (Site 16-124).

Appendix C SITE PLAN

Appendix D SUMMARY OF OCCURRENCES OF ASBESTOS-CONTAINING MATERIALS



NOTE
1. ASPHALT ON NORTH AUGUSTA ROAD, ORMOND STREET AND STEWART BOULEVARD IS PRESUMED TO BE ASBESTOS-CONTAINING.
2. DRAIN PIPES, ELECTRICAL CONDUITS, EXPANSION JOINT CAULKING AND ROAD PATCH ARE PRESUMED TO BE ASBESTOS-CONTAINING.
3. THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC CONSULTING LTD. REPORT AND MUST NOT BE USED FOR OTHER PURPOSES.

Reference:

Project No.:	165001160
Scale:	N.T.S.
Date:	21/01/04
Dwn. By:	CD_CS SL20201209??
Appv'd By:	LF

Client: ONTARIO MINISTRY OF TRANSPORTATION

Site Address: HIGHWAY 401 BROCKVILLE, ONTARIO

Dwg. No.: 1

SITE PLAN

Stantec

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Summary of Occurrences of Asbestos-Containing Materials

Level	Room	Specific Location	ACM Location	ACM Type	Estimated Quantity	Sample Number	Asbestos Content	Friable?	Visible?	Access.	ACM Condition	Comments/ Notes
E	Highway 401/Ormond Street Overpass (Site 16-123)	Ormond Street	Road	asphalt	150 sq. m	ns	PACM	No	yes	A	unknown (pacm)	PACM
E	Highway 401/North Augusta Road Interchange (Site 16-124)	North Augusta Road within bridge	North-east sidewalk	electrical conduit	50 m	ns	PACM	No	yes	A	unknown (pacm)	PACM
E	Highway 401/North Augusta Road Interchange (Site 16-124)	North Augusta Road	Road	road patch	20 sq. m	ns	PACM	No	yes	A	unknown (pacm)	PACM
E	Highway 401/North Augusta Road Interchange (Site 16-124)	North Augusta Road	Road	asphalt	700 sq. m	ns	PACM	No	yes	A	unknown (pacm)	PACM
E	Highway 401/North Augusta Road Interchange (Site 16-124)	Highway 401 within concrete wall under North Augusta Road	South-west side	drain pipe	50 m (5 penetrations)	ns	PACM	No	yes	A	unknown (pacm)	PACM
E	Highway 401/North Augusta Road Interchange (Site 16-124)	Highway 401 within concrete wall under North Augusta Road	North-east side	drain pipe	50 m (5 penetrations)	ns	PACM	No	yes	A	unknown (pacm)	PACM
E	Highway 401/North Augusta Road Interchange (Site 16-124)	North Augusta Road within bridge	South-west sidewalk	electrical conduit	50 m	ns	PACM	No	yes	A	unknown (pacm)	PACM

Accessibility Classification
- A - Areas of the building within reach (from floor level) of all building users
- B - Frequently entered maintenance areas within reach of maintenance staff, without the need for a ladder
- C - Areas of the building above 2.4 m where use of a ladder is required to reach the asbestos
- D - Areas of the building behind inaccessible solid ceiling systems, walls, or mechanical equipment, etc., where demolition of the ceiling, wall, or equipment, etc., is required to reach the asbestos

Visibility
- Yes - Suspect material is visible without opening hatches or lifting ceiling tiles
- No - Suspect material can only be viewed if access hatches are opened or ceiling tiles lifted.

*** Based on a non-intrusive inspection of visible surfaces within the room space.**

Notes:
- ACM - asbestos-containing material
- PACM - presumed asbestos-containing material
- Access. - accessibility
- nq - not quantified
- na - not applicable
- ns - not sampled
- ref - reference sample
- F - friable
- NF - non friable
- RCA - recommend corrective action
- BS - bulk sample
- sq.m - square meters

Summary of Occurrences of Asbestos-Containing Materials

Level	Room	Specific Location	ACM Location	ACM Type	Estimated Quantity	Sample Number	Asbestos Content	Friable?	Visible?	Access.	ACM Condition	Comments/ Notes
E	Highway 401/Stewart Boulevard Interchange (Site 16-121)	Stewart Boulevard	Road	expansion joint caulking	20 m	ns	PACM	No	yes	A	unknown (pacm)	PACM
E	Highway 401/Stewart Boulevard Interchange (Site 16-121)	Highway 401 within concrete wall under Stewart Boulevard	South-west side	drain pipe	80 m (8 penetrations)	ns	PACM	No	yes	A	unknown (pacm)	PACM
E	Highway 401/Stewart Boulevard Interchange (Site 16-121)	Highway 401 within concrete wall under Stewart Boulevard	North-east side	drain pipe	80 m (8 penetrations)	ns	PACM	No	yes	A	unknown (pacm)	PACM
E	Highway 401/Stewart Boulevard Interchange (Site 16-121)	Stewart Boulevard	South-west side within bridge	electrical conduit	50 m	ns	PACM	No	yes	A	unknown (pacm)	PACM
E	Highway 401/Stewart Boulevard Interchange (Site 16-121)	Stewart Boulevard	North-east side within sidewalk	electrical conduit	50 m	ns	PACM	No	yes	A	unknown (pacm)	PACM
E	Highway 401/Stewart Boulevard Interchange (Site 16-121)	Stewart Boulevard	Road	asphalt	500 sq. m	ns	PACM	No	yes	A	unknown (pacm)	PACM

Accessibility Classification
- A - Areas of the building within reach (from floor level) of all building users
- B - Frequently entered maintenance areas within reach of maintenance staff, without the need for a ladder
- C - Areas of the building above 2.4 m where use of a ladder is required to reach the asbestos
- D - Areas of the building behind inaccessible solid ceiling systems, walls, or mechanical equipment, etc., where demolition of the ceiling, wall, or equipment, etc., is required to reach the asbestos

Visibility
- Yes - Suspect material is visible without opening hatches or lifting ceiling tiles
- No - Suspect material can only be viewed if access hatches are opened or ceiling tiles lifted.

*** Based on a non-intrusive inspection of visible surfaces within the room space.**

Notes:
- ACM - asbestos-containing material
- PACM - presumed asbestos-containing material
- Access. - accessibility
- nq - not quantified
- na - not applicable
- ns - not sampled
- ref - reference sample
- F - friable
- NF - non friable
- RCA - recommend corrective action
- BS - bulk sample
- sq.m - square meters

Appendix E EVALUATION CRITERIA FOR ASSESSING ASBESTOS-CONTAINING MATERIALS

DESIGNATED SUBSTANCES AND HAZARDOUS MATERIALS ASSESSMENT, HIGHWAY 401, PLANNING PRELIMINARY DESIGN AND CLASS ENVIRONMENTAL ASSESSMENT, CITY OF BROCKVILLE (G.W.P. 4003-19-00)

Appendix E Evaluation Criteria for Assessing Asbestos-Containing Materials
April 26, 2021

Criteria for Assessing Asbestos-Containing Materials

A description of the criteria used in evaluating the condition, accessibility and exposure risk of asbestos-containing materials is provided below. The criteria are generally based on the Public Services and Procurement Canada (PSPC) document entitled A*sbestos Management Standard* (June 5, 2017) and industry standards of practice.

Assessment of Condition

Spray Applied Fireproofing, Insulation and Textured Finishes

In evaluating the condition of ACM spray applied as fireproofing, thermal insulation or texture, decorative or acoustic finishes, the following criteria apply:

Good

Surface of material shows no significant signs of damage, deterioration or delamination. Up to one percent visible damage to surface is allowed within range of GOOD. Evaluation of sprayed fireproofing requires the Assessor to be familiar with the irregular surface texture typical of sprayed asbestos products. GOOD condition includes unencapsulated or unpainted fireproofing or texture finishes, where no delamination or damage is observed, and encapsulated fireproofing or texture finishes where the encapsulation has been applied after the damage or fallout occurred.

Poor

Sprayed materials show signs of damage, delamination or deterioration. More than one percent damage to surface of ACM spray.

In observation areas, where damage exists in isolated locations, both GOOD and POOR condition may be reported. The extent or percentage of each condition will be recorded on the Assessor’s assessment form.

FAIR condition is not utilized or considered as a valid criterion in the evaluation of sprayed fireproofing, sprayed insulation, or texture coat finishes.

Other ACM

In evaluating the condition of mechanical insulation (on boilers, breaching, ductwork, piping, tanks, equipment etc.) the following criteria are used:

Good

Insulation is completely covered in jacketing and exhibits no evidence of damage or deterioration. No insulation is exposed. Includes conditions where the jacketing has minor surface damage (i.e., scuffs or stains), but the jacketing is not penetrated.

Fair

Minor penetration damage to jacketed insulation (cuts, tears, nicks, deterioration or delamination) or undamaged insulation that has never been jacketed. Insulation is exposed but not showing surface disintegration. The extent of missing insulation ranges should be minor to none.

Poor

Original insulation jacket is missing, damaged, deteriorated or delaminated. Insulation is exposed and significant areas have been dislodged. Damage cannot be readily repaired. The evaluation of mechanical insulation may be limited by the number of observations made and components that obstruct observations. In these circumstances, it is not possible to observe each foot of mechanical insulation from all angles.

Non-Friable and Potentially Friable Materials

Non-friable materials generally have little potential to release airborne fibres, even when damaged by mechanical breakage. However, some non-friable materials, i.e., exterior asbestos cement products, may have deteriorated so that the binder no longer effectively contains the asbestos fibres. In such cases of significantly deteriorated non-friable material, the material will be treated as a friable product.