

PWGSC Moosonee Buildings Demolition

SPECIFICATIONS

ISSUED FOR ADDENDUM NO. 02: 2019-09-03

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END OF SECTION

Part 1 General**1.1 WORK COVERED BY CONTRACT DOCUMENTS**

- .1 Work of this Contract comprises the demolition, removal, and site backfill/grading of the Operations Tower (Building 3), East Height Finder Tower (Building 1), Storage Building (Building 2), Clarifier 5, and Clarifier 5A located at the former Department of National Defense Radar Base in Moosonee, Ontario.

1.2 CONTRACT METHOD

- .1 Construct Work under single contract.

1.3 WORK BY OTHERS

- .1 Co-operate with other Contractors in carrying out their respective works and carry out instructions from the Departmental Representative.
- .2 Co-ordinate work with that of other Contractors. If any part of work under this Contract depends for its proper execution or result upon work of another Contractor, report promptly to the Departmental Representative, in writing, any defects which may interfere with proper execution of Work.

1.4 WORK SEQUENCE

- .1 Co-ordinate Progress Schedule with the Departmental Representative.
- .2 Required stages:
 - .1 Mobilization
 - .2 Removal of Hazardous Materials
 - .3 Superstructure Demolition
 - .1 Operations Tower (Building 3)
 - .2 East Height Finder Tower (Building 1)
 - .3 Storage Building (Building 2)
 - .4 Clarifier 5
 - .5 Clarifier 5A
 - .4 Foundation Demolition
 - .1 Operations Tower (Building 3)
 - .2 East Height Finder Tower (Building 1)
 - .3 Storage Building (Building 2)
 - .4 Clarifier 5
 - .5 Clarifier 5A
 - .5 Removal of Demolished Material from Site
 - .6 Backfilling
 - .7 Final Grading
- .3 Maintain fire access/control.

1.5 CONTRACTOR USE OF PREMISES

- .1 Unrestricted use of site.
- .2 Co-ordinate use of premises under direction of the Departmental Representative.
- .3 Obtain and pay for use of additional storage or work areas needed for operations under this Contract.
- .4 Remove or alter existing work to prevent injury or damage to portions of existing work which remain.
- .5 Repair or replace portions of existing work which have been altered during construction operations to match existing or adjoining work, as directed by the Departmental Representative.
- .6 At completion of operations condition of existing work: equal to or better than that which existed before new work started.

1.6 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING

- .1 Execute work with least possible interference or disturbance to adjacent site operations and normal use of premises. Arrange with the Departmental Representative to facilitate execution of work.

1.7 EXISTING SERVICES

- .1 Notify the Departmental Representative and utility companies of intended interruption of services and obtain required permission.
- .2 Where Work involves breaking into or connecting to existing services, give the Departmental Representative 48 hours notice for necessary interruption of mechanical or electrical service throughout course of work. Minimize duration of interruptions. Carry out work at times as directed by governing authorities with minimum disturbance to normal site usage.
- .3 Establish location and extent of service lines in area of work before starting Work. Notify the Departmental Representative of findings.
- .4 Submit schedule to and obtain approval from the Departmental Representative for any shut-down or closure of active service or facility including power and communications services. Adhere to approved schedule and provide notice to affected parties.
- .5 Provide temporary services when directed by the Departmental Representative to maintain critical building and tenant systems.
- .6 Where unknown services are encountered, immediately advise the Departmental Representative and confirm findings in writing.
- .7 Protect, relocate or maintain existing active services. When inactive services are encountered, cap off in manner approved by authorities having jurisdiction.
- .8 Record locations of maintained, re-routed and abandoned service lines.

1.8 DOCUMENTS REQUIRED

- .1 Maintain at job site, one copy each document as follows:
 - .1 Contract Drawings.

- .2 Specifications.
- .3 Addenda.
- .4 Reviewed Shop Drawings.
- .5 List of Outstanding Shop Drawings.
- .6 Change Orders.
- .7 Other Modifications to Contract.
- .8 Field Test Reports.
- .9 Copy of Approved Work Schedule.
- .10 Health and Safety Plan and Other Safety Related Documents.
- .11 Other documents as specified.

Part 2 Products

2.1 NOT USED

- .1 Not used.

Part 3 Execution

3.1 NOT USED

- .1 Not used.

END OF SECTION

Part 1 General

1.1 USE OF SITE AND FACILITIES

- .1 Execute work with least possible interference or disturbance to normal use of premises.

1.2 SPECIAL REQUIREMENTS

- .1 Submit schedule in accordance with Section 01 32 16.07.
- .2 Ensure Contractor's personnel employed on site become familiar with and obey regulations including safety, fire, traffic and security regulations.
- .3 Keep within limits of work and avenues of ingress and egress.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General**1.1 DEFINITIONS**

- .1 Activity: element of Work performed during course of Project. Activity normally has expected duration, and expected cost and expected resource requirements. Activities can be subdivided into tasks.
- .2 Bar Chart (GANTT Chart): graphic display of schedule-related information. In typical bar chart, activities or other Project elements are listed down left side of chart, dates are shown across top, and activity durations are shown as date-placed horizontal bars. Generally Bar Chart should be derived from commercially available computerized project management system.
- .3 Baseline: original approved plan (for project, work package, or activity), plus or minus approved scope changes.
- .4 Construction Work Week: Monday to Friday, inclusive, will provide five day work week and define schedule calendar working days as part of Bar (GANTT) Chart submission.
- .5 Duration: number of work periods (not including holidays or other nonworking periods) required to complete activity or other project element. Usually expressed as workdays or workweeks.
- .6 Master Plan: summary-level schedule that identifies major activities and key milestones.
- .7 Milestone: significant event in project, usually completion of major deliverable.
- .8 Project Schedule: planned dates for performing activities and the planned dates for meeting milestones. Dynamic, detailed record of tasks or activities that must be accomplished to satisfy Project objectives. Monitoring and control process involves using Project Schedule in executing and controlling activities and is used as basis for decision making throughout project life cycle.
- .9 Project Planning, Monitoring and Control System: overall system operated by Departmental Representative to enable monitoring of project work in relation to established milestones.

1.2 REQUIREMENTS

- .1 Ensure Master Plan and Detail Schedules are practical and remain within specified Contract duration.
- .2 Plan to complete Work in accordance with prescribed milestones and time frame.
- .3 Limit activity durations to maximum of approximately 10 working days, to allow for progress reporting.
- .4 Ensure that it is understood that Award of Contract or time of beginning, rate of progress, Certificate of Substantial Performance, and Certificate of Completion as defined times of completion are of essence of this contract.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00.
- .2 Submit Project Schedule to Departmental Representative within 5 working days of contract award.

1.4 PROJECT MILESTONES

- .1 Project milestones form interim targets for Project Schedule.
 - .1 Erosion and sediment control plan.
 - .2 Superstructure demolition.
 - .3 Substructure demolition.
 - .4 Excavation.
 - .5 Backfill.
 - .6 Final Grading.

1.5 PROJECT SCHEDULE REPORTING

- .1 Update Project Schedule on a weekly basis reflecting activity changes and completions, as well as activities in progress.
- .2 Include as part of Project Schedule, narrative report identifying Work status to date, comparing current progress to baseline, presenting current forecasts, defining problem areas, anticipated delays and impact with possible mitigation.

1.6 PROJECT MEETINGS

- .1 Discuss Project Schedule at regular site meetings, identify activities that are behind schedule and provide measures to regain slippage. Activities considered behind schedule are those with projected start or completion dates later than current approved dates shown on baseline schedule.
- .2 Weather related delays with their remedial measures will be discussed and negotiated.

Part 2 Products**2.1 NOT USED**

- .1 Not used.

Part 3 Execution**3.1 NOT USED**

- .1 Not used.

END OF SECTION

Part 1 General**1.1 ADMINISTRATIVE**

- .1 Submit to Departmental Representative submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .2 Do not proceed with Work affected by submittal until review is complete.
- .3 Present shop drawings, product data, samples, and mock-ups in SI Metric units.
- .4 Where items or information is not produced in SI Metric units converted values are acceptable.
- .5 Review submittals prior to submission to Departmental Representative. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and co-ordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.
- .6 Notify Departmental Representative, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.
- .7 Verify field measurements and affected adjacent Work are co-ordinated.
- .8 Contractor's responsibility for errors and omissions in submission is not relieved by Departmental Representative's review of submittals.
- .9 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Departmental Representative review.
- .10 Keep one reviewed copy of each submission on site.

1.2 SHOP DRAWINGS AND PRODUCT DATA

- .1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.
- .2 Submit drawings stamped and signed by professional engineer registered or licensed in Ontario, Canada.
- .3 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been co-ordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.
- .4 Allow 1 review of each submission by Departmental Representative.

- .5 Adjustments made on shop drawings by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.
- .6 Make changes in shop drawings as Departmental Representative may require, consistent with Contract Documents. When resubmitting, notify Departmental Representative in writing of revisions other than those requested.
- .7 Accompany submissions with transmittal letter containing:
 - .1 Date.
 - .2 Project title and number.
 - .3 Contractor's name and address.
 - .4 Identification and quantity of each shop drawing, product data and sample.
 - .5 Other pertinent data.
- .8 Submissions include:
 - .1 Date and revision dates.
 - .2 Project title and number.
 - .3 Name and address of:
 - .1 Subcontractor.
 - .2 Supplier.
 - .3 Manufacturer.
 - .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
 - .5 Details of appropriate portions of Work as applicable:
 - .1 Fabrication.
 - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
 - .3 Setting or erection details.
 - .4 Capacities.
 - .5 Performance characteristics.
 - .6 Standards.
 - .7 Operating weight.
 - .8 Wiring diagrams.
 - .9 Single line and schematic diagrams.
 - .10 Relationship to adjacent work.
- .9 After Departmental Representative's review, distribute copies.
- .10 Submit electronic copy of shop drawings for each requirement requested in specification Sections and as Departmental Representative may reasonably request.
- .11 Submit electronic copies of product data sheets or brochures for requirements requested in specification Sections and as requested by Departmental Representative where shop drawings will not be prepared due to standardized manufacture of product.

- .12 Submit electronic copies of test reports for requirements requested in specification Sections and as requested by Departmental Representative.
 - .1 Report signed by authorized official of testing laboratory that material, product, or system identical to material, product, or system to be provided has been tested in accord with specified requirements.
 - .2 Testing must have been within 3 years of date of contract award for project.
- .13 Submit electronic copies of certificates for requirements requested in specification Sections and as requested by Departmental Representative.
 - .1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.
 - .2 Certificates must be dated after award of project contract complete with project name.
- .14 Submit electronic copies of manufacturers instructions for requirements requested in specification Sections and as requested by Departmental Representative.
 - .1 Pre-printed material describing installation of product, system or material, including special notices and WHMIS Safety Data Sheets concerning impedances, hazards and safety precautions.
- .15 Submit electronic copies of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Departmental Representative.
- .16 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.
- .17 Submit electronic copies of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Departmental Representative.
- .18 Delete information not applicable to project.
- .19 Supplement standard information to provide details applicable to project.
- .20 If upon review by Departmental Representative, no errors or omissions are discovered or if only minor corrections are made, copies will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.
- .21 The review of shop drawings by Public Works and Government Services Canada (PWGSC) is for sole purpose of ascertaining conformance with general concept.
 - .1 This review shall not mean that PWGSC approves detail design inherent in shop drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting requirements of construction and Contract Documents.
 - .2 Without restricting generality of foregoing, Contractor is responsible for dimensions to be confirmed and correlated at job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of Work of sub-trades.

1.3 PHOTOGRAPHIC DOCUMENTATION

- .1 Submit electronic copy of colour digital photography in jpg format, fine resolution monthly with progress statement as directed by Departmental Representative.
- .2 Project identification: name and number of project and date of exposure indicated.
- .3 Number of viewpoints: 8 locations.
 - .1 Viewpoints and their location as determined by Departmental Representative.
- .4 Frequency of photographic documentation: weekly or as directed by Departmental Representative.
 - .1 Upon completion of: demolition, excavation, grading, and as directed by Departmental Representative.

1.4 CERTIFICATES AND TRANSCRIPTS

- .1 Immediately after award of Contract, submit Workplace Safety and Insurance Board status.
- .2 Submit transcription of insurance immediately after Award of Contract.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General**1.1 REFERENCE STANDARDS**

- .1 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations
- .2 Province of Ontario
 - .1 Occupational Health and Safety Act and Regulations for Construction Projects, R.S.O. 1990, c.0.1, as amended and O. Reg. 213/91 as amended - Updated 2017.
- .3 Canadian Standards Association (CSA): CSA S350-M1980 (R2003), Code of Practice for Safety in Demolition of Structures.
- .4 National Building Code 2015 (NBCC): NBC 2015, Division B, Part 8 Safety Measures at Construction and Demolition Sites
- .5 O. Reg. 490/09, Designated Substances
- .6 Workplace Safety and Insurance Act, 1997
- .7 Municipal Statutes and Authorities

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00.
- .2 Submit site-specific Health and Safety Plan: Within 7 days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:
 - .1 Results of site specific safety hazard assessment.
 - .2 Results of safety and health risk or hazard analysis for site tasks and operation found in work plan.
- .3 Submit 1 digital copy of Contractor's authorized representative's work site health and safety inspection reports weekly to Departmental Representative.
- .4 Submit copies of reports or directions issued by Federal, Provincial and Territorial health and safety inspectors.
- .5 Submit copies of incident and accident reports.
- .6 Submit WHMIS SDS - Safety Data Sheets.
- .7 Departmental Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 5 working days after receipt of plan. Revise plan as appropriate and resubmit plan to Departmental Representative within 5 working days after receipt of comments from Departmental Representative.
- .8 Departmental Representative's review of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.
- .9 Medical Surveillance: where prescribed by legislation, regulation or safety program, submit certification of medical surveillance for site personnel prior to commencement of Work, and submit additional certifications for any new site personnel to Departmental Representative.

- .10 On-site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations.

1.3 FILING OF NOTICE

- .1 File Notice of Project with authorities prior to beginning of Work.
- .2 Contractor shall be responsible and assume the Contractor role for each work zone. Contractor shall provide a written acknowledgement of this responsibility with 3 weeks of Contract Award.

1.4 SAFETY ASSESSMENT

- .1 The contractor shall review the Designated Substance Survey completed by Stantec dated March 29th, 2019. The Contractor shall take all precautions and measures identified within the report prior to commencement and throughout construction.
- .2 Perform site specific safety hazard assessment related to project.

1.5 MEETINGS

- .1 Schedule and administer Health and Safety meeting with Departmental Representative prior to commencement of Work.

1.6 PROJECT/SITE CONDITIONS

- .1 Work at site will involve contact with:
 - .1 Departmental Representative.

1.7 GENERAL REQUIREMENTS

- .1 Develop written site-specific Health and Safety Plan based on hazard assessment prior to beginning site Work and continue to implement, maintain, and enforce plan until final demobilization from site. Health and Safety Plan must address project specifications.
- .2 Departmental Representative may respond in writing, where deficiencies or concerns are noted and may request re-submission with correction of deficiencies or concerns.

1.8 RESPONSIBILITY

- .1 Be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.
- .2 Contractor will be responsible and assume the role Constructor as described in the Ontario Occupational Health and Safety Act and Regulations for Construction Projects.
- .3 Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

1.9 COMPLIANCE REQUIREMENTS

- .1 Comply with Ontario Occupational Health and Safety Act, R.S.O. 1990, c. 0.1 and Ontario Regulations for Construction Projects, O. Reg. 213/91.

- .2 Comply with R.S.Q., c. S-2.1, an Act Respecting Health and Safety, and c. S-2.1, r.4 Safety Code for the Construction Industry.
- .3 Comply with Occupational Health and Safety Regulations, 1996.
- .4 Comply with Occupational Health and Safety Act, General Safety Regulations, O.I.C.
- .5 Comply with Canada Labour Code, Canada Occupational Safety and Health Regulations.

1.10 UNFORSEEN HAZARDS

- .1 When unforeseen or peculiar safety-related factor, hazard, or condition occur during performance of Work, follow procedures in place for Employee's Right to Refuse Work in accordance with Acts and Regulations of Province having jurisdiction and advise Departmental Representative verbally and in writing.
- .2 When unforeseen or peculiar safety-related factor, hazard, or condition occur during performance of Work, advise Health and Safety co-ordinator and follow procedures in accordance with Acts and Regulations of Province having jurisdiction and advise Departmental Representative verbally and in writing.

1.11 POSTING OF DOCUMENTS

- .1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on site in accordance with Acts and Regulations of Province having jurisdiction, and in consultation with Departmental Representative.

1.12 CORRECTION OF NON-COMPLIANCE

- .1 Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by Departmental Representative.
- .2 Provide Departmental Representative with written report of action taken to correct non-compliance of health and safety issues identified.
- .3 Departmental Representative may stop Work if non-compliance of health and safety regulations is not corrected.

1.13 WORK STOPPAGE

- .1 Give precedence to safety and health of public and site personnel and protection of environment over cost and schedule considerations for Work.

Part 2 Products

2.1 NOT USED

- .1 Not used.

Part 3 Execution

3.1 NOT USED

- .1 Not used.

END OF SECTION

Part 1 General**1.1 REFERENCE STANDARDS**

- .1 Ontario Provincial Standard Specification
 - .1 OPSS 805 November 2015 - Construction Specification for Temporary Erosion and Sediment Control Measures.

1.2 DEFINITIONS

- .1 Environmental Pollution and Damage: presence of chemical, physical, biological elements or agents which adversely affect human health and welfare; unfavourably alter ecological balances of importance to human life; affect other species of importance to humans; or degrade environment aesthetically, culturally and/or historically.
- .2 Environmental Protection: prevention/control of pollution and habitat or environment disruption during construction.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00.
- .2 Before commencing construction activities or delivery of materials to site, submit Environmental Protection Plan for review by Departmental Representative.
- .3 Environmental Protection Plan must include comprehensive overview of known or potential environmental issues to be addressed during construction.
- .4 Address topics at level of detail commensurate with environmental issue and required construction tasks.
- .5 Include in Environmental Protection Plan:
 - .1 Names of persons responsible for ensuring adherence to Environmental Protection Plan.
 - .2 Names and qualifications of persons responsible for manifesting hazardous waste to be removed from site.
 - .3 Names and qualifications of persons responsible for training site personnel.
 - .4 Descriptions of environmental protection personnel training program.
 - .5 Erosion and sediment control plan identifying type and location of erosion and sediment controls to be provided including monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations.
 - .6 Drawings indicating locations of proposed temporary excavations or embankments for haul roads, stream crossings, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials including methods to control runoff and to contain materials on site.
 - .7 Traffic Control Plans including measures to reduce erosion of temporary roadbeds by construction traffic, especially during wet weather.

- .1 Plans to include measures to minimize amount of material transported onto paved public roads by vehicles or runoff.
- .8 Work area plan showing proposed activity in each portion of area and identifying areas of limited use or non-use.
 - .1 Plan to include measures for marking limits of use areas and methods for protection of features to be preserved within authorized work areas.
- .9 Spill Control Plan to include procedures, instructions, and reports to be used in event of unforeseen spill of regulated substance.
- .10 Non-Hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris.
- .11 Air pollution control plan detailing provisions to assure that dust, debris, materials, and trash, are contained on project site.
- .12 Contaminant Prevention Plan identifying potentially hazardous substances to be used on job site; intended actions to prevent introduction of such materials into air, water, or ground; and detailing provisions for compliance with Federal, Provincial, and Municipal laws and regulations for storage and handling of these materials.
- .13 Waste Water Management Plan identifying methods and procedures for management of discharge of waste waters which are directly derived from construction activities, such as concrete curing water, clean-up water, dewatering of ground water, disinfection water, hydrostatic test water, and water used in flushing of lines.
- .14 Historical, archaeological, cultural resources biological resources and wetlands plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, biological resources and wetlands.
- .15 Pesticide treatment plan to be included and updated, as required.

1.4 FIRES

- .1 Fires and burning of rubbish on site is not permitted.

1.5 DRAINAGE

- .1 Contractor shall follow Erosion and Sediment Control Plan (ESC) in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations.
- .2 Provide temporary drainage and pumping required to keep excavations and site free from water.
- .3 Ensure pumped water into waterways, sewer or drainage systems is free of suspended materials.
- .4 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements.

1.6 SITE CLEARING AND PLANT PROTECTION

- .1 Protect trees and plants on site and adjacent properties as indicated.

- .2 Protect trees and shrubs adjacent to construction work, storage areas and trucking lanes, and encase with protective wood framework from grade level to height of 2m minimum, or an alternative process submitted in writing and approved by the Departmental Representative.
- .3 Protect roots of designated trees to dripline during excavation and site grading to prevent disturbance or damage.
 - .1 Avoid unnecessary traffic, dumping and storage of materials over root zones.
- .4 Minimize stripping of topsoil and vegetation.
- .5 Restrict tree removal to areas indicated Departmental Representative.

1.7 WORK ADJACENT TO WATERWAYS

- .1 Construction equipment to be operated on land only.
- .2 Waterways to be kept free of excavated fill, waste material and debris.
- .3 Do not skid logs or construction materials across waterways.

1.8 POLLUTION CONTROL

- .1 Maintain temporary erosion and pollution control features installed under this Contract.
- .2 Control emissions from equipment and plant in accordance with local authorities' emission requirements.
- .3 Prevent sandblasting and other extraneous materials from contaminating air and waterways beyond application area.
- .4 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.
- .5 If contaminated soil is identified, the Departmental Representative shall be notified immediately.

1.9 HISTORICAL/ARCHAEOLOGICAL CONTROL

- .1 Provide historical, archaeological, cultural resources, biological resources, and wetlands plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, biological resources and wetlands known to be on project site: and identifies procedures to be followed if historical archaeological, cultural resources, biological resources and wetlands not previously known to be onsite or in area are discovered during construction.
- .2 Plan: include methods to assure protection of known or discovered resources and identify lines of communication between Contractor personnel and Departmental Representative.

1.10 NOTIFICATION

- .1 Departmental Representative will notify Contractor in writing of observed noncompliance with Federal, Provincial or Municipal environmental laws or regulations, permits, and other elements of Contractor's Environmental Protection plan.
- .2 Contractor: after receipt of such notice, inform Departmental Representative of proposed corrective action and take such action for approval by Departmental Representative.

- .1 Take action only after receipt of written approval by Departmental Representative.
- .3 Departmental Representative will issue stop order of work until satisfactory corrective action has been taken.
- .4 No time extensions granted or equitable adjustments allowed to Contractor for such suspensions.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11.
 - .1 Leave Work area clean at end of each day.
- .2 Ensure public waterways, storm and sanitary sewers remain free of waste and volatile materials disposal.
- .3 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11.

END OF SECTION

Part 1 General**1.1 REFERENCE STANDARDS**

- .1 CSA Group (CSA)
 - .1 CSA A23.1-14/A23.2-14, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
 - .2 CSA O121-17, Douglas Fir Plywood.
 - .3 CSA S269.2-16, Access Scaffolding for Construction Purposes.
 - .4 CAN/CSA-Z321-96 (R2006), Signs and Symbols for the Workplace.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00.

1.3 INSTALLATION AND REMOVAL

- .1 Identify areas which have to be gravelled to prevent tracking of mud.
- .2 Provide construction facilities in order to execute work expeditiously.
- .3 Remove from site all such work after use.

1.4 SITE STORAGE/LOADING

- .1 Confine work and operations of employees by Contract Documents. Do not unreasonably encumber premises with products.
- .2 Do not load or permit to load any part of Work with weight or force that will endanger Work.

1.5 CONSTRUCTION PARKING

- .1 Provide and maintain adequate access to project site.

1.6 SANITARY FACILITIES

- .1 Provide sanitary facilities for work force in accordance with governing regulations and ordinances.
- .2 Post notices and take precautions as required by local health authorities. Keep area and premises in sanitary condition.

1.7 PROTECTION AND MAINTENANCE OF TRAFFIC

- .1 Maintain and protect traffic on affected roads during construction period.
- .2 Contractor's traffic on roads selected for hauling material to and from site to interfere as little as possible with public traffic.
- .3 Verify adequacy of existing roads and allowable load limit on these roads. Contractor: responsible for repair of damage to roads caused by construction operations.

- .4 Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic.
- .5 Dust control: adequate to ensure safe operation at all times.

1.8 CLEAN-UP

- .1 Remove construction debris, waste materials, packaging material from work site daily.
- .2 Clean dirt or mud tracked onto paved or surfaced roadways.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- .1 Inspect, repair, and maintain erosion and sedimentation control measures during construction.
- .2 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

END OF SECTION

Part 1 General

1.1 PROJECT CLEANLINESS

- .1 Maintain Work in tidy condition, free from accumulation of waste products and debris.
- .2 Remove waste materials from site at daily regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site, unless approved by Departmental Representative.
- .3 Clear snow and ice from access to building, bank/pile snow in designated areas only.
- .4 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .5 Provide and use marked separate bins for recycling. Refer to Section 01 74 21.
- .6 Dispose of waste materials and debris off site. Clean interior areas prior to start of finishing work, and maintain areas free of dust and other contaminants during finishing operations.
- .7 Store volatile waste in covered metal containers, and remove from premises at end of each working day.
- .8 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.
- .9 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.
- .10 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.
- .11 When Work is Substantially Performed remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.
- .12 Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy.
- .13 Prior to final review remove surplus products, tools, construction machinery and equipment.
- .14 Remove waste products and debris.
- .15 Remove waste materials from site at regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site, unless approved by Departmental Representative.
- .16 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

1.2 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for recycling or reuse in accordance with Section 01 74 21.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General**1.1 WASTE MANAGEMENT GOALS**

- .1 Prior to start of Work conduct meeting with Departmental Representative to review and discuss PWGSC's waste management goal and Contractor's proposed Waste Reduction Workplan.
- .2 Protect environment and prevent environmental pollution damage.

1.2 REFERENCE STANDARDS

- .1 Ontario Provincial Standard Specification
 - .1 OPSS.PROV 180 November 2016 - General Specification for the management of excess materials
- .2 Ontario Environmental Protection Act (EPA)
 - .1 Regulation 102/94, Waste Audits and Waste Reduction Workplans.
 - .2 Regulation 103/94, Source Separation Programs.
- .3 Canadian Construction Association (CCA)
 - .1 CCA 81-2001: A Best Practices Guide to Solid Waste Reduction.
- .4 Public Works and Government Services Canada (PSPC)
 - .1 2002 National Construction, Renovation and Demolition Non-Hazardous Solid Waste Management Protocol.
 - .2 CRD Waste Management Market Research Report (available from PSPC's Environmental Services).
 - .3 Sustainable Development Strategy 2007-2009: Target 2.1 Environmentally Sustainable Use of Natural Resources.

1.3 DEFINITIONS

- .1 Approved/Authorized recycling facility: waste recycler approved by applicable provincial authority or other users of material for recycling approved by the Departmental Representative.
- .2 Class III: non-hazardous waste - construction renovation and demolition waste.
- .3 Construction, Renovation and/or Demolition (CRD) Waste: Class III solid, non-hazardous waste materials generated during construction, demolition, and/or renovation activities
- .4 Cost/Revenue Analysis Workplan (CRAW): based on information from Waste Reduction Workplan, and intended as financial tracking tool for determining economic status of waste management practices.
- .5 Inert Fill: inert waste - exclusively asphalt and concrete.

- .6 Waste Source Separation Program (WSSP): implementation and co-ordination of ongoing activities to ensure designated waste materials will be sorted into pre-defined categories and sent for recycling and reuse, maximizing diversion and potential to reduce disposal costs.
- .7 Recyclable: ability of product or material to be recovered at end of its life cycle and re-manufactured into new product for reuse.
- .8 Recycle: process by which waste and recyclable materials are transformed or collected for purpose of being transferred into new products.
- .9 Recycling: process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for purpose of using in altered form. Recycling does not include burning, incinerating, or thermally destroying waste.
- .10 Reuse: repeated use of product in same form but not necessarily for same purpose. Reuse includes:
 - .1 Salvaging reusable materials from re-modelling projects, before demolition stage, for resale, reuse on current project or for storage for use on future projects.
 - .2 Returning reusable items including pallets or unused products to vendors.
- .11 Salvage: removal of structural and non-structural materials from deconstruction/disassembly projects for purpose of reuse or recycling.
- .12 Separate Condition: refers to waste sorted into individual types.
- .13 Source Separation: act of keeping different types of waste materials separate beginning from the point they became waste.
- .14 Waste Audit (WA): detailed inventory of estimated quantities of waste materials that will be generated during construction, demolition, deconstruction and/or renovation. Involves quantifying by volume/weight amounts of materials and wastes that will be reused, recycled or landfilled.
- .15 Waste Diversion Report: detailed report of final results, quantifying cumulative weights and percentages of waste materials reused, recycled and landfilled over course of project. Measures success against Waste Reduction Workplan (WRW) goals and identifies lessons learned.
- .16 Waste Management Co-ordinator (WMC): contractor representative responsible for supervising waste management activities as well as co-ordinating required submittal and reporting requirements.
- .17 Waste Reduction Workplan (WRW): written report which addresses opportunities for reduction, reuse, or recycling of materials generated by project. Specifies diversion goals, implementation and reporting procedures, anticipated results and responsibilities. Waste Reduction Workplan (Schedule B) information acquired from Waste Audit.

1.4 DOCUMENTS

- .1 Post and maintain in visible and accessible area at job site, one copy of following documents:
 - .1 Waste Reduction Workplan (Schedule B).
 - .2 Schedule B completed for project.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00.
- .2 Prepare and submit following prior to project start-up:
 - .1 1 copy and 1 electronic copy of completed Waste Reduction Workplan (WRW): Schedule B.
- .3 Prepare and submit on monthly basis, throughout project or at intervals agreed to by Departmental Representative the following:
 - .1 Receipts, scale tickets, waybills, and/or waste disposal receipts that show quantities and types of materials reused, recycled, or disposed of.
 - .2 Updated Waste Materials Tracking form.
 - .3 Written monthly summary report detailing cumulative amounts of waste materials reused, recycled and landfilled, and brief status of ongoing waste management activities.
- .4 Submit prior to final payment the following:
 - .1 Waste Diversion Report, indicating final quantities in tonnes by material types salvaged for reuse, recycling or disposal in landfill and recycling centres, re-use depots, landfills and other waste processors that received waste materials.
 - .2 Provide receipts, scale tickets, waybills, waste disposal receipts that confirm quantities and types of materials reused, recycled or disposed of and destination.

1.6 WASTE REDUCTION WORKPLAN (WRW)

- .1 Prepare and submit WRW (Schedule B) at least 10 days prior to project start-up.
- .2 WRW identifies strategies to optimize diversion through reduction, reuse, and recycling of materials and comply with applicable regulations, based on information acquired from WA.
- .3 WRW should include but not limited to:
 - .1 Applicable regulations.
 - .2 Specific goals for waste reduction, identify existing barriers and develop strategies to overcome them.
 - .3 Destination of materials identified.
 - .4 Methods to collect, separate, and reduce generated wastes.
 - .5 Location of waste bins on-site.
 - .6 Methods to track and report results reliably.
 - .7 Details on materials handling and removal procedures.
 - .8 Recycler and reclaimer requirements.
 - .9 Quantities of materials to be salvaged for reuse or recycled and materials sent to landfill.
 - .10 Requirements for monitoring on-site waste management activities.
- .4 Structure WRW to prioritize actions and follow 3R's hierarchy, with Reduction as first priority, followed by Reuse, then Recycle.

- .5 Post WRW or summary where workers at site are able to review content.
- .6 Monitor and report on waste reduction by documenting total volume (in tonnes) and cost of actual waste removed from project.

1.7 USE OF SITE AND FACILITIES

- .1 Execute Work with minimal interference and disturbance to normal use of premises.

1.8 STORAGE, HANDLING AND PROTECTION

- .1 Unless specified otherwise, materials for removal become Contractor's property.
- .2 Separate non-salvageable materials from salvaged items. Transport and deliver non-salvageable items to licensed disposal facility.
- .3 Prevent contamination of materials to be salvaged and recycled and handle materials in accordance with requirements for acceptance by designated processing facilities.
 - .1 On-site source separation is recommended.
 - .2 Remove co-mingled materials to off site processing facility for separation.
 - .3 Obtain waybills, receipts and/or scale tickets for separated materials removed from site.
 - .4 Materials reused on-site are considered to be diverted from landfill and as such are to be included in all reporting.

1.9 DISPOSAL OF WASTES

- .1 Do not bury rubbish or waste materials.
- .2 Do not dispose of oil, mineral spirits, volatile materials, waste, or paint thinner into waterways, storm, or sanitary sewers.
- .3 Keep records of construction waste including:
 - .1 Total tonnage generated.
 - .2 Tonnage reused or recycled.
- .4 Remove materials on-site as Work progresses.
- .5 Contractor shall dispose of waste in strict accordance with regulatory requirements and authorities having jurisdiction. The Contractor shall submit a disposal plan to the departmental representative for approval prior to proceeding with the work.
- .6 Hazardous waste materials shall be disposed of at the municipal landfill facility located in Moosonee, Ontario.

1.10 SCHEDULING

- .1 Co-ordinate Work with other activities at site to ensure timely and orderly progress of Work.

Part 2 Products **2.1 NOT USED**

- .1 Not Used.

Part 3 Execution**3.1 APPLICATION**

- .1 Do Work in compliance with WRW.
- .2 Handle waste materials not reused, salvaged, or recycled in accordance with appropriate regulations and codes.

3.2 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11.
- .3 Waste Management: separate waste materials for reuse or recycling in accordance with Section 01 74 21.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.
 - .2 Source separate materials to be reused/recycled into specified sort areas.

3.3 WASTE REDUCTION WORKPLAN (WRW)

- .1 Schedule B

(1) Material Category	(2) Person(s) Respon- sible	(3) Total Quantity of Waste (unit)	(4) Reused Amount (units) Projected	Actual	(5) Recycled Amount (unit) Projected	Actual	(6) Material(s) Destina- tion
Wood and Plastics Material Description							
Chutes							
Warped Pallet Forms							
Plastic Packaging							
Card- board Packaging							
Other							
Doors and Windows Material							

Description							
Painted Frames							
Glass							
Wood							
Metal							
Other							

3.4 CANADIAN GOVERNMENTAL DEPARTMENTS CHIEF RESPONSIBILITY FOR THE ENVIRONMENT

.1 Schedule G - Government Chief Responsibility for the Environment:

Province	Address	General Inquires	Fax
Ontario	Ministry of Environment and Energy, 135 St. Clair Avenue West Toronto ON M4V 1P5	416-323-4321 800-565- 4923	416-323-4682
	Environment Canada Toronto ON	416-734-4494	

3.5 SCHEDULES

.1 Following Schedules are attached to this Specification:

.1 Waste Reduction Workplan Form - Schedule B.

END OF SECTION

Part 1 General**1.1 MEASUREMENT AND PAYMENT**

- .1 Measurement Procedures.
 - .1 Measure removal of foundations in cubic metres.
 - .2 Measure removal of culverts, pipe sewers and drains in metres regardless of diameter.
 - .1 End points of measurements will be at centres of maintenance holes or catch basins or open ends of pipes, as applicable.
 - .3 Measure removal of catch basins or maintenance holes in units.
 - .4 Measure abandonment of wells or septic tanks in units.
 - .5 Payment for excavating, backfilling and restoration is paid separately, not included in above removal items.
 - .6 Measure removal of waste from site in tonnes.

1.2 REFERENCE STANDARDS

- .1 Ontario Provincial Standard Specification
 - .1 OPSS.PROV 180 November 2016 - General specification for the management of excess materials
 - .2 OPSS.PROV 510 November 2014 - Construction Specification for Removals
- .2 Department of Justice Canada (Jus)
 - .1 Canadian Environmental Assessment Act (CEAA), 2012
 - .2 Canadian Environmental Protection Act (CEPA), 2012
 - .1 SOR/2003-2, On-Road Vehicle and Engine Emission Regulations
 - .2 SOR/2006-268, Regulations Amending the On-Road Vehicle and Engine Emission Regulations
 - .3 Transportation of Dangerous Goods Act (TDGA), 1992, c. 34
 - .4 Motor Vehicle Safety Act (MVSA), 1995
 - .5 Hazardous Materials Information Review Act, 1985

1.3 DEFINITIONS

- .1 Demolition: rapid destruction of building following removal of hazardous materials.
- .2 Hazardous Materials: dangerous substances, dangerous goods, hazardous commodities and hazardous products, may include but not limited to: asbestos PCB's, CFC's, HCFC's poisons, corrosive agents, flammable substances, ammunition, explosives, radioactive substances, or other material that can endanger human health or well being or environment if handled improperly.
- .3 Waste Audit (WA): detailed inventory of materials in building. Indicates quantities of reuse, recycling and landfill.

- .1 Involves quantifying by volume/weight amounts of materials and wastes generated during construction, demolition, deconstruction, or renovation project.
- .2 Indicates quantities of reuse, recycling and landfill.
- .4 Waste Management Coordinator (WMC): contractor representative responsible for supervising waste management activities as well as coordinating related, required submittal and reporting requirements.
- .5 Waste Reduction Workplan (WRW): written report which addresses opportunities for reduction, reuse, or recycling of materials. WRW is based on information acquired from WA.

1.4 ADMINISTRATIVE REQUIREMENTS

- .1 Site Meetings.
 - .1 Convene pre-demolition meeting one week prior to beginning work of this Section to:
 - .1 Verify project requirements.
 - .2 Co-ordination with other building subtrades.
 - .2 Arrange for site visit with Departmental Representative to examine existing site conditions adjacent to demolition work, prior to start of Work.
 - .3 Hold project meetings every week.
 - .4 Ensure key personnel attend.
 - .5 Reporting Requirements: WMC to complete.
 - .6 WMC must provide written report on status of waste diversion activity at each meeting.
 - .7 Departmental Representative will provide written notification of change of meeting schedule established upon contract award 24 hours prior to scheduled meeting.
- .2 Scheduling: meet project time lines without compromising specified minimum rates of material diversion.
 - .1 Notify Departmental Representative in writing when unforeseen delays occur.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00.
- .2 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Ontario, Canada.
 - .2 Submit for approval drawings, diagrams or details showing sequence of demolition work and supporting structures and underpinning, where required by authorities having jurisdiction.
- .3 Hazardous Materials:
 - .1 Provide description of Hazardous Materials and Notification of Filing with proper authorities prior to beginning of Work as required.
- .4 Waste Reduction Workplan:

- .1 Prior to beginning of Work on site submit detailed Waste Reduction Workplan in accordance with Section 01 74 21:
 - .1 Descriptions of and anticipated quantities in percentages of materials to be salvaged reused, recycled and landfilled.
 - .2 Schedule of selective demolition.
 - .3 Number and location of dumpsters.
 - .4 Anticipated frequency of tippage.
 - .5 Name and address of waste facilities.
- .5 Certificates:
 - .1 Submit copies of certified weigh bills from authorized disposal sites and reuse and recycling facilities for material removed from site on monthly basis upon request of Departmental Representative.
 - .2 Written authorization from Departmental Representative is required to deviate from facilities listed in Waste Reduction Workplan.
- .6 The contractor shall submit a demolition procedure of the buildings for review and approval prior to commencing the work.

1.6 QUALITY ASSURANCE

- .1 Regulatory Requirements: ensure Work is performed in compliance with applicable Provincial/Territorial regulations.

1.7 DELIVERY, STORAGE AND HANDLING

- .1 Store and manage hazardous materials in accordance with Section 01 35 43.
- .2 Develop Waste Reduction Workplan related to Work of this Section.

1.8 SITE CONDITIONS

- .1 Site Environmental Requirements.
 - .1 Perform work in accordance with Section 01 35 43.
 - .2 Ensure that selective demolition work does not adversely affect adjacent watercourses, groundwater and wildlife, or contribute to excess air and noise pollution.
 - .3 Do not dispose of waste of volatile materials including but not limited to, mineral spirits, oil, petroleum based lubricants, or toxic cleaning solutions into watercourses, storm or sanitary sewers.
 - .1 Ensure proper disposal procedures are maintained throughout the project.
 - .4 Do not pump water containing suspended materials into watercourses, storm or sanitary sewers or onto adjacent properties.
 - .5 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authorities.
 - .6 Protect trees, plants and foliage on site and adjacent properties where indicated.
- .2 Existing Conditions.

- .1 Remove contaminated or hazardous materials as directed by Departmental Representative from site, prior to start of demolition Work, and dispose of at designated disposal facilities in safe manner in accordance with TDGA and other applicable regulatory requirements
- .2 List of hazardous materials: see abatement specification.

Part 2 Products

2.1 EQUIPMENT

- .1 Leave machinery running only while in use, except where extreme temperatures prohibit shutting machinery down.

Part 3 Execution

3.1 PREPARATION

- .1 Inspect site with Departmental Representative and verify extent and location of items designated for removal, disposal, alternative disposal, recycling, salvage and items to remain.
- .2 Locate and protect utilities. Preserve active utilities traversing site in operating condition.
- .3 Notify and obtain approval of utility companies before starting demolition.
- .4 Disconnect and Cap Mechanical Services.
 - .1 Sewer and Water Lines: remove in accordance with authority having jurisdictions directed by Departmental Representative and securely plug to form watertight seal.

3.2 REMOVAL OF HAZARDOUS WASTES

- .1 Remove contaminated or dangerous materials defined by authorities having jurisdiction, relating to environmental protection, from site and dispose of in safe manner to minimize danger at site or during disposal.

3.3 REMOVAL OPERATIONS

- .1 Remove items as indicated.
- .2 Do not disturb items designated to remain in place.
- .3 Decommission water wells and monitoring wells in accordance with Provincial regulations.
- .4 Decommission septic tanks in accordance with Provincial Regulations
 - .1 Septic tanks may either be removed or filled with granular or sand materials.
- .5 Remove designated trees during demolition.
 - .1 Obtain written approval of Departmental Representative prior to removal of trees.

- .2 Trees in physical contact with structures to be demolished are to be removed as necessary by the contractor as part of the demolition works. Any change to the cost of work to be requested in writing from the Departmental Representative prior to starting work.
- .6 Stockpile topsoil for final grading and landscaping:
 - .1 Provide erosion control and seeding if not immediately used.
- .7 Disposal of Material:
 - .1 Dispose of materials not designated for salvage or reuse on site at authorized facilities approved in Waste Reduction Workplan
- .8 Backfill:
 - .1 Backfill in areas as indicated and in accordance with Section 31 00 99.

3.4 STOCKPILING

- .1 Label stockpiles, indicating material type and quantity.
- .2 Designate appropriate security resources/measures to prevent vandalism, damage, and theft.
- .3 Locate stockpiled materials convenient for use in new construction to eliminate double handling wherever possible.
- .4 Stockpile materials designated for alternate disposal in location which facilitates removal from site and examination by potential end markets, and which does not impede disassembly, processing, or hauling procedures.

3.5 REMOVAL FROM SITE

- .1 Remove stockpiled material as directed by Departmental Representative, when it interferes with operations of project.
- .2 Remove stockpiles of like materials by alternate disposal option once collection of materials is complete.
- .3 Transport material designated for alternate disposal using approved receiving organizations, facilities, and haulers listed in Waste Reduction Workplan and in accordance with applicable regulations.
 - .1 Written authorization from Departmental Representative is required to deviate from receiving organizations, facilities, or haulers listed in Waste Reduction Workplan.
- .4 Dispose of materials not designated for alternate disposal in accordance with applicable regulations.
 - .1 Disposal Facilities: approved and listed in Waste Reduction Workplan.
 - .2 Written authorization from Departmental Representative is required to deviate from disposal facilities listed in Waste Reduction Workplan.

3.6 RESTORATION

- .1 Restore areas and existing works outside areas of demolition to match condition of adjacent, undisturbed areas.
- .2 Use soil treatments and procedures which are not harmful to health, are not injurious to plants, and do not endanger wildlife, adjacent water courses or ground water.

3.7 FIELD QUALITY CONTROL

- .1 Verification requirements in accordance with Section 01 74 21, include:
 - .1 Materials and resources.
 - .2 Storage and collection of recyclables.
 - .3 Construction waste management.
 - .4 Resource reuse.
 - .5 Recycled content.
 - .6 Local/regional materials.
 - .7 Wood.
 - .8 Low-emitting materials.

3.8 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11.
 - .1 Leave Work area clean at end of each day.
 - .2 Remove debris, trim surfaces and leave work site clean, upon completion of Work
 - .3 Use cleaning solutions and procedures which are not harmful to health, are not injurious to plants, and do not endanger wildlife, adjacent water courses or ground water.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11.
- .3 Waste Management: separate waste materials for reuse or recycling in accordance with Section 01 74 21.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.9 PROTECTION

- .1 Repair damage to adjacent materials or property caused by selective site demolition.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

- .1 Canadian Standards Association (CSA International)
 - .1 CSA S350-M1980 (R2003), Code of Practice for Safety in Demolition of Structures.
- .2 National Research Council Canada (NRC)
 - .1 National Building Code of Canada 2015 (NBC).
 - .2 National Fire Code of Canada 2015 (NFC).
- .3 Ontario Provincial Standard Specification
 - .1 OPSS.PROV 510 November 2014 - Construction Specification for Removals

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00.
- .2 Shop Drawings:
 - .1 Provide shop drawings and product data in accordance with Section 01 33 00.
 - .2 Submit drawings stamped and signed by professional engineer registered or licensed in Ontario, Canada.
- .3 Prior to beginning of Work on site submit detailed Waste Reduction Workplan in accordance with Section 01 74 21 and indicate:
 - .1 Descriptions of and anticipated quantities of materials to be salvaged reused, recycled, and landfilled.
 - .2 Schedule of selective demolition.
 - .3 Number and location of dumpsters.
 - .4 Anticipated frequency of tippage.

1.3 DELIVERY, STORAGE AND HANDLING

- .1 Waste Management and Disposal:
 - .1 Separate waste materials for recycling or reuse in accordance with Section 01 74 21.

1.4 SITE CONDITIONS

- .1 Review designated substance report and take precautions to protect environment.
- .2 Should material resembling spray or trowel-applied asbestos or other designated substance listed as hazardous be encountered, stop work, take preventative measures, and notify Departmental Representative immediately.
 - .1 Do not proceed until written instructions have been received from Departmental Representative.

- .3 Notify Departmental Representative before disrupting access or services.
- .4 Correct conditions detrimental to timely and proper completion of Contracted Work as directed by Departmental Representative. Do not proceed with Contracted Work until detrimental conditions have been corrected.

Part 2 Products

2.1 EQUIPMENT

- .1 Leave equipment and machinery running only while in use, except where extreme temperatures prohibit shutting down.
- .2 Demonstrate that tools and machinery are being used in manner which allows for salvage of materials in best condition possible.

Part 3 Execution

3.1 PREPARATION

- .1 Do Work in accordance with Section 01 35 29.06.
- .2 Protection:
 - .1 Prevent movement, settlement, or damage to adjacent structures, utilities to remain in place. Provide bracing and shoring required.
 - .2 Provide temporary dust screens, covers, railings, supports and other protection as required.
- .3 Locate and protect utility lines. Do not disrupt active or energized utilities designated to remain undisturbed.
 - .1 Sewer and water lines: remove in accordance with requirements of authority having jurisdiction as directed by Departmental Representative.
 - .2 Other underground services: remove and dispose of as directed by Departmental Representative
- .4 Blasting or other uses of explosives is not permitted.

3.2 STOCKPILING

- .1 Label stockpiles, indicating material type and quantity.
- .2 Designate appropriate security resources/measures to prevent vandalism, damage and theft.
- .3 Locate stockpiled materials convenient for use in new construction. Eliminate double handling wherever possible.
- .4 Stockpile materials designated for alternate disposal in location which facilitates removal from site and examination by potential end markets, and which does not impede disassembly, processing, or hauling procedures.

3.3 REMOVAL FROM SITE

- .1 Transport material designated for alternate disposal by approved haulers to receiving organizations and facilities listed in waste reduction work plan and in accordance with applicable regulations. Do not deviate from facilities, haulers or receiving organizations listed in waste reduction workplan without prior written authorization from Departmental Representative.
- .2 Dispose of materials not designated for alternate disposal in accordance with applicable regulations. Disposal facilities must be approved of and listed in waste reduction workplan. Do not deviate from disposal facilities listed in waste reduction work plan without prior written authorization from Departmental Representative.

3.4 CLEANING AND RESTORATION

- .1 Keep site clean and organized throughout demolition procedure.
- .2 Upon completion of project, reinstate areas affected by Work to match condition of adjacent, undisturbed areas.

3.5 BURNING

- .1 The use of burning at the project site for the disposal of refuse and debris will not be permitted.

END OF SECTION

PART 1 General

1.1 RELATED REQUIREMENTS

- .1 Refer to the following report (further referred to herein as the "Site Specific DSR"), bound into this specification, for information pertaining to hazardous building materials that have been identified that may require disturbance during the Work:
 - .1 Report title *Designated Substances and Hazardous Materials Survey – Moosonee National Defense Radar Base, Moosonee National Defense Radar Base, Moosonee, Ontario* prepared by Stantec and dated March 29, 2019.
 - .2 Report title *Designated Substances and Hazardous Materials Survey, Four Buildings, National Defense Radar Base, Moosonee, Ontario*, dated July 2017, and prepared for Public Works and Government Services Canada by DST Consulting Engineers Inc.

1.2 REFERENCE STANDARDS

- .1 Canadian Environmental Protection Act, 1999 (CEPA 1999)
 - .1 Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations (SOR/2005-149).
- .2 Department of Justice Canada (Jus)
 - .1 Transportation of Dangerous Goods Act, 1992 (TDG Act) 1992, (c. 34).
 - .2 Transportation of Dangerous Goods Regulations (T-19.01-SOR/2001-286).
- .3 Green Seal Environmental Standards (GS)
 - .1 GS-11-2015, Edition 3.2, Paints and Coatings.
 - .2 GS-36-2013, Edition 2.1, Commercial Adhesives.
- .4 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
 - .1 WHMIS Safety Data Sheets (SDS).
- .5 National Research Council Canada (NRC)
 - .1 National Fire Code of Canada 2015 (NFC).
- .6 Government of Ontario
 - .1 Regulation 347/90 of the Revised Regulations of Ontario, amended to Ontario Regulation 461/05 and 217/08, General – Waste Management, under the Environmental Protection Act.

- .2 Ontario Regulation 490/09 Designated Substances, made under the Occupational Health and Safety Act (OHSA).
- .3 Environmental Protection Act (EPA), Part VI, the Ozone Depleting Substances – General Regulation (R.R.O. 1990, Regulation 356 amended to Ontario Regulation. 351/93).
- .4 Refrigerants Regulation, O. Reg. 189/94 amended to Ontario Regulation 519/97.
- .5 Canadian Environmental Protection Act (CEPA), Ozone-Depleting Substances Regulations, 1998 SOR/99-7.
- .7 Government of Canada
 - .1 The Canada Labour Code, Part II, Canada Occupational Health and Safety Regulations.
 - .2 The Federal PCB Regulations (SOR/2008-273).
 - .3 The Federal Halocarbons Regulation (July 2003).
- .8 Canadian Construction Association
 - .1 Standard Construction Document CCA 82 “Mould Guidelines for the Canadian Construction Industry” (2004 – further referred to herein as “CCA 82”).

1.3 DEFINITIONS

- .1 Dangerous Goods: product, substance, or organism specifically listed or meets hazard criteria established in Transportation of Dangerous Goods Regulations.
- .2 Hazardous Material: product, substance, or organism used for its original purpose; and is either dangerous goods or material that will cause adverse impact to environment or adversely affect health of persons, animals, or plant life when released into environment.
- .3 Hazardous Waste: hazardous material no longer used for its original purpose and that is intended for recycling, treatment or disposal.
- .4 Workplace Hazardous Materials Information System (WHMIS): Canada-wide system designed to give employers and workers information about hazardous materials used in workplace. Under WHMIS, information on hazardous materials is provided on container labels, safety data sheets (SDS), and worker education programs. WHMIS is put into effect by combination of federal and provincial laws.
- .5 Hazardous Building Material: component of a building or structure that will cause adverse impact to environment or adversely affect health of persons, animals, or plant life when altered, disturbed or removed during maintenance, renovation or demolition.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for hazardous materials and include product characteristics, performance criteria, physical size, finish, and limitations.
 - .2 Submit two copies of WHMIS Safety Data Sheets (SDS) to the Departmental Representative for each hazardous material required prior to bringing hazardous material on site.
 - .3 Submit hazardous materials management plan to Departmental Representative that identifies hazardous materials, usage, location, personal protective equipment requirements, and disposal arrangements.
 - .4 Hazardous waste classification: identify waste codes applicable to each hazardous waste material based on applicable federal and provincial acts, regulations, and guidelines. Waste profiles, analyses, and classification submitted to contract offices for review and approval.
 - .5 Low-Emitting Materials: submit listing of adhesives and sealants, paints and coatings used in building, comply with VOC and chemical component limits or restrictions requirements.
 - .6 Spill response: establish spill response procedures. Comply with applicable requirements according to classification of waste material. Designate an emergency coordinator and emergency contacts for comprehensive emergency response and incident mitigation.
 - .7 Record keeping: contractor is responsible for maintaining adequate records of handling, storing, and shipping of hazardous materials.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Transport hazardous materials and wastes in accordance with Transportation of Dangerous Goods Act, Transportation of Dangerous Goods Regulations, and applicable provincial regulations.
 - .1 When exporting hazardous waste to another country, ensure compliance with Export and Import of Hazardous Waste and Hazardous Recyclable Materials Regulations.

- .4 Storage and Handling Requirements:
 - .1 Co-ordinate storage of hazardous materials with Departmental Representative and abide by internal requirements for labelling and storage of materials and wastes.
 - .2 Store and handle hazardous materials and wastes in accordance with applicable federal and provincial laws, regulations, codes, and guidelines.
 - .3 Store and handle flammable and combustible materials in accordance with National Fire Code of Canada (NFC) requirements.
 - .4 Keep no more than 45 litres of flammable and combustible liquids such as gasoline, kerosene and naphtha for ready use.
 - .5 Store flammable and combustible liquids in approved safety cans bearing the Underwriters' Laboratory of Canada or Factory Mutual seal of approval.
 - .6 Storage of quantities of flammable and combustible liquids exceeding 45 litres for work purposes requires the written approval of the Departmental Representative.
- .5 Transfer of flammable and combustible liquids is prohibited within buildings.
- .6 Transfer flammable and combustible liquids away from open flames or heat-producing devices.
- .7 Solvents or cleaning agents: non-flammable or have flash point above 38 degrees C.
- .8 Store flammable and combustible waste liquids for disposal in approved containers located in safe, ventilated area. Keep quantities to minimum.
- .9 Observe smoking regulations, smoking is prohibited in areas where hazardous materials are stored, used, or handled.
- .10 Storage requirements for quantities of hazardous materials and wastes in excess of 5 kg for solids, and 5 litres for liquids:
 - .1 Store hazardous materials and wastes in closed and sealed containers.
 - .2 Label containers of hazardous materials and wastes in accordance with WHMIS.
 - .3 Store hazardous materials and wastes in containers compatible with that material or waste.
 - .4 Segregate incompatible materials and wastes.
 - .5 Ensure that different hazardous materials or hazardous wastes are stored in separate containers.
 - .6 Store hazardous materials and wastes in secure storage area with controlled access.
 - .7 Maintain clear egress from storage area.

- .8 Store hazardous materials and wastes in location that will prevent them from spilling into environment.
- .9 Have appropriate emergency spill response equipment available near storage area, including personal protective equipment.
- .10 Maintain inventory of hazardous materials and wastes, including product name, quantity, and date when storage began.
- .11 When hazardous waste is generated on site:
 - .1 Co-ordinate transportation and disposal with Departmental Representative.
 - .2 Comply with applicable federal, provincial and municipal laws and regulations for generators of hazardous waste.
 - .3 Use licensed carrier authorized by provincial authorities to accept subject material.
 - .4 Before shipping material obtain written notice from intended hazardous waste treatment or disposal facility it will accept material and it is licensed to accept this material.
 - .5 Label containers with legible, visible safety marks as prescribed by federal and provincial regulations.
 - .6 Only trained personnel handle, offer for transport, or transport dangerous goods.
 - .7 Provide photocopy of shipping documents and waste manifests to Departmental Representative.
 - .8 Track receipt of completed manifest from consignee after shipping dangerous goods. Provide photocopy of completed manifest to Departmental Representative.
 - .9 Report discharge, emission, or escape of hazardous materials immediately to Departmental Representative and appropriate provincial authority. Take reasonable measures to control release.
- .11 Ensure personnel have been trained in accordance with Workplace Hazardous Materials Information System (WHMIS) requirements.
- .12 Report spills or accidents immediately to Departmental Representative. Submit a written spill report to Departmental Representative within 24 hours of incident.

1.6 EXISTING CONDITIONS

- .1 Reports and information pertaining to hazardous building materials present within the building that may be handled, removed, or otherwise disturbed and disposed of during this Project are bound into this specification.
- .2 Notify Department Representative of suspected hazardous building material discovered during Work and not apparent from drawings, specifications, or reports pertaining to the Work. Do not disturb such material pending instructions from the client representative.

1.7 MATERIALS

.1 Description:

- .1 Bring on site only quantities of hazardous material required to perform Work.
- .2 Maintain WHMIS Safety Data Sheets (SDS) in proximity to where materials are being used. Communicate this location to personnel who may have contact with hazardous materials.
- .3 Sustainability Characteristics:
 - .1 Adhesives and Sealants: maximum VOC limit to SCAQMD Rule 1168.
 - .2 Coatings, Primers, Paints in accordance with manufacturer's recommendations for surface conditions:
 - .1 Primer: maximum VOC limit to SCAQMD Rule 1113.
 - .2 Paints: maximum VOC limit to SCAQMD Rule 1113.
 - .3 Coatings: maximum VOC limit to SCAQMD Rule 1113.
 - .4 Spill Response Materials: provide spill response materials which can be used for absorbing/shoveling and containing hazardous materials.
 - .5 Provide personal protective equipment.

PART 2 Execution

2.1 HAZARDOUS MATERIALS ABATEMENT

- .1 Scope of Abatement Activities for hazardous building materials other than asbestos and lead, which are specified elsewhere in the tender documents, is summarized below, in general form.
 - .1 Abatement shall be conducted to handle, alter, remove and/or dispose of hazardous building materials as identified in the Site Specific DSR in accordance with applicable regulations, guidelines, standards and/or best practices for such work, to the extent that such identified hazardous building materials will be impacted (handled, altered, damaged, removed) by the Work.
 - .2 Contractor is responsible for reviewing plans, specifications and reports such that they understand the locations and amounts of hazardous building materials that will be impacted by their Work, and such that appropriate plans and budgets can be included in their overall bids.

- .3 The listing below is a summary of the identified hazardous building material categories that are anticipated to require disturbance (other than asbestos and lead, which are specified elsewhere), along with the associated removal and disposal regulations, guidelines and/or standards.
 - .4 Should the work areas be expanded, or work must occur outside of the areas noted, the Contractor is to notify the Departmental Representative as additional assessment and abatement work may be required prior to disturbance of building material.
 - .5 Should additional materials be identified that require abatement, the Contractor is to comply with the requirements of the applicable sections of the specifications.
 - .6 Contractor to quantify and clarify all materials to be removed at the site. Quantities stated in these documents are estimates only.
- .2 Work Schedule
- .1 The abatement of asbestos-containing materials is to be completed and the Contractor is to coordinate the schedule with the Departmental Representative.
- .3 Scope of Project and Project Design
- .1 The intent is to provide information in these documents that indicates the likely extent and presence of asbestos-containing materials that are to be abated or repaired. The intent is to remove asbestos-containing materials for the purpose of compliance with Ontario Regulation (O. Reg.) 278/05, Canada Labour Code Part II and PSPC Asbestos Management Standard.
 - .2 The Contractor shall design an abatement plan, including any phasing or staging, so that all materials are removed in accordance with O. Reg. 278/05, Canada Labour Code Part II and PSPC Asbestos Management Standard. This plan will be submitted to the Departmental Representative for review and approval before any work is completed. All work to be read in conjunction with other sections. The following are the anticipated minimum requirements for abatement.

.4 Asbestos

- .1 All work to be carried out at Moosonee National Defence Radar Base, located in Moosonee, Ontario.
- .2 Work to be coordinated with the Departmental Representative and other trades.
- .3 Work shall not commence on any phase of the project that involves the potential disturbance of hazardous materials until receiving permission to proceed from the Departmental Representative and inspection requirements are discussed.
- .4 Contractor to quantify and clarify all materials to be removed at the site. No allowances will be made for extras for materials that are noted. For locations where material needs to be removed, read this in conjunction with all tender drawings and documents.
- .5 Read this section in conjunction with all other sections so as to comply with the General Conditions of the contract.
- .6 Work shall not commence on the project that involves the potential disturbance of asbestos-containing materials until receiving permission to proceed from the Departmental Representative and inspection requirements are discussed.
- .7 Provide adequate workforce to complete all work specified in this section within the specified time frame.
- .8 The Contractor shall allow for removal of asbestos-containing materials identified in the following locations, and as noted in the reports bond to this specification and any materials identified during the demolition:

Building 1

Asbestos-Containing Material	Room	Approx. Quantity	Minimum Abatement Procedures
Interior window glaze compound - grey	1 st Level – interior	24 m (4 windows)	Type 1
	2 nd level – interior	18 m (3 windows)	Type 1
	Total	42 m (7 windows)	
Exterior joint caulking – grey	Exterior	54 m	Type 1
	Total	54 m	
Black roof tar	Roof	175 m ²	Type 1
	Total	175 m²	

Building 2

Asbestos-Containing Material	Room	Approx. Quantity	Minimum Abatement Procedures
Cement board	Room 1	60 m ²	Type 2
	Total	60 m²	
9"x9" vinyl floor tiles – green and associated asbestos-containing mastic	Room 2	200 m ²	Type 2 (minimum procedures due to asbestos debris)
	Total	200 m²	
Drywall joint-fill compound	Room 2	90 m ²	Type 2
	Room 3	10 m ²	Type 2
	Total	100 m²	
Duct insulation - black	Room 2	45 m ²	Type 3
	Total	45 m²	
Exterior door and vent caulking – grey	Exterior	18 m	Type 1
	Total	18 m	
Roof caulking	Roof	NQ	To be sampled
	Total	NQ	
Roofing materials	Roof	NQ	To be sampled
	Total	NQ	
Roofing insulation	Roof	NQ	To be sampled
	Total	NQ	

Building 3

Asbestos-Containing Material	Room	Approx. Quantity	Minimum Abatement Procedures
Sprayed fireproofing debris	1 st floor - storage	200 m ²	Type 3
	4 th level - interior	400 m ²	Type 3
	Mezzanine - entrance	50 m ²	Type 3
	Total	650 m²	Type 3
Sprayed fireproofing	1 st level - communications	160 m ²	Type 3
	1 st level - storage	200 m ²	Type 3
	4 th level - interior	400 m ²	Type 3
	Mezzanine - entrance	50 m ²	Type 3
	Total	810 m²	
Fire rated door	1 st level - communications	1 door	Type 1
	1 st level - storage	1 door	Type 1
	Mezzanine - entrance	4 doors	Type 1
	Total	6 doors	
Drywall joint-fill compound	1 st level - storage	100 m ²	Type 3 (minimum procedures due to asbestos debris)
	1 st to 2 nd level - stairwell	30 m ²	Type 3 (minimum procedures due to asbestos debris)
	Mezzanine - entrance	30 m ²	Type 3 (minimum procedures due to asbestos debris)
	Total	160 m²	
Gasket material	1 st level - communications	NQ	Type 3 (minimum procedures due to asbestos debris)
	1 st level - storage	NQ	Type 3 (minimum procedures due to asbestos debris)

Asbestos-Containing Material	Room	Approx. Quantity	Minimum Abatement Procedures
	2 nd level - interior	NQ	Type 3 (minimum procedures due to asbestos debris)
	3 rd level - interior	NQ	Type 3 (minimum procedures due to asbestos debris)
	4 th level - interior	NQ	Type 3 (minimum procedures due to asbestos debris)
	Mezzanine - entrance	NQ	Type 3 (minimum procedures due to asbestos debris)
	Total	NQ	
Caulking materials – cast iron pipe	1 st level - communications	NQ	Type 3 (minimum procedures due to asbestos debris)
	1 st level - storage	NQ	Type 3 (minimum procedures due to asbestos debris)
	2 nd level - interior	NQ	Type 3 (minimum procedures due to asbestos debris)
	3 rd level - interior	NQ	Type 3 (minimum procedures due to asbestos debris)
	4 th level - interior	NQ	Type 3 (minimum procedures due to asbestos debris)
	Mezzanine - entrance	NQ	Type 3 (minimum procedures due to asbestos debris)
	Total	NQ	

Asbestos-Containing Material	Room	Approx. Quantity	Minimum Abatement Procedures
Insulating cement on pipe fittings and associated debris	1 st level - communications	3 fittings	Type 3
	1 st level - storage	60 fittings	Type 3
	2 nd level - interior	40 fittings	Type 3
	3 rd level - interior	10 fittings	Type 3
	Mezzanine - entrance	15 fittings	Type 3
	Total	128 fittings	
Pre-formed tank/body insulation	1 st level - storage	4 m ²	Type 3
	Total	4 m²	
9"x9" vinyl floor tiles – grey	2 nd level - interior	400 m ²	Type 3 (minimum procedures due to asbestos debris)
	3 rd level - interior	400 m ²	Type 3 (minimum procedures due to asbestos debris)
	4 th level – interior	400 m ²	Type 3 (minimum procedures due to asbestos debris)
	Mezzanine -entrance	50 m ²	Type 3 (minimum procedures due to asbestos debris)
	Total	1250 m²	
Roof caulking	Roof	NQ	To be sampled
	Total	NQ	
Roofing materials	Roof	200 m ²	To be sampled
	Total	200 m²	

Building 4

Asbestos-Containing Material	Room	Approx. Quantity	Minimum Abatement Procedures
Corrugated paper-like straight pipe insulation	Bay 2	30 m	Type 3
	Total	30 m	
Insulating cement on pipe fittings and associated debris	Bay 2	29 fittings	Type 3
	Hallway	7 fittings	Type 3
	Storage	8 fittings	Type 3
	Total	44 fittings	
Fire rated doors	Bay 1	1 door	Type 1
	Bay 2	3 doors	Type 1
	Total	4 doors	
Exterior wall caulking - grey	Exterior	235 m	Type 1
	Total	235 m	
Caulking materials – cast iron pipe	Bay 1	NQ	Type 3 (minimum procedures due to asbestos debris)
	Bay 2	NQ	Type 3 (minimum procedures due to asbestos debris)
	Total	NQ	
Exterior window caulking - grey	Exterior	265 m (52 windows)	Type 1
	Total	265 m (52 windows)	
Cement board	Exterior	350 m ²	Type 2
	Roof	60 m ²	Type 2
	Total	410 m²	
Roof caulking	Roof	NQ	To be sampled
	Total	NQ	

Asbestos-Containing Material	Room	Approx. Quantity	Minimum Abatement Procedures
Roofing materials	Roof	2000 m ²	To be sampled
	Total	2000 m ²	

Building 5

Asbestos-Containing Material	Room	Approx. Quantity	Minimum Abatement Procedures
Roof caulking	Roof	NQ	To be sampled
	Total	NQ	
Roofing materials	Roof	NQ	To be sampled
	Total	NQ	

Building 5A

Asbestos-Containing Material	Room	Approx. Quantity	Minimum Abatement Procedures
Roof caulking	Roof	NQ	To be sampled
	Total	NQ	
Roofing materials	Roof	NQ	To be sampled
	Total	NQ	

.5 Lead

- .1 Disposal of yellow and yellow/off-white colored paint on exterior cladding and white-coloured paint on cast-iron drain pipes as hazardous waste.
- .2 Prior to removal from the site and disposal, materials containing lead should be subject to toxicity characteristic leaching procedure (TCLP) to determine the toxicity of with respect to lead prior to disposal in accordance with R., R.O. 1990, Regulation 347 General – Waste Management, as amended (R.R.O., 1990, Reg. 347) under the Environmental Protection Act (EPA). If TCLP testing is not completed, contractor to assume paint to be disposed of as lead waste.

.6 Polychlorinated Biphenyls (PCBs)

- .1 Inspect one (1) light fixture in Building 1 and 15 light fixtures in Building 3 and dispose of PCB waste as necessary.

- .2 Should a 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.
- .7 Mould
 - .1 When demolition work proceeds, it is expected that mould-impacted building materials identified in the Site Specific DSR will be disturbed, removed and disposed of during that process. Due to the potential presence of mould on building materials as indicated in the Site Specific DSR, workers conducting removal of those materials should be notified of the potential presence of mould and should be provided with respiratory protection and/or other personal protective equipment as deemed necessary for the work that they will be conducting. Refer to CCA 82 for applicable PPE and procedures.
 - .2 If significant mould contamination is identified in concealed locations, an experienced mould abatement contractor may be required to assist with removal in accordance with applicable guidelines and standards for such work (e.g. CCA 82).
- .8 Mercury
 - .1 Disposal of 100 mercury-containing fluorescent light tubes in Building 3 as mercury waste.
 - .2 When mercury-containing items are removed ensure all mercury waste is handled, stored and disposed of in accordance with the applicable regulations.
 - .3 Prior to the demolition work, the light tubes and mercury containing devices must be stored in a safe, secure location before being disposed of following the requirements of O. Reg. 347/90.
 - .4 Comply with O. Reg. 490/09 Designated Substances, made under the OHSA when conducting remedial work involving mercury.
 - .5 Precautions should be taken if workers may potentially be exposed to mercury or mercury vapours to ensure that workers exposure levels do not exceed the occupational exposure limit of 0.025 mg/m³ as per the ON OH&S Reg. This can be achieved by providing respiratory and skin protection applicable to the hazard and task to be completed.
- .9 Ozone-Depleting Substances (ODSs)
 - .1 ODSs were not identified in equipment that are anticipated to be impacted by the demolition project.

- .10 Silica
 - .1 When silica-containing materials are to be disturbed and/or removed (e.g., demolition of concrete slabs, masonry or concrete units, removal of gypsum board/plaster walls, impacts to stucco-like wall or ceiling coatings, etc.), ensure dust control measures are employed such that airborne silica dust concentrations do not exceed the exposure limit as stipulated by ON OH&S Reg. (cristobalite and quartz – each 0.025 mg/m³). This would include, but not be limited to, the following:
 - .1 Providing workers with respiratory protection
 - .2 Wetting the surface of the materials, use of water or dust suppressing agents to prevent dust emissions
 - .3 Providing workers with facilities to properly wash prior to exiting the work area.
- .11 Urea Formaldehyde Foam Insulation (UFFI)
 - .1 UFFI was not identified in building materials that are anticipated to be impacted by the demolition project.
- .12 Radioactive Sources/Substances
 - .1 Suspect radiological sources and/or substances were not identified in building materials that are anticipated to be impacted by the demolition project.
- .13 Hazardous Materials
 - .1 Disposal of 32 Exide batteries in Building 3.

2.2 CLEANING

- .1 Progress Cleaning:
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.
- .3 Waste Management: separate waste materials for recycling, and reuse:
 - .1 Dispose of hazardous waste materials in accordance with applicable federal and provincial acts, regulations, and guidelines.
 - .2 Recycle hazardous wastes for which there is approved, cost effective recycling process available.
 - .3 Send hazardous wastes to authorized hazardous waste disposal or treatment facilities.

- .4 Burning, diluting, or mixing hazardous wastes for purpose of disposal is prohibited.
- .5 Disposal of hazardous materials in waterways, storm or sanitary sewers, or in municipal solid waste landfills is prohibited.
- .6 Dispose of hazardous wastes in timely fashion in accordance with applicable provincial regulations.
- .7 Minimize generation of hazardous waste to maximum extent practicable. Take necessary precautions to avoid mixing clean and contaminated wastes.
- .8 Identify and evaluate recycling and reclamation options as alternatives to land disposal, such as:
 - .1 Hazardous wastes recycled in manner constituting disposal.
 - .2 Hazardous waste burned for energy recovery.
 - .3 Lead-acid battery recycling.
 - .4 Hazardous wastes with economically recoverable precious metals.

2.3 DISPOSAL

- .1 Dispose of hazardous waste materials in accordance with applicable federal and provincial acts, regulations, and guidelines.
- .2 Recycle hazardous wastes for which there is approved, cost effective recycling process available.
- .3 Send hazardous wastes to authorized hazardous waste disposal or treatment facilities.
- .4 Burning, diluting, or mixing hazardous wastes for purpose of disposal is prohibited.
- .5 Disposal of hazardous materials in waterways, storm or sanitary sewers, or in municipal solid waste landfills is prohibited.
- .6 Dispose of hazardous wastes in timely fashion in accordance with applicable provincial regulations.
- .7 Minimize generation of hazardous waste to maximum extent practicable. Take necessary precautions to avoid mixing clean and contaminated wastes.

- .8 Identify and evaluate recycling and reclamation options as alternatives to land disposal, such as:
 - .1 Hazardous wastes recycled in manner constituting disposal.
 - .2 Hazardous waste burned for energy recovery.
 - .3 Lead-acid battery recycling.
 - .4 Hazardous wastes with economically recoverable precious metals.

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END OF SECTION

PART 1 General**1.1 SUMMARY**

- .1 Comply with requirements of this Section when performing Type 1 work procedures within the work areas as prescribed in O.Reg.278/05 including the following:
 - .1 Removing black roof tar on Building 1. The material must be removed without being broken, cut, drilled, abraded, ground, sanded or vibrated.
 - .2 Removing window glaze compound – grey on the interior of Building 1. The material must be removed without being broken, cut, drilled, abraded, ground, sanded or vibrated.
 - .3 Removing joint caulking – grey on the exterior of Building 1. The material must be removed without being broken, cut, drilled, abraded, ground, sanded or vibrated.
 - .4 Removing window caulking – grey on the exterior of Building 4. The material must be removed without being broken, cut, drilled, abraded, ground, sanded or vibrated.
 - .5 Removing exterior caulking – grey on vents, walls, doors and joints of Building 2 and Building 4. The material must be removed without being broken, cut, drilled, abraded, ground, sanded or vibrated.
 - .6 Removing presumed asbestos-containing fire-rated doors in Building 3 and Building 4. The material must be removed without being broken, cut, drilled, abraded, ground, sanded or vibrated.
 - .7 Removing presumed asbestos-containing roofing materials and roof caulking and roof insulation in Building 2, Building 3, Building 4, Building 5 and Building 5A.
- .2 Removing non-friable asbestos-containing materials, other than ceiling tiles, if the material is installed or removed without being broken, cut, drilled, abraded, ground, sanded or vibrated.
- .3 Break, cut, grind, sand, drill, scrape, vibrate or abrade non-friable asbestos containing materials using non-powered hand-held tools, and the material is wetted to control the spread of dust or fibres.
- .4 The Contractor is to quantify all materials at the site. No allowances will be made for extras for materials that are noted. The summary of occurrences of asbestos-containing materials is provided in the Stantec Consulting Ltd. report entitled *Designated Substances and Hazardous Materials Survey – Moosonee*

National Defence Radar Base, Moosonee National Defence Radar Base, Moosonee, Ontario dated March 29, 2019.

- .5 The contractor is to provide the following:
 - .1 Sanitary facilities for workers and Authorized Visitors.
 - .2 Washroom facilities for workers and Authorized Visitors.
 - .3 Temporary facilities including connections to electrical, water and drainage point sources.
 - .4 Any special facilities and supplies required by the specification and any relevant or applicable guidelines, codes, or regulations.
 - .5 All and any other materials, equipment and tools required to complete the work.
 - .6 In addition, the Contractor shall maintain an adequate supply of protective clothing and equipment as described herein for use by Authorized Visitors who may need to enter the work-site.
- .6 All vacuums used on site must have HEPA integrity test completed on site prior to use. Only units documented as passing the test may be used on site. Documentation must be provided to the Departmental Representative showing test information.
- .7 Electricity and water service to be made available by the Departmental Representative. Contractor to provide adequate lighting to the satisfaction of the Departmental Representative.
- .8 Departmental Representative is to receive a written work schedule at least 1 week in advance.

1.2 SECTION INCLUDES

- .1 Requirements and procedures for asbestos abatement of non-friable asbestos-containing materials.

1.3 REFERENCE STANDARDS

- .1 Canadian General Standards Board (CGSB).
 - .1 CAN/CGSB-1.205-03, Sealer for Application of Asbestos-Fibre Releasing Materials.
- .2 Department of Justice Canada (Jus).
 - .1 Canadian Environmental Protection Act, 1999 (CEPA).
- .3 Health Canada/Workplace Hazardous Materials Information System (WHMIS).
 - .1 Safety Data Sheets (SDS).

- .4 Transport Canada (TC).
 - .1 Transportation of Dangerous Goods Act, 1992 (TDGA).
- .5 Ontario Environmental Protection Act, R.R.O 1990,
 - .1 General – Waste Management, O. Reg. 347/90, as amended.
- .6 Underwriters' Laboratories of Canada (ULC).
- .7 National Joint Council (NJC).
 - .1 Part XI – Hazardous Substances.
- .8 PSPC Asbestos Management Standard and Directive
- .9 Canada Labour Code Part II, section 124 and 125.
 - .1 Canada Occupational Health and Safety Regulations
- .10 Ontario Ministry of Labour (MoL).
 - .1 Occupational Health and Safety Act, R.S.O 1990, c. O1 (OSHA)
 - .1 O. Reg. 278/05 – Designated Substance – Asbestos on Construction Projects and in Buildings and Repair Operations, as amended
 - .2 Ontario Occupational Health and Safety Act, R.S.O. 1990, Regulation 490/09 “Designated Substances”, as amended

1.4 DEFINITIONS

- .1 Amended Water: water with nonionic surfactant wetting agent added to reduce water tension to allow thorough wetting of fibres.
- .2 Asbestos-Containing Materials (ACMs): materials that contain 0.5 per cent or more asbestos by dry weight and are identified under Existing Conditions including fallen materials and settled dust.
- .3 Asbestos Work Area: area where work takes place which will, or may, disturb ACMs.
- .4 Contractor: Asbestos Abatement Contractor with accredited workers and supervisors and the proper insurance for performing asbestos abatement.
- .5 Authorized Visitors: Departmental representatives of regulatory agencies.
- .6 Competent worker: in relation to specific work, means a worker who:
 - .1 Is qualified because of knowledge, training and experience to perform the work.
 - .2 Is familiar with the provincial and federal laws and with the provisions of the regulations that apply to the work.

- .3 Has knowledge of all potential or actual danger to health or safety in the work.
- .7 Friable material: means material that:
 - .1 When dry, can be crumbled, pulverized or powdered by hand pressure, or is crumbled, pulverized or powdered.
- .8 Degreaser: Degreasing product used to completely remove residual from concrete and other surfaces.
- .9 HEPA vacuum: High Efficiency Particulate Air filtered vacuum equipment with filter system capable of collecting and retaining fibres greater than 0.3 microns in any direction at 99.97% efficiency.
- .10 HEPA Integrity Test: A testing method used to determine the integrity of the vacuums and negative air units, testing for HEPA-filter leaks.
- .11 Mastic Remover: Non-solvent containing mastic remover used to completely remove mastic from concrete and other surfaces.
- .12 Non-Friable Material: material that when dry cannot be crumbled, pulverized or powdered by hand pressure.
- .13 Occupied Area: any area of the building or work site that is outside Asbestos Work Area.
- .14 Polyethylene: polyethylene sheeting or rip-proof polyethylene sheeting with tape along edges, around penetrating objects, over cuts and tears, and elsewhere as required to provide protection and isolation.
- .15 Sprayer: garden reservoir type sprayer or airless spray equipment capable of producing mist or fine spray. Must have appropriate capacity for work.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit proof satisfactory to Departmental Representative that suitable arrangements have been made to dispose of asbestos-containing waste in accordance with requirements of authority having jurisdiction.
- .2 Submit Provincial/Territorial and/or local requirements for Notice of Project Form.
- .3 Submit proof of Contractor's Asbestos Liability Insurance.
- .4 Submit to Departmental Representative necessary permits for transportation and disposal of asbestos-containing waste and proof that asbestos-containing waste has been received and properly disposed.

- .5 Submit proof that all asbestos workers and/or supervisor have received appropriate training and education by a competent person in the hazards of asbestos exposure, good personal hygiene and work practices while working in Asbestos Work Areas, and the use, cleaning and disposal of respirators and protective clothing.
- .6 Submit proof satisfactory to Departmental Representative that employees have respirator fitting and testing. Workers must be fit tested (irritant smoke test) with respirator that is personally issued.

1.6 QUALITY ASSURANCE

- .1 Regulatory Requirements: comply with Federal, Provincial/Territorial, and local requirements pertaining to asbestos, provided that in case of conflict among these requirements or with these specifications, more stringent requirement applies. Comply with regulations in effect at time work is performed.
- .2 Health and Safety:
 - .1 Safety Requirements: worker protection.
 - .1 Protective equipment and clothing to be worn by workers while in Asbestos Work Area include:
 - .1 Air purifying half-mask respirator with P-100 particulate filter, personally issued to worker and marked as to efficiency and purpose, suitable for protection against asbestos and acceptable to Provincial Authority having jurisdiction. The respirator to be fitted so that there is an effective seal between the respirator and the worker's face, unless the respirator is equipped with a hood or helmet. The respirator to be cleaned, disinfected and inspected after use on each shift, or more often if necessary, when issued for the exclusive use of one worker, or after each use when used by more than one worker. The respirator to have damaged or deteriorated parts replaced prior to being used by a worker; and, when not in use, to be stored in a convenient, clean and sanitary location. The employer to establish written procedures regarding the selection, use and care of respirators, and a copy of the procedures to be provided to and reviewed with each worker who is required to wear a respirator. A worker not to be assigned to an operation requiring the use of a respirator unless he or she is physically able to perform the operation while using the respirator.
 - .2 Disposable-type protective clothing that does not readily retain or permit penetration of asbestos fibres. Protective clothing to be provided by the employer and worn by every worker who enters the work area, and the protective

clothing shall consist of a head covering and full body covering that fits snugly at the ankles, wrists and neck, in order to prevent asbestos fibres from reaching the garments and skin under the protective clothing to include suitable footwear, and to be repaired or replaced if torn.

- .2 Eating, drinking, chewing, and smoking are not permitted in Asbestos Work Area.
- .3 Before leaving Asbestos Work Area, the worker can decontaminate his or her protective clothing by using a vacuum equipped with a HEPA filter, or by damp wiping, before removing the protective clothing, or, if the protective clothing will not be reused, place it in a container for dust and waste. The container to be dust tight, suitable for asbestos waste, impervious to asbestos, identified as asbestos waste, cleaned with a damp cloth or a vacuum equipped with a HEPA filter immediately before removal from the work area, and removed from the work area frequently and at regular intervals.
- .4 Facilities for washing hands and face shall be provided within or close to the Asbestos Work Area.
- .5 Ensure workers wash hands and face when leaving Asbestos Work Area. Facilities for washing are located.
- .6 Ensure that no person required to enter an Asbestos Work Area has facial hair that affects seal between respirator and face.

1.7 WASTE MANAGEMENT AND DISPOSAL

- .1 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .2 Collect and separate for disposal packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
- .3 Separate for recycling and place in designated containers waste in accordance with Waste Management Plan.
- .4 Place materials defined as hazardous or toxic in designated containers.
- .5 Handle and dispose of hazardous materials in accordance with the CEPA, TDGA, Regional and Municipal regulations.
- .6 Fold up metal banding, flatten and place in designated area for recycling.
- .7 Disposal of asbestos waste generated by removal activities must comply with Federal, Provincial, Territorial and Municipal regulations. Dispose of asbestos waste in sealed double thickness 6 mils bags or leak proof drums. Label containers with appropriate warning labels.

- .8 Provide manifests describing and listing waste created. Transport containers by approved means to licensed landfill for burial.

1.8 EXISTING CONDITIONS

- .1 Refer to the following for details on asbestos-containing materials:
 - .1 *Designated Substances and Hazardous Materials Survey – Moosonee National Defence Radar Base, Moosonee National Defence Radar Base, Moosonee, Ontario*, prepared by Stantec Consulting Ltd. and dated March 28, 2019.
 - .2 *Designated Substances and Hazardous Materials Survey, Four Buildings, National Defence Radar Base, Moosonee, Ontario*, dated July 2017, and prepared for Public Works and Government Services Canada by DST Consulting Engineers Inc.
- .2 Notify Departmental Representative of asbestos-containing material discovered during Work and not apparent from drawings, specifications, or report pertaining to Work. Do not disturb such material pending instructions from Departmental Representative.

1.9 SCHEDULING

- .1 Hours of Work: perform work involving asbestos abatement located at the Buildings during hours specified by Departmental Representative. The work schedule must be approved in writing by the Departmental Representative in advance of work. Contractor shall be available to work continuously from beginning to end of project.

1.10 PERSONNEL TRAINING

- .1 Before beginning Work, provide Departmental Representative satisfactory proof that every worker has had instruction and training in hazards of asbestos exposure, in personal hygiene and work practices, and in use, cleaning, and disposal of respirators and protective clothing.
- .2 Instruction and training related to respirators includes, following minimum requirements:
 - .1 Fitting of equipment.
 - .2 Inspection and maintenance of equipment.
 - .3 Disinfecting of equipment.
 - .4 Limitations of equipment.
- .3 Instruction and training must be provided by a competent, qualified person.

PART 2 Products**2.1 MATERIALS**

- .1 Drop Sheets:
 - .1 Polyethylene: 0.15 mm thick.
 - .2 FR polyethylene: 0.15 mm thick woven fibre reinforced fabric bonded both sides with polyethylene.
- .2 Wetting Agent: 50% polyoxyethylene ester and 50% polyoxyethylene ether mixed with water in a concentration to provide thorough wetting of asbestos-containing material.
- .3 Waste Containers: contain waste in two separate containers.
 - .1 Inner container: 0.15 mm thick sealable polyethylene waste bag.
 - .2 Outer container: sealable metal or fibre type where there are sharp objects included in waste material; otherwise outer container may be sealable metal or fibre type or second 0.15 mm thick sealable polyethylene bag.
 - .3 Labelling requirements: affix pre-printed cautionary asbestos warning in both official languages that is visible when ready for removal to disposal site.
- .4 Slow - drying sealer: non-staining, clear, water - dispersible type that remains tacky on surface for at least 8 hours and designed for purpose of trapping residual asbestos fibres.
- .5 Tape: fibreglass - reinforced duct tape suitable for sealing polyethylene under both dry conditions and wet conditions using amended water.

PART 3 Execution**3.1 PROCEDURES**

- .1 Before beginning work, temporary shoring shall be put in place to allow for entry and abatement activities as necessary in Building 2 and Building 3.
- .2 Before beginning Work, isolate Asbestos Work Area using, minimum, preprinted cautionary asbestos warning signs in both official languages that are visible at access routes to Asbestos Work Area.
 - .1 Remove visible dust from surfaces in the work area where dust is likely to be disturbed during course of work.

- .2 Use HEPA vacuum or damp cloths where damp cleaning does not create a hazard and is otherwise appropriate.
- .3 Do not use compressed air to clean up or remove dust from any surface.
- .3 Asbestos-containing building materials to be removed without the use of power tools.
- .4 Prevent spread of dust from Asbestos Work Area using measures appropriate to work to be done.
 - .1 Use FR polyethylene drop sheets over flooring such as carpeting that absorbs dust and over flooring in Asbestos Work Area where dust and contamination cannot otherwise be safely contained. Drop sheets are not to be reused.
- .2 Wet materials containing asbestos to be cut, ground, abraded, scraped, drilled, or otherwise disturbed unless wetting creates hazard or causes damage.
 - .1 Use garden reservoir type low - velocity fine - mist sprayer.
 - .2 Perform Work to reduce dust creation to lowest levels practicable.
 - .3 Work will be subject to visual inspection and air monitoring.
 - .4 Contamination of surrounding areas indicated by visual inspection or air monitoring will require complete enclosure and clean-up of affected areas.
- .6 Ensure that worker exposure is controlled by appropriate personal protective equipment being utilized and the Asbestos Work Area is well ventilated if solvent based removal of mastic is to be undertaken.
- .7 Remove caulking from door frames, window frames, vents and walls with the use of non-powered hand tools and place in asbestos waste bags for disposal.
- .8 Remove windows and window frame and separate remaining caulking materials with the use of non-powered hand tools and dispose place in asbestos waste bags for disposal.
- .9 Wrap window frames and glass with glazing materials in poly sheeting, affix asbestos label, and place in lined disposal bin.
- .10 Remove presumed asbestos-containing fire-rated doors with the use of non-powered hand tools. Wrap doors in 6-mil polyethylene and place in asbestos-waste bin. Test insulation if present for asbestos, and if present, dispose of entire door as asbestos containing waste.
- .11 Remove black roof tar and substrate materials containing tar with the use of non-powered hand tools and dispose of as asbestos waste.

- .12 Test presumed asbestos-containing roofing materials, roof caulking and roof insulation if present for asbestos, and if asbestos is present, removal with the use of non-powdered hand tools and dispose of as asbestos containing waste.
- .13 Frequently and at regular intervals during Work and immediately on completion of work:
 - .1 Dust and waste to be cleaned up and removed using a vacuum equipped with a HEPA filter, or by damp mopping or wet sweeping, and placed in a waste container, and
 - .2 Drop sheets to be wetted and placed in a waste container as soon as practicable.
- .14 Cleanup:
 - .1 Place dust and asbestos containing waste in sealed dust-tight waste bags. Treat drop sheets and disposable protective clothing as asbestos waste; wet and fold these items to contain dust, and then place in plastic bags.
 - .2 Clean exterior of each waste-filled bag using damp cloths or HEPA vacuum and place in second clean waste bag immediately prior to removal from Asbestos Work Area.
 - .3 Seal waste bags and remove from site. Dispose of in accordance with requirements of Provincial/Territorial and Federal Authority having jurisdiction. Supervise dumping and ensure that dump operator is fully aware of hazardous nature of material to be dumped and that the appropriate guidelines and regulations for asbestos disposal are followed.
 - .4 Perform final thorough clean-up of Work areas and adjacent areas affected by Work using HEPA vacuum.

END OF SECTION

PART 1 General**1.1 SUMMARY**

- .1 Comply with requirements of this Section when performing Type 2 work procedures within the work areas as prescribed in O. Reg. 278/05 including the following work:
 - .1 Removing drywall joint-fill compound on the interior walls of Building 2.
 - .2 Removing cement board panels on the interior of Building 2 and exterior and roof of Building 4.
 - .3 Removing 9"x9" (225mm x 225mm) vinyl floor tile – green with asbestos-containing mastic in Building 2.
 - .4 Removing non-friable asbestos containing materials by breaking, cutting, drilling, abrading, grounding, sanding or vibrating if:
 - .1 The material is not wetted to control the spread of dust or fibres, and
 - .2 The work is done only by means of non-powered hand-held tools.
 - .9 Removing non-friable asbestos containing materials by breaking, cutting, drilling, abrading, grounding, sanding or vibrating if the work is done by means of power tools that are attached to dust-collecting devices equipped with HEPA filters.
 - .10 The Contractor is to quantify all materials at the site. No allowances will be made for extras for materials that are noted. The summary of occurrences of asbestos-containing materials is provided in the Stantec Consulting Ltd. report entitled *Designated Substances and Hazardous Materials Survey – Moosonee National Defence Radar Base, Moosonee National Defence Radar Base, Moosonee, Ontario* dated March 29, 2019 and *Designated Substances and Hazardous Materials Survey, Four Buildings, National Defence Radar Base, Moosonee, Ontario*, dated July 2017, and prepared for Public Works and Government Services Canada by DST Consulting Engineers Inc.
 - .11 Removing more than one square metre of drywall in which joint-filling compounds that are asbestos containing materials have been used.
 - .12 Removing of asbestos containing material from a pipe, duct or similar structure using a glove bag.
 - .13 Cleaning filters used in an air handling unit in a building that has sprayed-on asbestos containing fireproofing.

1.2 SECTION INCLUDES

- .1 Requirements and procedures for asbestos abatement of non-friable asbestos-containing materials.

1.3 REFERENCE STANDARDS

- .1 Canadian General Standards Board (CGSB).
 - .1 CAN/CGSB-1.205-03, Sealer for Application of Asbestos-Fibre Releasing Materials.
- .2 Department of Justice Canada (Jus).
 - .1 Canadian Environmental Protection Act, 1999 (CEPA).
- .3 Health Canada/Workplace Hazardous Materials Information System (WHMIS).
 - .1 Safety Data Sheets (SDS).
- .4 Transport Canada (TC).
 - .1 Transportation of Dangerous Goods Act, 1992 (TDGA).
- .5 Ontario Environmental Protection Act, R.R.O 1990,
 - .1 General – Waste Management, O. Reg. 347/90, as amended.
- .6 Underwriters' Laboratories of Canada (ULC).
- .7 National Joint Council (NJC).
 - .1 Part XI – Hazardous Substances.
- .8 PSPC Asbestos Management Directive
- .9 Canada Labour Code Part II, section 124 and 125.
 - .1 Canada Occupational Health and Safety Regulations
- .10 Ontario Ministry of Labour (MOL).
 - .1 Occupational Health and Safety Act, R.S.O 1990, c. O1 (OSHA)
 - .1 O. Reg. 278/05 – Designated Substance – Asbestos on Construction Projects and in Buildings and Repair Operations, as amended
 - .2 Ontario Occupational Health and Safety Act, R.S.O. 1990, Regulation 490/09 “Designated Substances”, as amended

1.4 DEFINITIONS

- .1 Amended Water: water with non-ionic surfactant wetting agent added to reduce water tension to allow wetting of fibres.
- .2 Asbestos Containing Materials (ACMs): materials that contain 0.5 per cent or more asbestos by dry weight and are identified under Existing Conditions including fallen materials and settled dust.

- .3 Asbestos Work Area: area where work takes place which will, or may disturb ACMs.
- .4 Authorized Visitors: Departmental Representatives and representatives of regulatory agencies.
- .5 Competent worker in relation to specific work, means a worker who:
 - .1 Is qualified because of knowledge, training and experience to perform the work.
 - .2 Is familiar with the federal and provincial laws and with the provisions of the regulations that apply to the work.
 - .3 Has knowledge of all potential or actual danger to health or safety in the work.
- .6 Friable Materials: material that when dry can be crumbled, pulverized or powdered by hand pressure and includes such material that is crumbled, pulverized or powdered.
- .7 Glove Bag: prefabricated glove bag as follows:
 - .1 Minimum thickness 0.25 mm (10 mil) polyvinyl-chloride bag.
 - .2 Integral 0.25 mm (10 mil) thick polyvinyl-chloride gloves and elastic ports.
 - .3 Equipped with reversible double pull double throw zipper on top and at approximately mid-section of the bag.
 - .4 Straps for sealing ends around pipe.
- .8 HEPA vacuum: High Efficiency Particulate Air filtered vacuum equipment with filter system capable of collecting and retaining fibres greater than 0.3 microns in any dimension at 99.97% efficiency.
- .9 Non-Friable Material: material that when dry cannot be crumbled, pulverized or powdered by hand pressure.
- .10 Occupied Area: any area of building or work site that is outside Asbestos Work Area.
- .11 Polyethylene: polyethylene sheeting or rip-proof polyethylene sheeting with tape along edges, around penetrating objects, over cuts and tears, and elsewhere as required to provide protection and isolation.
- .12 Sprayer: garden reservoir type sprayer or airless spray equipment capable of producing mist or fine spray. Must have appropriate capacity for scope of work.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit proof satisfactory to Departmental Representative that suitable arrangements have been made to dispose of asbestos containing waste in accordance with requirements of authority having jurisdiction.
- .2 Submit Provincial/Territorial and/or local requirements for Notice of Project Form.
- .3 Submit proof of Contractor's Asbestos Liability Insurance.
- .4 Submit to Departmental Representative necessary permits for transportation and disposal of asbestos containing waste and proof that asbestos containing waste has been received and properly disposed.
- .5 Submit proof satisfactory to Departmental Representative that all asbestos workers have received appropriate training and education by a competent person in the hazards of asbestos exposure, good personal hygiene, entry and exit from Asbestos Work Area, aspects of work procedures and protective measures while working in Asbestos Work Areas, and the use, cleaning and disposal of respirators and protective clothing.
- .6 Submit proof that supervisory personnel have attended asbestos abatement course, of not less than two days duration, approved by Departmental Representative. Minimum of one supervisor for every ten workers.
- .7 Submit Workplace Safety & Insurance Board certificates and transcription of insurance.
- .8 Submit documentation including test results, fire and flammability data, and WHMIS Safety Data Sheets (SDS) for chemicals or materials including:
 - .1 Encapsulants
 - .2 Amended water
 - .3 Slow drying sealer
- .9 Submit proof satisfactory to Departmental Representative that employees have respirator fitting and testing. Workers must be fit tested (irritant smoke test) with respirator that is personally issued.

1.6 QUALITY ASSURANCE

- .1 Regulatory Requirements: comply with Federal, Provincial/Territorial and local requirements pertaining to asbestos, provided that in case of conflict among these requirements or with these specifications more stringent requirement applies. Comply with regulations in effect at the time work is performed.
- .2 Health and Safety:

- .1 Safety Requirements: worker and visitor protection.
 - .1 Protective equipment and clothing to be worn by workers while in Asbestos Work Area include:
 - 1. Air purifying half-mask respirator with P-100 particulate filter, personally issued to worker and marked as to efficiency and purpose, suitable for protection against asbestos and acceptable to Provincial Authority having jurisdiction. The respirator to be fitted so that there is an effective seal between the respirator and the worker's face, unless the respirator is equipped with a hood or helmet. The respirator to be cleaned, disinfected and inspected after use on each shift, or more often if necessary, when issued for the exclusive use of one worker, or after each use when used by more than one worker. The respirator to have damaged or deteriorated parts replaced prior to being used by a worker; and, when not in use, to be stored in a convenient, clean and sanitary location. The employer to establish written procedures regarding the selection, use and care of respirators, and a copy of the procedures to be provided to and reviewed with each worker who is required to wear a respirator. A worker not to be assigned to an operation requiring the use of a respirator unless he or she is physically able to perform the operation while using the respirator.
 - 2. Disposable type protective clothing that does not readily retain or permit penetration of asbestos fibres. Protective clothing to be provided by the employer and worn by every worker who enters the work area, and the protective clothing to consist of a head covering and full body covering that fits snugly at the ankles, wrists and neck, in order to prevent asbestos fibres from reaching the garments and skin under the protective clothing. It includes suitable footwear, and it to be repaired or replaced if torn.
 - .3 Eating, drinking, chewing, and smoking are not permitted in Asbestos Work Area.
 - .4 Before leaving Asbestos Work Area, the worker can decontaminate his or her protective clothing by using a vacuum equipped with a HEPA filter, or by damp wiping, before removing the protective clothing, or, if the protective clothing will not be reused, place it in a container for dust and waste. The container to be dust tight, suitable for asbestos waste, impervious to asbestos, identified as asbestos waste, cleaned with a damp cloth or a vacuum equipped with a HEPA filter immediately before removal from the work area, and removed from the work area frequently and at regular intervals.

- .5 Ensure workers wash hands and face when leaving Asbestos Work Area.
- .6 Ensure that no person required to enter an Asbestos Work Area has facial hair that affects seal between respirator and face.
- .7 Visitor Protection:
 - .1 Provide protective clothing and approved respirators to Authorized Visitors to work areas.
 - .2 Instruct Authorized Visitors in the use of protective clothing, respirators and procedures.
 - .3 Instruct Authorized Visitors in proper procedures to be followed in entering into and exiting from Asbestos Work Area.

1.7 WASTE MANAGEMENT AND DISPOSAL

- .1 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .2 Collect and separate for disposal packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
- .3 Separate for recycling and place in designated containers in accordance with Waste Management Plan.
- .4 Place materials defined as hazardous or toxic in designated containers.
- .5 Handle and dispose of hazardous materials in accordance with the CEPA, TDGA, Regional and Municipal regulations.
- .6 Fold up metal banding, flatten and place in designated area for recycling.
- .7 Disposal of asbestos waste generated by removal activities must comply with Federal, Provincial/Territorial and Municipal regulations. Dispose of asbestos waste in sealed double thickness 6 mils bags or leak proof drums. Label containers with appropriate warning labels.
- .8 Provide manifests describing and listing waste created. Transport containers by approved means to licenced landfill for burial.

1.8 EXISTING CONDITIONS

- .1 Reports and information pertaining to ACMS to be handled, removed, or otherwise disturbed and disposed of during this Project are bound into this specification.
- .2 Notify Departmental Representative of friable material discovered during Work and not apparent from drawings, specifications, or report pertaining to Work. Do not disturb such material until instructed by Departmental Representative.

1.9 SCHEDULING

- .1 Perform work involving asbestos abatement located at the Buildings during hours specified by Departmental Representative. The work schedule must be approved in writing by the Departmental Representative in advance of work. Contractor shall be available to work continuously from beginning to end of project.

1.10 PERSONNEL TRAINING

- .1 Before beginning Work, provide Departmental Representative satisfactory proof that every worker has had instruction and training in hazards of asbestos exposure, in personal hygiene and work practices, in use of glove bag procedures, and in use, cleaning, and disposal of respirators and protective clothing.
- .2 Instruction and training related to respirators includes, at minimum:
 - .1 Fitting of equipment.
 - .2 Inspection and maintenance of equipment.
 - .3 Disinfecting of equipment.
 - .4 Limitations of equipment.
- .3 Instruction and training must be provided by competent, qualified person.

PART 2 Products**2.1 MATERIALS**

- .1 Drop and Enclosure Sheets:
 - .1 Polyethylene: 0.15 mm thick.
 - .2 FR polyethylene: 0.15 mm thick woven fibre reinforced fabric bonded both sides with polyethylene.

- .2 Wetting Agent: 50% polyoxyethylene ester and 50% polyoxyethylene ether mixed with water in concentration to provide thorough wetting of asbestos containing material.
- .3 Waste Containers: contain waste in two separate containers.
 - .1 Inner container: 0.15 mm thick sealable polyethylene bag [or where glove bag method is used, glove bag itself.
 - .2 Outer container: sealable metal or fibre type where there are sharp objects included in waste material; otherwise outer container may be sealable metal or fibre type or second 0.15 mm thick sealable polyethylene bag.
 - .3 Labelling requirements: affix preprinted cautionary asbestos warning, in both official languages, that is visible when ready for removal to disposal site.
- .4 Glove bag:
 - .1 Acceptable materials: safe-T-Strip products in configuration suitable for Work, or Alternative material approved by addendum during tendering period in accordance with Instructions to Bidders.
 - .2 The glove bag to be equipped with:
 - .1 Sleeves and gloves that are permanently sealed to the body of the bag to allow the worker to access and deal with the insulation and maintain a sealed enclosure throughout the work period.
 - .2 Valves or openings to allow insertion of a vacuum hose and the nozzle of a water sprayer while maintaining the seal to the pipe, duct or similar structure.
 - .3 A tool pouch with a drain.
 - .4 A seamless bottom and a means of sealing off the lower portion of the bag.
 - .5 A high strength double throw zipper and removable straps, if the bag is to be moved during the removal operation.
- .5 Tape: tape suitable for sealing polyethylene to surfaces under both dry and wet conditions using amended water.

- .6 Slow - drying sealer: non-staining, clear, water - dispersible type that remains tacky on surface for at least 8 hours and designed for purpose of trapping residual asbestos fibres.
 - .1 Sealer: flame spread and smoke developed rating less than 50 and be compatible with new fireproofing.
- .7 Encapsulant: surface film forming type conforming to CAN/CGSB-1.205.

PART 3 Execution

3.1 SUPERVISION

- .1 Minimum of one Supervisor for every ten workers is required.
- .2 Approved Supervisor must remain within Asbestos Work Area during disturbance, removal, or other handling of asbestos-containing materials.

3.2 PROCEDURES

- .1 Before beginning work, temporary shoring shall be put in place to allow for entry and abatement activities as necessary in Building 2 and Building 3.
- .2 Before beginning Work, at each access to Asbestos Work Area, install warning signs in both official languages in upper case 'Helvetica Medium' letters reading as follows, where number in parentheses indicates font size to be used: 'CAUTION ASBESTOS HAZARD AREA (25 mm) / NO UNAUTHORIZED ENTRY (19 mm) / WEAR ASSIGNED PROTECTIVE EQUIPMENT (19 mm) / BREATHING ASBESTOS DUST MAY CAUSE SERIOUS BODILY HARM (7 mm)'.
 - .1 Use HEPA vacuum or damp cloths where damp cleaning does not create hazard and is otherwise appropriate.
 - .2 Do not use compressed air to clean up or remove dust from any surface.
- .4 Prevent spread of dust from Asbestos Work Area using measures appropriate to work to be done.
 - .1 Use FR polyethylene drop sheets over flooring such as carpeting that absorbs dust and over flooring in work areas where dust or contamination cannot otherwise be safely contained.
 - .2 When removing asbestos containing material from piping or equipment and "glove bag" method is not used and when removing suspended ceilings and walls themselves do not enclose work area erect enclosure

of polyethylene sheeting around work area, shut off mechanical ventilation system serving work area and seal ventilation ducts to and from work area.

- .5 Before removing suspended ceilings, remove friable material on upper surfaces using HEPA vacuum equipment.
- .6 Remove loose material by HEPA vacuum; thoroughly wet friable material containing asbestos to be removed or disturbed before and during Work unless wetting creates hazard or causes damage.
 - .1 Use garden reservoir type low - velocity sprayer or airless spray equipment capable of producing mist or fine spray.
 - .2 Perform Work in a manner to reduce dust creation to lowest levels practicable.
- .7 Pipe Insulation Removal Using Glove Bag:
 - .1 A glove bag not to be used to remove insulation from a pipe, duct or similar structure if:
 - .1 It may not be possible to maintain a proper seal for any reason including, without limitation:
 - .1 The condition of the insulation.
 - .2 The temperature of the pipe, duct or similar structure.
 - .2 The bag could become damaged for any reason including, without limitation.
 - .1 The type of jacketing.
 - .2 The temperature of the pipe, duct or similar structure.
 - .2 Upon installation of the glove bag, inspect bag for any damage or defects. If any damage or defects are found, the glove bag is to be repaired or replaced. The glove bag to be inspected at regular intervals for damage and defects, and repair or replaced, as appropriately. The asbestos containing contents of the damaged or defective glove bag found during removal are to be wetted and the glove bag and its contents are to be removed and disposed of in an appropriate waste disposal container. Any damaged or defective glove bags are not be reused.
 - .3 Place tools necessary to remove insulation in tool pouch. Wrap bag around pipe and close zippers. Seal bag to pipe with cloth straps.
 - .4 Place hands in gloves and use necessary tools to remove insulation. Arrange insulation in bag to obtain full capacity of bag.

- .5 Insert nozzle of garden reservoir type sprayer into bag through valve and wash down pipe and interior of bag thoroughly. Wet surface of insulation in lower section of bag.
- .6 To remove bag after completion of stripping, wash top section and tools thoroughly. Remove air from top section through elasticized valve using a HEPA vacuum. Pull polyethylene waste container over glove bag before removing from pipe. Release one strap and remove freshly washed tools. Place tools in water. Remove second strap and zipper. Fold over into waste container and seal.
- .7 After removal of bag ensure that pipe is free of residue. Remove residue using HEPA vacuum or wet cloths. Ensure that surfaces are free of sludge which after drying could release asbestos dust into atmosphere. Seal exposed surfaces of pipe and ends of insulation with slow drying sealer to seal in any residual fibres.
- .8 Upon completion of Work shift, cover exposed ends of remaining pipe insulation with polyethylene taped in place.
- .8 Remove asbestos-containing drywall joint-fill compound with the use of non-powered hand-tools. Wet the materials during toe removal with the use of an airless sprayer.
- .9 Remove vinyl floor tiles with asbestos-containing mastic with the use of non-powered hand-tools. Wet the materials during toe removal with the use of an airless sprayer.
- .10 Work is subject to visual inspection and air monitoring. Contamination of surrounding areas indicated by visual inspection or air monitoring will require complete enclosure and clean-up of affected areas.
- .11 Cleanup:
 - .1 Frequently during Work and immediately after completion of work, clean up dust and asbestos containing waste using HEPA vacuum or by damp mopping.
 - .2 Place dust and asbestos containing waste in sealed dust tight waste bags. Treat drop sheets and disposable protective clothing as asbestos waste and wet and fold to contain dust and then place in waste bags.
 - .3 Immediately before their removal from Asbestos Work Area and disposal, clean each filled waste bag using damp cloths or HEPA vacuum and place in second clean waste bag.
 - .4 Seal and remove double bagged waste from site. Dispose of in accordance with requirements of Provincial/Territorial and Federal authority having jurisdiction. Supervise dumping and ensure that dump

operator is fully aware of hazardous nature of material to be dumped and that guidelines and regulations for asbestos disposal are followed.

- .5 Perform final thorough clean-up of Asbestos Work Areas and adjacent areas affected by Work using HEPA vacuum.

3.3 AIR MONITORING

- .1 From beginning of Work until completion of cleaning operations, Departmental Representative to take air samples on daily basis outside of Asbestos Work Area enclosures in accordance with Provincial/Territorial Occupational Health and Safety Regulations and PWGSC requirements.
 - .1 Contractor will be responsible for monitoring inside enclosure in accordance with applicable Provincial/Territorial Occupational Health and Safety Regulations.
- .2 If air monitoring shows that areas outside Asbestos Work Area enclosure are contaminated, enclose, maintain and clean these areas in same manner as that applicable to Asbestos Work Area.
- .3 Ensure that respiratory safety factors are not exceeded.
- .4 During the course of Work, Departmental Representative to measure fibre content of air outside Work areas by means of air samples analyzed by Phase Contrast Microscopy (PCM).
 - .1 Stop Work when PCM measurements exceed 0.05 f/cc and correct procedures.

3.4 INSPECTION

- .1 Perform inspection of Asbestos Work Area to confirm compliance with specification and governing authority requirements. Deviations from these requirements that have not been approved in writing by Departmental Representative may result in Work stoppage, at no additional cost.

- .2 Departmental Representative will inspect Work for:
 - .1 Adherence to specific procedures and materials.
 - .2 Final cleanliness and completion.
 - .3 No additional costs will be allowed by Contractor for additional labour or materials required to provide specified performance level.
- .3 When asbestos leakage from Asbestos Work Area has occurred or is likely to occur Departmental Representative may order Work shutdown.
 - .1 No additional costs will be allowed by Contractor for additional labour or materials required to provide specified performance level.

END OF SECTION

Part 1 General

1.1 SUMMARY

- .1 Comply with requirements of this Section when performing following Work:
 - .1 Removing insulating cement on pipe fittings and associated debris in the interior of Building 3.
 - .2 Removing black duct insulation in the interior of Building 2.
 - .3 Removing sprayed fireproofing and associated debris in the interior of Building 3.
 - .4 Removing pre-formed tank/body insulation on the stairwell of Building 3.
 - .5 Removing drywall joint-fill compound on the interior walls of Building 3.
 - .6 Removing gasket material from the interior of Building 3.
 - .7 Removing presumed asbestos-containing caulking materials from the interior cast-iron drains in Building 3 and 4.
 - .8 Removing 9"x9" vinyl floor tile – grey in the interior of Building 3.
 - .9 Removing insulating cement on pipe fittings and associated debris in the interior of Building 4
 - .10 Removing corrugated straight pipe insulation and associated debris in the interior of Building 4.

- .11 Removal or disturbance as specified of more than one square metre of friable asbestos containing material during the repair, alteration, maintenance or demolition of a building or any machinery or equipment located as indicated at site.
- .12 Removal or disturbance of more than one (1) square metre of insulating cement on pipe fittings.
- .13 Removal or disturbance of more than one (1) square metre of pressed paper straight pipe insulation.
- .14 Removal or disturbance of more than one (1) square metre of corrugated paper-like straight pipe insulation.
- .15 The removal or disturbance of more than one (1) square metre of friable asbestos-containing material.
- .16 The spray application of a sealant to friable asbestos containing material.
- .17 Cleaning or removing air handling equipment, including rigid ducting but not including filters, in a building that has asbestos containing sprayed fireproofing.
- .18 Repairing, altering or demolishing all or part of a kiln, metallurgical furnace or similar structure that is made in part of refractory materials that are asbestos containing materials.
- .19 Breaking, cutting, drilling, abrading, grinding, sanding or vibrating non-friable asbestos containing material, if the work is done by means of power tools that are not attached to dust-collecting devices equipped with HEPA filters.
- .20 Repairing, altering or demolishing all or part of any building in which asbestos is or was used in the manufacture of products.
- .2 Refer to section 028210 for the abatement project scope locations.

1.2 REFERENCE STANDARDS

- .1 Canadian General Standards Board (CGSB).
 - .1 CAN/CGSB-1.205-03, Sealer for Application of Asbestos-Fibre Releasing Materials.
- .2 Department of Justice Canada (Jus).
 - .1 Canadian Environmental Protection Act, 1999 (CEPA).
- .3 Health Canada/Workplace Hazardous Materials Information System (WHMIS).
 - .1 Safety Data Sheets (SDS).
- .4 Transport Canada (TC).

- .1 Transportation of Dangerous Goods Act, 1992 (TDGA).
- .5 Ontario Environmental Protection Act, R.R.O 1990,
 - .1 General – Waste Management, O. Reg. 347/90, as amended.
- .6 Underwriters' Laboratories of Canada (ULC).
- .7 National Joint Council (NJC).
 - .1 Part XI – Hazardous Substances.
- .8 PSPC Asbestos Management Directive
- .9 Canada Labour Code Part II, section 124 and 125.
 - .1 Canada Occupational Health and Safety Regulations
- .10 Ontario Ministry of Labour (MOL).
 - .1 Occupational Health and Safety Act, R.S.O 1990, c. O1 (OSHA)
 - .1 O. Reg. 278/05 – Designated Substance – Asbestos on Construction Projects and in Buildings and Repair Operations, as amended
 - .2 Ontario Occupational Health and Safety Act, R.S.O. 1990, Regulation 490/09 “Designated Substances”, as amended

1.3 DEFINITIONS

- .1 Airlock: system for permitting ingress or egress without permitting air movement between contaminated area and uncontaminated area, typically consisting of two curtained doorways at least 2 m apart.
- .2 Amended Water: water with a non-ionic surfactant wetting agent added to reduce water tension to allow wetting of fibres.
- .3 Asbestos Containing Materials (ACMs): materials that contain 0.5 per cent or more asbestos by dry weight and are identified under Existing Conditions including fallen materials and settled dust.
- .4 Asbestos Work Areas: area where work takes place which will, or may disturb ACMs.
- .5 Authorized Visitors: Departmental Representatives and representatives of regulatory agencies.
- .6 Competent worker: in relation to specific work, means a worker who:
 - .1 Is qualified because of knowledge, training and experience to perform the work.
 - .2 Is familiar with the federal and provincial laws and with the provisions of the regulations that apply to the work.

- .3 Has knowledge of all potential or actual danger to health or safety in the work.
- .7 Contractor: Qualified Asbestos Abatement Contractor with accredited workers and supervisors and the proper insurance for performing asbestos abatement.
- .8 Curtained doorway: arrangement of closures to allow ingress and egress from one room to another while permitting minimal air movement between rooms, typically constructed as follows:
 - .1 Place two overlapping sheets of polyethylene over existing or temporarily framed doorway, secure each along top of doorway, secure vertical edge of one sheet along one vertical side of doorway, and secure vertical edge of other sheet along opposite vertical side of doorway.
 - .2 Reinforce free edges of polyethylene with duct tape and weight bottom edge to ensure proper closing.
 - .3 Overlap each polyethylene sheet at openings not less than 1.5 m on each side.
- .9 DOP Test: testing method used to determine integrity of Negative Pressure unit using dioctyl phthalate (DOP) HEPA-filter leak test.
- .10 Friable Materials: material that when dry can be crumbled, pulverized or powdered by hand pressure and includes such material that is crumbled, pulverized or powdered.
- .11 Glove Bag: prefabricated glove bag as follows:
 - .1 Minimum thickness 0.25 mm (10 mil) polyvinyl-chloride bag.
 - .2 Integral 0.25 mm (10 mil) thick polyvinyl-chloride gloves and elastic ports.
 - .3 Equipped with reversible double pull double throw zipper on top and at approximately mid-section of the bag.
 - .4 Straps for sealing ends around pipe.
- .12 HEPA vacuum: High Efficiency Particulate Air filtered vacuum equipment with a filter system capable of collecting and retaining fibres greater than 0.3 microns in any direction at 99.97% efficiency.
- .13 HEPA Integrity Test: A testing method used to determine the integrity of the vacuums and negative air units, testing for HEPA-filter leaks.
- .14 Minor Amounts of ACMs: Less than or equal to 1 m² of friable material containing chrysotile asbestos.

- .15 Negative pressure: system that extracts air directly from work area, filters such extracted air through High Efficiency Particulate Air filtering system, and discharges this air directly outside work area to exterior of building.
 - .1 System to maintain minimum pressure differential of 5 Pa relative to adjacent areas outside of work areas, be equipped with alarm to warn of system breakdown, and be equipped with instrument to continuously monitor and automatically record pressure differences.
- .16 Non-Friable Materials: material that when dry cannot be crumbled, pulverized or powdered by hand pressure.
- .17 Occupied Areas: any area of building or work site that is outside Asbestos Work Area.
- .18 Polyethylene: Polyethylene sheeting or rip-proof polyethylene sheeting with tape along edges, around penetrating objects, over cuts and tears, and elsewhere as required to provide protection and isolation.
- .19 Polyethylene sheeting sealed with tape: polyethylene sheeting of type and thickness specified sealed with tape along edges, around penetrating objects, over cuts and tears, and elsewhere as required to provide continuous polyethylene membrane to protect underlying surfaces from water damage or damage by sealants, and to prevent escape of asbestos fibres through sheeting into clean area.
- .20 Sprayer: garden reservoir type sprayer or airless spray equipment capable of producing mist or fine spray. Must be appropriate capacity for scope of work.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Before beginning work:
 - .1 Obtain from appropriate agency and submit to Departmental Representative necessary permits for transportation and disposal of asbestos waste. Ensure that dump operator is fully aware of hazardous nature of material being dumped, and proper methods of disposal. Submit proof satisfactory to Departmental Representative that suitable arrangements have been made to receive and properly dispose of asbestos waste.
 - .2 Submit proof satisfactory to Departmental Representative that all asbestos workers have received appropriate training and education by a competent person on hazards of asbestos exposure, good personal hygiene, entry and exit from Asbestos Work Area, aspects of work procedures and protective measures while working in Asbestos Work Areas, and the use, cleaning and disposal of respirators and protective clothing. Submit proof of attendance in form of certificate.

- .3 Ensure supervisory personnel have attended asbestos abatement course, of not less than two days duration, approved by Departmental Representative. Submit proof of attendance in form of certificate. Minimum of one Supervisor for every ten workers.
- .4 Submit layout of proposed enclosures and decontamination facilities to Departmental Representative for review.
- .5 Submit documentation including test results for sealer proposed for use.
- .6 Submit Provincial/Territorial and/or local requirements for Notice of Project form.
- .7 Submit proof of Contractor's Asbestos Liability Insurance.
- .8 Submit proof satisfactory to Departmental Representative that employees have respirator fitting and testing. Workers must be fit tested (irritant smoke test) with respirator that is personally issued.
- .9 Submit Workplace Safety & Insurance Board status and transcription of insurance.
- .10 Submit documentation including test results, fire and flammability data, and WHMIS Safety Data Sheets (SDS) for chemicals or materials including but not limited to following:
 - .1 Encapsulants.
 - .2 Amended water.
 - .3 Slow drying sealer.
- .2 Where required, submit proof that any scaffolding has been inspected and has been approved for use by a licensed Engineer in Ontario, in accordance with the OHSA.
- .3 Submit proof to the Departmental Representative that suitable arrangements have been made to dispose of asbestos-containing waste in accordance with requirements of authority having jurisdiction.

1.5 QUALITY ASSURANCE

- .1 Regulatory Requirements: comply with Federal, Provincial/Territorial and local requirements pertaining to asbestos, provided that in case of conflict among those requirements or with these specifications more stringent requirement applies. Comply with regulations in effect at time work is performed.
- .2 Comply with all requirements of the Ontario OHSA.

.3 Health and Safety:

.1 Safety Requirements: worker and visitor protection.

.1 Protective equipment and clothing to be worn by workers while in Asbestos Work Area includes:

.1 Powered air purifying respirator (PAPR) with P-100 particulate filter, personally issued to worker and marked as to efficiency and purpose, suitable for protection against asbestos and acceptable to Provincial Authority having jurisdiction. The respirator to be fitted so that there is an effective seal between the respirator and the worker's face, unless the respirator is equipped with a hood or helmet. The respirator to be cleaned, disinfected and inspected after use on each shift, or more often if necessary, when issued for the exclusive use of one worker, or after each use when used by more than one worker. The respirator to have damaged or deteriorated parts replaced prior to being used by a worker; and, when not in use, to be stored in a convenient, clean and sanitary location. The employer to establish written procedures regarding the selection, use and care of respirators, and a copy of the procedures to be provided to and reviewed with each worker who is required to wear a respirator. A worker not to be assigned to an operation requiring the use of a respirator unless he or she is physically able to perform the operation while using the respirator.

.2 Disposable type protective clothing that does not readily retain or permit penetration of asbestos fibres. Protective clothing to be provided by the employer and worn by every worker who enters the work area, and the protective clothing to consist of a head covering and full body covering that fits snugly at the ankles, wrists and neck, in order to prevent asbestos fibres from reaching the garments and skin under the protective clothing. It includes suitable footwear, and it to be repaired or replaced if torn. Requirements for each worker:

.1 Remove street clothes in clean change room and put on respirator with new filters or reusable filters that have been tested as satisfactory, clean coveralls and head covers before entering Equipment and Access Rooms or Asbestos Work Area. Store street clothes, uncontaminated footwear, towels, and similar uncontaminated articles in clean change room.

- .2 Remove gross contamination from clothing before leaving work area then proceed to Equipment and Access Room and remove clothing except respirators. Place contaminated work suits in receptacles for disposal with other asbestos - contaminated materials. Leave reusable items except respirator in Equipment and Access Room. Still wearing the respirator proceed naked to showers. Using soap and water wash body and hair thoroughly. Clean outside of respirator with soap and water while showering; remove respirator; remove filters and wet them and dispose of filters in container provided for purpose; and wash and rinse inside of respirator. When not in use in work area, store work footwear in Equipment and Access Room. Upon completion of asbestos abatement, dispose of footwear as contaminated waste or clean thoroughly inside and out using soap and water before removing from work area or from Equipment and Access Room.
 - .3 After showering and drying off, proceed to clean change room and dress in street clothes at end of each day's work, or in clean coveralls before eating, smoking, or drinking. If re-entering work area, follow procedures outlined in paragraphs above.
 - .4 Enter unloading room from outside dressed in clean coveralls to remove waste containers and equipment from Holding Room of Container and Equipment Decontamination Enclosure system. Workers must not use this system as means to leave or enter work area.
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- .2 Eating, drinking, chewing, and smoking are not permitted in Asbestos Work Area.
 - .3 Ensure workers are fully protected with respirators and protective clothing during preparation of system of enclosures prior to commencing actual asbestos abatement.
 - .4 Provide and post in Clean Change Room and in Equipment and Access Room the procedures described in this Section, in both official languages.
 - .5 Ensure that no person required to enter an Asbestos Work Area has facial hair that affects seal between respirator and face.

.6 Visitor Protection:

- .1 Provide protective clothing and approved respirators to Authorized Visitors to work areas.
- .2 Instruct Authorized Visitors in the use of protective clothing, respirators and procedures.
- .3 Instruct Authorized Visitors in proper procedures to be followed in entering into and exiting from Asbestos Work Area.

1.6 WASTE MANAGEMENT AND DISPOSAL

- .1 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .2 Collect and separate for disposal packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
- .3 Separate for recycling and place in designated containers waste in accordance with Waste Management Plan.
- .4 Place materials defined as hazardous or toxic in designated containers.
- .5 Handle and dispose of hazardous materials in accordance with the CEPA, TDGA, Regional and Municipal regulations.
- .6 Fold up metal banding, flatten and place in designated area for recycling.
- .7 Disposal of asbestos waste generated by removal activities must comply with Federal, Provincial, Territorial and Municipal regulations. Dispose of asbestos waste in sealed double thickness 6 mm bags or leak proof drums. Label containers with appropriate warning labels.
- .8 Provide manifests describing and listing waste created. Transport containers by approved means to licenced landfill for burial.

1.7 EXISTING CONDITIONS

- .1 Results of tests of asbestos containing materials to be handled, removed, or otherwise disturbed and disposed of during this Project are bound into this specification. These are for general information only and are not necessarily representative of asbestos containing materials covered within scope of this Project.
- .2 Notify Departmental Representative of suspect asbestos containing material discovered during Work and not apparent from drawings, specifications, or report pertaining to Work. Do not disturb such material until instructed by Departmental Representative.

1.8 SCHEDULING

- .1 Not later than ten (10) days before beginning Work on this Project notify following in writing:
 - .1 Appropriate Regional or Zone Director of Medical Services Branch, Health Canada.
 - .2 Regional Office of Labour Canada.
 - .3 Provincial/Territorial, Department of Labour.
 - .4 Disposal Authority.
- .2 Inform sub-trades of presence of asbestos containing materials identified in Existing Conditions.
- .3 Submit to Departmental Representative copy of notifications prior to start of Work.
- .4 Hours of Work: Perform work involving asbestos abatement located at the Buildings during hours specified by Departmental Representative. The work schedule must be approved in writing by the Departmental Representative in advance of work. Contractor shall be available to work continuously from beginning to end of project.

1.9 PERSONNEL TRAINING

- .1 Before beginning Work, provide to Departmental Representative satisfactory proof that every worker has had instruction and training in hazards of asbestos exposure, in personal hygiene including dress and showers, in entry and exit from Asbestos Work Area, in aspects of work procedures including glove bag procedures, and in use, cleaning, and disposal of respirators and protective clothing.
- .2 Instruction and training related to respirators includes, at minimum:
 - .1 Proper fitting of equipment.
 - .2 Inspection and maintenance of equipment.
 - .3 Disinfecting of equipment.
 - .4 Limitations of equipment.
- .3 Instruction and training must be provided by competent, qualified person.
- .4 Supervisory personnel to complete required training.

- .5 Ensure all workers working on scaffolding have received appropriate certification for working on scaffolding and elevated platforms.

1.10 NOTIFICATION

- .1 Not later than ten (10) days before commencing work on this project notify orally and in writing, an inspector at the office of the Ministry of Labour. The written notice shall be as outlined in O. Reg. 278/05.
- .2 Inform all sub-trades of the presence of asbestos-containing materials identified.
- .3 Submit to the Departmental Representative a copy of all notifications prior to the start of work.

PART 2 Products

2.1 MATERIALS

- .1 Polyethylene: minimum 0.15 mm thick unless otherwise specified; in sheet size to minimize joints.
- .2 FR polyethylene: minimum 0.15 mm thick, woven fibre reinforced fabric bonded both sides with polyethylene.
- .3 Tape: fibreglass - reinforced duct tape suitable for sealing polyethylene under both dry conditions and wet conditions using amended water.
- .4 Wetting agent: 50% polyoxyethylene ester and 50% polyoxyethylene ether, or other material approved by Departmental Representative, mixed with water in concentration to provide adequate penetration and wetting of asbestos containing material.
- .5 Waste Containers: contain waste in two separate containers.
 - .1 Inner container: 0.15 mm thick sealable polyethylene bag or where glove bag method is used, glove bag itself.
 - .2 Outer container: sealable metal or fibre type where there are sharp objects included in waste material; otherwise outer container may be sealable metal or fibre type or second 0.15 mm thick sealable polyethylene bag.
 - .3 Labelling requirements: affix preprinted cautionary asbestos warning, in both official languages, that is visible when ready for removal to disposal site. Label containers in accordance with Asbestos Regulations. Label in both official languages.
- .6 Tape: tape suitable for sealing polyethylene to surfaces under both dry and wet conditions using amended water.

- .7 Slow - drying sealer: non-staining, clear, water - dispersible type that remains tacky on surface for at least 8 hours and designed for purpose of trapping residual asbestos fibres.
- .8 Sealer: flame spread and smoke developed rating less than 50.

PART 3 Execution

3.1 SUPERVISION

- .1 A minimum of one Supervisor for every ten workers is required for pre-cleaning the Asbestos Work Area, set-up of the Asbestos Work Area, removal and/or repair work.
- .2 The approved Supervisor or Supervisors must remain within the Asbestos Work Area at all times during the disturbance, removal, or other handling of asbestos-containing materials.

3.2 PREPARATION

- .1 Before beginning work, temporary shoring shall be put in place to allow for entry and abatement activities as necessary in Building 2 and Building 3.
- .2 The spread of dust from the work area to be prevented by:
 - .1 Using enclosures of polyethylene or other suitable material that is impervious to asbestos (including, if the enclosure material is opaque, one or more transparent window areas to allow observation of the entire work area from outside the enclosure), if the work area is not enclosed by walls.
 - .2 Using curtains of polyethylene sheeting or other suitable material that is impervious to asbestos, fitted on each side of each entrance or exit from the work area.
- .1 Put negative pressure system in operation and operate continuously from time first polyethylene is installed to seal openings until final completion of work including final cleanup. Provide continuous monitoring of pressure difference using automatic recording instrument. The system to be inspected and maintained by a competent person prior each use to ensure that there is no air leakage, and if the filter is found to be damaged or defective, it to be replaced before the ventilation system is used.
- .2 Implement Type 2 operations for sealing/isolating in building with debris and damaged materials. Seal off openings such as corridors, doorways, windows, skylights, ducts, grilles, and diffusers, holes in building exterior walls and roof with polyethylene sheeting sealed with tape.

- .3 Cover floor and wall surfaces with polyethylene sheeting sealed with tape. Use two layers of FR polyethylene on floors. Cover floors first so that polyethylene extends at least 300 mm up walls then cover walls to overlap floor sheeting.
 - .4 Build airlocks at entrances to and exits from work areas so that work areas are always closed off by one curtained doorway when workers enter or exit.
 - .5 At each access to work areas install warning signs in both official languages in upper case "Helvetica Medium" letters reading as follows where number in parentheses indicates font size to be used: "CAUTION ASBESTOS HAZARD AREA (25 mm) NO UNAUTHORIZED ENTRY (19 mm) WEAR ASSIGNED PROTECTIVE EQUIPMENT (19 mm) BREATHING ASBESTOS DUST MAY CAUSE SERIOUS BODILY HARM (7 mm)".
 - .6 Maintain emergency and fire exits from work areas, or establish alternative exits satisfactory to Authorities having jurisdiction.
 - .7 Where application of water is required for wetting asbestos containing materials, shut off electrical power, provide 24 volt safety lighting and ground fault interrupter circuits on power source for electrical tools, in accordance with applicable CSA Standard. Ensure safe installation of electrical lines and equipment.
 - .8 After preparation of work areas and Decontamination Enclosure Systems, remove contents within work areas progressively and carefully, and dispose of as contaminated waste.
 - .9 After preparation of work areas and Decontamination Enclosure Systems, for the removal of all other asbestos containing materials, remove within work area and dispose of as contaminated waste in specified containers. Spray asbestos debris and immediate work area with amended water to reduce dust, as work progresses.
- .3 Worker Decontamination Enclosure System:
- .1 Worker Decontamination Enclosure System includes Equipment and Access Room, Shower Room, and Clean Room, as follows:
 - .1 Equipment and Access Room: build Equipment and Access Room between Shower Room and work areas, with two curtained doorways, one to Shower Room and one to work areas. Install portable toilet, waste receptor, and storage facilities for workers' shoes and protective clothing to be reworn in work areas. Build Equipment and Access Room large enough to accommodate specified facilities, other equipment needed, and at least one worker allowing him /her sufficient space to undress comfortably.

- .2 Shower Room: build Shower Room between Clean Room and Equipment and Access Room, with two curtained doorways, one to Clean Room and one to Equipment and Access Room. Provide one shower for every five workers. Provide constant supply of hot and cold or warm water. Provide soap, clean towels, and appropriate containers for disposal of used respirator filters
Departmental Representative.
- .3 Clean Room: build Clean Room between Shower Room and clean areas outside of enclosures, with two curtained doorways, one to outside of enclosures and one to Shower Room. Provide lockers or hangers and hooks for workers' street clothes and personal belongings. Provide storage for clean protective clothing and respiratory equipment. Install mirror to permit workers to fit respiratory equipment properly.
- .4 Container and Equipment Decontamination Enclosure System:
 - .1 Container and Equipment Decontamination Enclosure System consists of Staging Area within work area, Washroom, Holding Room, and Unloading Room. Purpose of system is to provide means to decontaminate waste containers, scaffolding, waste and material containers, vacuum and spray equipment, and other tools and equipment for which Worker Decontamination Enclosure System is not suitable.
 - .1 Staging Area: designate Staging Area in work area for gross removal of dust and debris from waste containers and equipment, labelling and sealing of waste containers, and temporary storage pending removal to Washroom. Equip Staging Area with curtained doorway to Washroom.
 - .2 Washroom: build Washroom between Staging Area and Holding Room with two curtained doorways, one to Staging Area and one to Holding Room. Provide high - pressure low - volume sprays for washing of waste containers and equipment. Pump waste water through 5 micrometre filter system before directing into drains. Provide piping and connect to water sources and drains.
 - .3 Holding Room: build Holding Room between Washroom and Unloading Room, with two curtained doorways, one to Washroom and one to Unloading Room. Build Holding Room sized to accommodate at least two waste containers and largest item of equipment used.
 - .4 Unloading Room: build Unloading Room between Holding Room and outside, with two curtained doorways, one to Holding Room and one to outside.

- .5 Construction of Decontamination Enclosures:
 - .1 Build suitable framing for enclosures, and line with polyethylene sheeting sealed with tape. Use two layers of FR polyethylene on floors.
 - .2 Build curtained doorways between enclosures so that when people move through or when waste containers and equipment are moved through doorway, one of two closures comprising doorway always remains closed.
 - .3 The waste decontamination enclosure shall be constructed in addition to the worker decontamination enclosure.
- .6 Separation of Work Areas from Occupied Areas:
 - .1 Separate parts of building required to remain in use from parts of building used for asbestos abatement by means of airtight barrier system constructed as follows:
 - .1 Build suitable floor to ceiling lumber or metal stud framing, cover with polyethylene sheeting sealed with tape, and apply 9 mm minimum thick plywood. Seal joints between plywood sheets and between plywood and adjacent materials with surface film forming type sealer, to create airtight barrier.
 - .2 Cover plywood barrier with polyethylene sealed with tape, as specified for work areas.
- .7 Maintenance of Enclosures:
 - .1 Maintain enclosures in tidy condition.
 - .2 Ensure that barriers and polyethylene linings are effectively sealed and taped. Repair damaged barriers and remedy defects immediately upon discovery.
 - .3 Visually inspect enclosures at beginning of each working period.
 - .4 Use smoke methods to test effectiveness of barriers when directed by the Departmental Representative.
- .8 Do not begin Asbestos Abatement work until:
 - .1 Arrangements have been made for disposal of waste.
 - .2 For wet stripping techniques, arrangements have been made for containing, filtering, and disposal of waste water.
 - .3 Work areas and decontamination enclosures and parts of building required to remain in use are effectively segregated.

- .4 Tools, equipment, and materials waste containers are on hand.
- .5 Arrangements have been made for building security.
- .6 Warning signs are displayed where access to contaminated areas is possible.
- .7 Notifications have been completed and other preparatory steps have been taken.
- .8 Pre-contamination visual inspection has been completed by the Departmental Representative, and authorization to proceed with abatement work is granted.

3.3 SUPERVISION

- .1 Minimum of one Supervisor for every ten workers is required.
- .2 Approved Supervisor must remain within Asbestos Work Area during disturbance, removal, or other handling of asbestos containing materials.

3.4 ASBESTOS REMOVAL

- .1 Before removing asbestos:
 - .1 Prepare site.
 - .2 Spray asbestos material with water containing specified wetting agent, using airless spray equipment capable of providing "mist" application to prevent release of fibres. Saturate asbestos material sufficiently to wet it to substrate without causing excess dripping. Spray asbestos material repeatedly during work process to maintain saturation and to minimize asbestos fibre dispersion.
- .2 Remove saturated asbestos material in small sections. Do not allow saturated asbestos to dry out. As it is being removed pack material in sealable plastic bags 0.15 mm minimum thick and place in labelled containers for transport.
- .3 Seal filled containers. Clean external surfaces thoroughly by wet sponging. Remove from immediate working area to Staging Area. Clean external surfaces thoroughly again by wet sponging before moving containers to decontamination Washroom. Wash containers thoroughly in decontamination Washroom, and store in Holding Room pending removal to Unloading Room and outside. Ensure that containers are removed from Holding Room by workers who have entered from uncontaminated areas dressed in clean coveralls.
- .4 All waste bins brought and stored on site must be covered and locked at all times when in use on the property. Location of bins must be approved by the client.

- .5 After completion of stripping work, wire brushed and wet sponged surfaces from which asbestos has been removed to remove visible material. During this work keep surfaces wet.
- .6 After wire brushing and wet sponging to remove visible asbestos, wet clean entire work area including Equipment and Access Room, and equipment used in process. After 24 hour period to allow for dust settling, wet clean these areas and objects again. During this settling period no entry, activity, or ventilation will be permitted. After inspection by Departmental Representative apply continuous coat of slow drying sealer to surfaces of work area. Allow at least 16 hours with no entry, activity, ventilation, or disturbance other than operation of negative pressure units during this period.
- .7 Work is subject to visual inspection and air monitoring. Contamination of surrounding areas indicated by visual inspection or air monitoring will require complete enclosure and clean-up of affected areas.
- .8 Cleanup:
 - .1 Frequently during Work and immediately after completion of work, clean up dust and asbestos containing waste using HEPA vacuum or by damp mopping.
 - .2 Place dust and asbestos containing waste in sealed dust tight waste bags. Treat drop sheets and disposable protective clothing as asbestos waste and wet and fold to contain dust and then place in waste bags.
 - .3 Immediately before their removal from Asbestos Work Area and disposal, clean each filled waste bag using damp cloths or HEPA vacuum and place in second clean waste bag.
 - .4 Seal and remove double bagged waste from site. Dispose of in accordance with requirements of Provincial/Territorial and Federal authority having jurisdiction. Supervise dumping and ensure that dump operator is fully aware of hazardous nature of material to be dumped and that guidelines and regulations for asbestos disposal are followed.
 - .5 Perform final thorough clean-up of Asbestos Work Areas and adjacent areas affected by Work using HEPA vacuum.

3.5 FINAL CLEANUP

- .1 Remove polyethylene sheet by rolling it away from walls to centre of work area. Vacuum visible asbestos containing particles observed during cleanup, immediately, using HEPA vacuum equipment.
- .2 Place polyethylene seals, tape, cleaning material, clothing, and other contaminated waste in plastic bags and sealed labelled waste containers for transport.

- .3 Include in clean-up Work areas, Equipment and Access Room, Washroom, Shower Room, and other contaminated enclosures.
- .4 Include in clean-up sealed waste containers and equipment used in Work and remove from work areas, via Container and Equipment Decontamination Enclosure System, at appropriate time in cleaning sequence.
- .5 Conduct final check to ensure that no dust or debris remains on surfaces as result of dismantling operations and carry out air monitoring again to ensure that asbestos levels in building do not exceed 0.01 fibres/cc. Repeat cleaning using HEPA vacuum equipment, or wet cleaning methods where feasible, in conjunction with sampling until levels meet this criteria.
- .6 As work progresses, and to prevent exceeding available storage capacity on site, remove sealed and labelled containers containing asbestos waste and dispose to authorized disposal area in accordance with requirements of disposal authority. Ensure that each shipment of containers transported to dump is accompanied by Contractor's representative to ensure that dumping is done in accordance with governing regulations.

3.6 AIR MONITORING

- .1 From beginning of Work until completion of cleaning operations, Departmental Representative to take air samples on daily basis outside of Asbestos Work Area enclosures in accordance with Provincial/Territorial Occupational Health and Safety Regulations and PWGSC requirements.
 - .1 Contractor will be responsible for monitoring inside enclosure in accordance with applicable Provincial/Territorial Occupational Health and Safety Regulations.
- .2 Use results of air monitoring inside work area to establish type of respirators to be used. Workers may be required to wear sample pumps for up to full-shift periods.
 - .1 If fibre levels are above safety factor of respirators in use, stop abatement, apply means of dust suppression, and use higher safety factor in respiratory protection for persons inside enclosure.
 - .2 If air monitoring shows that areas outside work area enclosures are contaminated, enclose, maintain and clean these areas, in same manner as that applicable to work areas.
- .3 During course of Work, Departmental Representative to measure fibre content of air outside work areas by means air samples analyzed by Phase Contrast Microscopy (PCM).
 - .1 Stop Work when PCM measurements exceed 0.05 f/cc and correct procedures.

3.7 INSPECTION

- .1 Perform inspection of Asbestos Work Area to confirm compliance with specification and governing authority requirements. Deviations from these requirements that have not been approved in writing by Departmental Representative may result in Work stoppage, at no additional costs.
- .2 Departmental Representative will inspect Work for:
 - .1 Adherence to specific procedures and materials.
 - .2 Final cleanliness and completion.
 - .3 No additional costs will be allowed by Contractor for additional labour or materials required to provide specified performance level.
- .3 When asbestos leakage from Asbestos Work Area has occurred or is likely to occur Departmental Representative may order Work shutdown.
 - .1 No additional costs will be allowed by Contractor for additional labour or materials required to provide specified performance level.

END OF SECTION

Part 1 General**1.1 SUMMARY**

- .1 Comply with requirements of this Section when performing following Work:
 - .1 Disposal of yellow and yellow/off-white colored paint on exterior cladding and white-coloured paint on cast-iron drain pipes as hazardous waste.
 - .2 Prior to removal from the site and disposal, materials containing lead should be subject to toxicity characteristic leaching procedure (TCLP) to determine the toxicity of with respect to lead prior to disposal in accordance with R.,R.O. 1990, Regulation 347 General – Waste Management, as amended (R.R.O., 1990, Reg. 347) under the Environmental Protection act (EPA). If TCLP testing is not completed, contractor to assume paint to be disposed of as lead waste.

1.2 REFERENCE STANDARDS

- .1 Canadian General Standards Board (CGSB).
 - .1 CAN/CGSB-1.205-03, Sealer for Application of Asbestos-Fibre Releasing Materials.
- .2 Department of Justice Canada (Jus).
 - .1 Canadian Environmental Protection Act, 1999 (CEPA).
- .3 Health Canada/Workplace Hazardous Materials Information System (WHMIS).
 - .1 Safety Data Sheets (SDS).
- .4 Transport Canada (TC).
 - .1 Transportation of Dangerous Goods Act, 1992 (TDGA).
- .5 Ontario Environmental Protection Act, R.R.O 1990.
 - .1 General – Waste Management, O. Reg. 347/90, as amended.
- .6 Underwriters' Laboratories of Canada (ULC).
- .7 U.S. Environmental Protection Agency (EPA)
 - .1 EPA 747-R-95-007, 1995, Sampling House Dust for Lead.
 - .2 U.S. Department of Health and Human Services/Centers for Disease Control and Prevention/National Institute for Occupational Safety and Health (NIOSH)

- .3 NIOSH 94-113 - NIOSH Manual of Analytical Methods (NMAM), 4th Edition (1994).
- .2 U.S. Department of Labour - Occupational Safety and Health Administration (OSHA) - Toxic and Hazardous Substances.
 - .1 Lead in Construction Regulation - 29 CFR 1926.62-1993.
- .3 Underwriters' Laboratories of Canada (ULC).
- .4 Province of Ontario.
 - .1 Environment Council of Ontario (EACO).
 - .1 Lead Guideline for Construction, Renovation, Maintenance or Repair, October 2014.
 - .2 Ontario Ministry of Labour.
 - .1 Occupational Health and Safety Branch, Guideline Lead On Construction Projects, September 2004, and O. Reg. 490/09 respecting Designated Substances - Lead made under the Occupational Health and Safety Act as amended by O. Reg. 148/12 and O. Reg. 149/12.

1.3 DEFINITIONS

- .1 HEPA vacuum: High Efficiency Particulate Air filtered vacuum equipment with a filter system capable of collecting and retaining fibres greater than 0.3 microns in any direction at 99.97% efficiency.
- .2 Authorized Visitors: Departmental Representative or representatives of regulatory agencies.
- .3 Polyethylene: polyethylene sheeting or rip-proof polyethylene sheeting with tape along edges, around penetrating objects over cuts and tears, and elsewhere as required to provide protection and isolation. For protection of underlying surfaces from damage and to prevent lead dust entering in clean area.
- .4 Sprayer: garden reservoir type sprayer or airless spray equipment capable of producing mist or fine spray. Must be appropriate capacity for scope of work.
- .5 Action level: employee exposure, without regard to use of respirators, to airborne concentration of lead of 50 micrograms per cubic metre of air (50 ug/m³) calculated as 8-hour time-weighted average (TWA). Minimum precautions for lead abatement are based on airborne lead concentrations less than 0.05 milligrams per cubic metre of air for removal of lead-based paint by methods noted in paragraph 1.1.

- .6 Competent person: Departmental Representative capable of identifying existing lead hazards in workplace taking corrective measures to eliminate them.
- .7 Lead dust: wipe sampling on vertical surfaces and/or horizontal surfaces, dust and debris is considered to be lead contaminated if it contains more than 40 micrograms of lead in dust per square foot.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide proof satisfactory to Departmental Representative that suitable arrangements have been made to dispose of lead-based paint waste in accordance with requirements of authority having jurisdiction.
- .2 Provide proof of Contractor's Environmental Liability Insurance.
- .3 Quality Control:
 - .1 Provide Departmental Representative necessary permits for transportation and disposal of lead-based paint waste and proof that lead-based paint waste has been received and properly disposed of.
 - .2 Provide proof satisfactory to Departmental Representative that employees have had instruction on hazards of lead exposure, respirator use, dress, and aspects of work procedures and protective measures.

1.5 QUALITY ASSURANCE

- .1 Regulatory Requirements: comply with Federal, Provincial, Territorial and local requirements pertaining to lead paint, provided that in case of conflict among those requirements or with these specifications more stringent requirement applies. Comply with regulations in effect at time work is performed.
- .2 Health and Safety:
 - .1 Safety Requirements: worker and visitor protection.
 - .1 Protective equipment and clothing to be worn by workers and visitors in work Area include:
 - .1 Respirator NIOSH approved and equipped with replaceable HEPA filter cartridges with an assigned protection factor of 10, acceptable to Authority having jurisdiction. Suitable for type of lead and level of lead dust exposure. Provide sufficient amount of filters.
 - .2 Half mask respirator: half-mask particulate respirator with P100 series filter.
 - .2 Eating, drinking, chewing, and smoking are not permitted in work area.

.3 Ensure workers wash hands and face when leaving work area. Facilities for washing are located.

.4 Visitor Protection:

.1 Provide approved respirators to Authorized Visitors to work areas.

.2 Instruct Authorized Visitors on procedures to be followed in entering and exiting work area.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Handle and dispose of hazardous materials in accordance with CEPA, TDGA, Regional and Municipal regulations.

.2 Disposal of lead waste generated by removal activities must comply with Federal, Provincial, Territorial and Municipal regulations. Dispose of lead waste in sealed double thickness 0.15 mm bags or leak proof drums. Label containers with appropriate warning labels.

.3 Provide manifests describing and listing waste created. Transport containers by approved means to licensed landfill for burial.

1.7 EXISTING CONDITIONS

.1 Reports and information pertaining to lead-based paint to be handled, removed, or otherwise disturbed and disposed of are bound into this specification.

.2 Notify Departmental Representative of lead-based paint discovered during Work and not apparent from drawings, specifications, or report pertaining to Work. Do not disturb such material until instructed by Departmental Representative.

1.8 SCHEDULING

.1 Not later than two days before beginning Work on this Project notify following in writing:

.1 Appropriate Regional or Zone Director of Medical Services Branch, Health Canada.

.2 Provincial Ministry of Labour.

.3 Disposal Authority.

.2 Inform sub trades of presence of lead-containing materials identified in Existing Conditions.

.3 Provide Departmental Representative copy of notifications prior to start of Work.

1.9 PERSONNEL TRAINING

- .1 Provide Departmental Representative satisfactory proof that every worker has had instruction and training in hazards of lead exposure, in personal hygiene, in aspects of work procedures, and in use, cleaning, and disposal of respirators.
- .2 Instruction and training related to respirators includes, at minimum:
 - .1 Proper fitting of equipment.
 - .2 Inspection and maintenance of equipment.
 - .3 Disinfecting of equipment.
 - .4 Limitations of equipment.
- .3 Instruction and training must be provided by competent, qualified person.
- .4 Supervisory personnel to complete required training.

Part 2 Products

2.1 MATERIALS

- .1 Polyethylene 0.15 mm thick unless otherwise specified; in sheet size to minimize joints.
- .2 Tape: fibreglass - reinforced duct tape suitable for sealing polyethylene under dry conditions and wet conditions using amended water.
- .3 Slow - drying sealer: non-staining, clear, water - dispersible type that remains tacky on surface for at least 8 hours and designed for purpose of trapping residual lead paint residue.
- .4 Lead waste containers: Type acceptable to dump operator with tightly fitting covers and 0.15 mm thickness sealable polyethylene liners.
 - .1 Label containers with pre-printed bilingual cautionary Warning Lead clearly visible when ready for removal to disposal site.

Part 3 Execution

3.1 SUPERVISION

- .1 One Supervisor for every ten workers is required.
- .2 Supervisor must remain within work area during disturbance, removal, or handling of lead-based paints.

3.2 PREPARATION

- .1 Remove and store items to be salvaged or reused.
 - .1 Protect and wrap items and transport and store in area specified by Departmental Representative.
- .2 Do not start work until:
 - .1 Arrangements have been made for disposal of waste.
 - .2 Tools, equipment, and materials waste containers are on site.
 - .3 Arrangements have been made for building security.
 - .4 Notifications have been completed and preparatory steps have been taken.

3.3 INSPECTION

- .1 Perform inspection to confirm compliance with specification and governing authority requirements. Deviations from these requirements not approved in writing by Departmental Representative will result in work stoppage, at no additional costs.
- .2 Departmental Representative will inspect work for:
 - .1 Adherence to specific procedures and materials.
 - .2 Final cleanliness and completion.
 - .3 No additional costs will be allowed by Contractor for additional labour or materials required to provide specified performance level.

3.4 FINAL CLEANUP

- .1 Conduct final check to ensure no dust or debris remains on surfaces as result of dismantling operations.

END OF SECTION

PART 1 General**1.1 SUMMARY**

- .1 Comply with requirements of this Section working in area identified to contain mould or suspect mould of if mould of suspect mould is identified.

1.2 REFERENCE STANDARDS

- .1 American Conference of Governmental Industrial Hygienists (ACGIH), Bioaerosols Assessment and Control, 1999.
- .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS).
 - .1 Safety Data Sheets (SDS).
- .3 New York City Department of Health - Bureau of Environmental and Occupational Disease Epidemiology's Guidelines on the Assessment and Remediation of Fungi in Indoor Environment, 2008.
- .4 United States Department of Labor Occupational Safety and Health Administration (OSHA).
 - .1 29 CFR 1910.134 - Respiratory Protection.
 - .2 29 CFR 1910.1200 - Hazard Communication.
- .5 United States Environmental Protection Agency (EPA), Mould Remediation in Schools and Commercial Buildings, 2001.
- .6 Canadian Standards Association (CSA).
 - .7 CSA Z94.4-18, Selection, Use and Care of Respirators.
- .7 Canadian Construction Association.
 - .1 Standard Construction Document CCA 82 "Mould Guidelines for the Canadian Construction Industry" (2004 – further referred to herein as "CCA 82").
- .8 Environment Council of Ontario (EACO).
 - .1 Lead Guideline for Construction, Renovation, Maintenance or Repair, 2015.

1.3 DEFINITIONS

- .1 Cleaning solution: detergent solution, not bleach.

- .2 Competent person: individuals, Departmental Representative who can demonstrate that mould remediation training has been obtained, is capable of identifying existing microbial hazards in workplace and selecting appropriate control strategy for microbial exposure.
- .3 Contractor: remediation contractor providing demolition and removal services as defined in specification.
- .4 Fibre reinforced polyethylene sheet (FRPS): rip-proof fibre reinforced polyethylene sheet sheeting with added fibre reinforced adhesive tape along edges.
- .5 HEPA vacuum: High Efficiency Particulate Air filtered vacuum equipment with filter system capable of collecting and retaining particles greater than 0.3 microns in any direction at 99.97% efficiency.
- .6 HVAC: heating ventilating and air-conditioning systems which serve occupied areas. Includes but is not limited to air handling units, duct work, terminal boxes and vents.
- .7 Mould Contaminated Work Area: specific area or location where actual work is being performed or such other areas of a facility where it has been determined that it may be hazardous to public health as result of mould remediation.
- .8 Occupied Area: areas of building or work site that is outside of Mould Contaminated Work Area.
- .9 PPE: Personnel Protection Equipment.
- .10 Sprayer: garden reservoir type sprayer or airless spray equipment capable of producing mist or fine spray. Must have a minimum of six litres capacity for work.

1.4 REGULATORY REQUIREMENTS

- .1 Comply with regulations in effect at time work is performed. In case of conflict among these requirements or with these specifications the more stringent requirement applies. If no regulations exist, follow guidelines most widely accepted by recognized professional organizations such as occupational hygienists, health professionals or environmental engineers.

1.5 EXISTING CONDITIONS

- .1 Reports and information pertaining to Mould to be handled, removed, or otherwise disturbed and disposed of during this Project are bound into this specification.
- .2 Refer to the following for details on Mould impacted materials:

- .1 *Designated Substances and Hazardous Materials Survey – Moosonee National Defense Radar Base, Moosonee National Defense Radar Base, Moosonee, Ontario* dated March 29, 2019 and prepared by Stantec Consulting Ltd.
- .2 *Designated Substances and Hazardous Materials Survey, Four Buildings, National Defense Radar Base, Moosonee, Ontario*, dated July 2017, and prepared for Public Works and Government Services Canada by DST Consulting Engineers Inc.
- .3 Notify Departmental Representative of mould impacted materials discovered during Work and not apparent from drawings, specifications, or report pertaining to Work. Do not disturb such material until instructed by the Departmental Representative.

1.6 INSTRUCTION AND TRAINING

- .1 Before commencing work, provide to Departmental Representative satisfactory proof that every worker has had instruction and training in potential health hazards of mould exposure, handling of hazardous materials, and in use of disposable respirators and protective clothing. This training can be performed as part of program to comply with requirements of OSHA Hazard Communication Standard 29 CFR 1910.1200.
- .2 Workers shall complete respirator pre-screening in accordance with CSA Z94.4-18.
- .3 Instruction and training must be provided by designated construction safety advisor.
- .4 Instruction and training related to use of personal respirators:
 1. Fitting of equipment.
 2. Inspection and maintenance of equipment.
 3. Disinfecting of equipment.
 4. Limitations of equipment.

1.7 WORKER PROTECTION

- .1 Non-powered disposable filter-type respirator of type N95 OSHA 29 CFR 1910.134, suitable for protection against mould and acceptable to Provincial Authority having jurisdiction.
- .2 Gloves and eye protection.
- .3 Disposable paper coveralls are recommended.

- .4 No person required to enter Mould Contaminated Work Area to have facial hair that affects seal between respirator and face.
- .5 Eating, drinking and chewing are not permitted in Mould Contaminated Work Area.
- .6 Before leaving Mould Contaminated Work Area, dispose of protective clothing as waste as specified.
- .7 Ensure workers wash hands and face after leaving Mould Contaminated Work Area.

1.8 HOURS OF WORK

- 1. Typical work schedule - Perform work after normal working hours. Include in Contract Sum. Be available to work continuously from beginning to end of project.

PART 2 Products

2.1 MATERIALS

- 1. Drop Sheets: 0.15 mm thick woven fibre reinforced fabric bonded both sides with fibre reinforced polyethylene sheet.
- 2. Disposal bags: dust-tight 0.15 mm clear polyethylene waste bags.
- 3. Wetting Agent: water to mist mould-containing material.
- 4. Cleaning solution: detergent solution for damp wipe and mop.

5. Fibre reinforced adhesive tape: used in sealing joints of fibre reinforced polyethylene sheets and for attachment of fibre reinforced polyethylene sheet to finished and unfinished surfaces. Fibre reinforced adhesive tape must be capable of adhering under both dry and wet conditions.
6. Materials: provide materials such as fibre reinforced polyethylene sheeting, lumber, nails, and hardware necessary to construct and dismantle barriers that isolate Mould Contaminated Work Area.

2.2 TOOLS AND EQUIPMENT

- .1 Tools and equipment: suitable for use with microbial contamination and must be able to withstand de-contamination.
- .2 Personnel protective equipment (protective clothing, disposable respirators): provided in sufficient quantities for duration of project.
- .3 Vacuum cleaners: equipped with HEPA filters.
- .4 Ladders and/or scaffolds: adequate length, strength and sufficient quantity to support work schedule.

PART 3 Execution

- .1 In work area where mould or suspect mould is present the following mould precautions are to be used.
 - .1 Provide tight-fitting full-face dual cartridge negative air purifying respirator equipped with HEPA filter cartridges to be worn. Disposable respirators not allowed.
 - .2 Gloves that extend to middle of forearm.
 - .3 Use mould-impervious polyethylene coated disposable head and foot coverings, and body suit made of breathable material. Seal gaps, such as those around ankles and wrists, with fibre reinforced adhesive tape.
 - .4 Procedures for entering Mould Contaminated Work Area. Each worker to:
 - .1 Remove street clothes in Decontamination Room and put on respirator with new filters or reusable filters, clean disposable protective clothing and head covers before entering Mould Contaminated Work Area. Store street clothes, uncontaminated footwear and towels in Decontamination Room.
 - .5 Ensure that no person required to enter Mould Contaminated Work Area has facial hair that affects seal between respirator and face.

- .6 Eating, drinking and chewing are not permitted in Mould Contaminated Work Area. Drinking is permitted in Decontamination Area.
- .7 Procedures for exiting Mould Contaminated Work Area. Workers to:
 - .1 Remove gross contamination from clothing before leaving work area then proceed to Decontamination Room and remove disposable protective clothing except respirators. Place contaminated work suits in closed containers for disposal with mould contaminated materials.
 - .2 Clean outside of respirator with cleaning solution. Remove respirator, remove and dispose of filters in container provided for purpose. Wash and rinse inside of respirator.
- .8 When not in use in work area, store reusable work footwear in Decontamination Room. Upon completion of mould remediation, clean footwear thoroughly inside and out using cleaning solution before removing from Mould Contaminated Work Area or from Decontamination Room.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

- .1 Ontario Provincial Standard Specifications (OPSS)
 - .1 OPSS.PROV 1004, 2012. Material Specification for Aggregates - Miscellaneous.
 - .2 OPSS.PROV 1010, 2013. Material Specification for Aggregates - Base, Subbase, Select Subgrade, and Backfill Material.
 - .3 OPSS.MUNI 1359.05.03.01, 2016. Material Specification for Unshrinkable Backfill.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00.
- .2 Sustainable Design Submittals:
 - .1 Erosion and Sedimentation Control: Contractor shall follow Erosion and Sediment Control Plan (ESC) in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations.
 - .2 Construction Waste Management:
 - .1 Submit project Waste Management Plan highlighting recycling and salvage requirements.

Part 2 Products

2.1 MATERIALS

- .1 Granular to OPSS.PROV 1010 Granular 'B' compacted in 0.15m layers, Sand to OPSS.PROV 1004.
- .2 Granular 'B' specified above may be substituted with crushed concrete to OPSS.MUNI 1359.05.03.01. Material and gradation must comply with requisite physical properties.

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions:
 - .1 Before commencing work establish locations of buried services on and adjacent to site.
- .2 Evaluation and Assessment:
 - .1 Arrange with appropriate authority for relocation of buried services that interfere with execution of work. Pay costs of relocating services.
 - .2 Testing of materials and compaction of backfill and fill will be carried out by testing laboratory designated and paid for by the contractor.

- .3 Not later than 48 hours before backfilling or filling with approved material, notify Departmental Representative so that compaction tests can be carried out by designated testing agency.
- .4 Before commencing work, conduct, with Departmental Representative, condition survey of existing structures, trees and plants, lawns, fencing, service poles, wires, rail tracks and paving, survey bench marks and monuments which may be affected by work.

3.2 PREPARATION

- .1 Temporary Erosion and Sedimentation Control:
 - .1 Use temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, in accordance with sediment and erosion control drawings and requirements of authorities having jurisdiction.
 - .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
 - .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.
- .2 Protection of in-place conditions:
 - .1 Protect excavations from freezing.
 - .2 Keep excavations clean, free of standing water, and loose soil.
 - .3 Where soil is subject to significant volume change due to change in moisture content, cover and protect to Departmental Representative's approval.
 - .4 Protect natural and man-made features required to remain undisturbed. Unless otherwise indicated or located in an area to be occupied by new construction, protect existing trees from damage.
 - .5 Protect buried services that are to remain undisturbed.
- .3 Removal:
 - .1 Remove obsolete buried services within 2 m of foundations. Cap cut-offs.
 - .2 Remove obstructions, ice and snow, from surfaces to be excavated within limits indicated.
 - .3 Remove trees, stumps, logs, brush, shrubs, bushes, vines, undergrowth, rotten wood, dead plant material, exposed boulders and debris within areas designated on drawings.
 - .4 Remove stumps and tree roots below footings, slabs, and paving, and to 600 mm below finished grade elsewhere.

3.3 EXCAVATION

- .1 Topsoil stripping:
 - .1 Do not handle topsoil while in wet or frozen condition or in any manner in which soil structure is adversely affected.
 - .2 Strip topsoil to depths as directed by Departmental Representative. Avoid mixing topsoil with subsoil.

- .3 Strip topsoil over areas to be covered by new construction, over areas where grade changes are required, and so that excavated material may be stockpiled without covering topsoil.
- .4 Dispose of topsoil as directed by Departmental Representative.

3.4 SITE QUALITY CONTROL

- .1 Fill material and spaces to be filled to be inspected and approved by Departmental Representative.

3.5 BACKFILLING

- .1 Start backfilling only after inspection and receipt of written approval of fill material and spaces to be filled from Departmental Representative.
- .2 Remove snow, ice, construction debris, organic soil and standing water from spaces to be filled.
- .3 Lateral support: maintain even levels of backfill around structures as work progresses, to equalize earth pressures.
- .4 Compaction of subgrade: compact existing subgrade under walks, paving, and slabs on grade, to same compaction as specified for fill. Fill excavated areas with selected subgrade material or gravel and sand compacted as specified for fill. Proposed fill material to be approved by Departmental Representative prior to starting work.
- .5 Placing:
 - .1 Place backfill, fill and basecourse material in 150 mm lifts. Add water as required to achieve specified density.
- .6 Compaction: compact each layer of material to following densities for material to ASTM D698:
 - .1 To underside of basecourses: 95%.
 - .2 Basecourses: 100%.
 - .3 Elsewhere: 90%.

3.6 GRADING

- .1 Grade to ensure that water will drain away from buildings, walls, and paved areas, to catch basins and other disposal areas approved by Departmental Representative. Grade to be gradual between finished spot elevations as indicated.

3.7 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11.
 - .1 Dispose of cleared and grubbed material off site.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools, and equipment in accordance with Section 01 74 11.
- .3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21.

END OF SECTION

APPENDIX A

Existing Surveys



DESIGNATED SUBSTANCES & HAZARDOUS MATERIALS SURVEY



FOUR BUILDINGS NATIONAL DEFENCE RADAR BASE MOOSONEE, ONTARIO

Submitted By:
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Prepared for:
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July 2017

**DST File No.: GV-NO-029911
PWGSC SOA No: EQ447-141528-018**

**Designated Substances and Hazardous Material Survey
Four Buildings at the Moosonee DND Radar Base
Moosonee, Ontario**

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1.0 INTRODUCTION

DST Consulting Engineers Inc. (DST) was retained by Public Works and Government Services Canada (PWGSC) to perform a Designated Substances and Hazardous Materials Survey (DSHMS) for four buildings at the DND Radar Base, located in Moosonee, Ontario. Three of the buildings are planned for demolition and one for ownership transfer.

This report is required under the *Ontario Occupational Health and Safety Act* in order to identify designated substances that may be present within the building. The *Canada Labour Code* also stipulates under *Part II, Section 124* that every employer shall ensure that the health and safety at work of every person employed by the employer is protected. By having a DSHMS conducted, the Project Manager will be able to inform stakeholders of any designated substances that may be present and possibly disturbed.

DST staff completed a visual evaluation of building materials for the presence of suspected designated substances and hazardous materials at the above-noted buildings on July 10, 2017.

2.0 SCOPE OF WORK

The survey implemented by DST included the 11 designated substances listed in Section 30 of the *Occupational Health and Safety Act, R.S.O. 1990, Chapter O.1*. Designated Substances, as identified under the Ontario Occupational Health and Safety Act, are as follows:

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

Other Hazardous Materials that are not classified as Designated Substances, but were included as part of the survey and considered pertinent due to applicable regulations, best practice guidelines and/or potential risks to human health and/or the environment, are:

- Polychlorinated Biphenyls (PCBs),
- Halocarbons,
- Mould, and
- Other hazardous materials, as deemed pertinent.

The four buildings included in this survey were as follows:

- Former East Height Finder Tower (Building 1, to be demolished);
- Former West Height Finder Tower (Building 1A, to be demolished);
- Former Operations Tower (Building 3, to be demolished); and
- Former Power and Central Heating Plant, now used as a warehouse (Building 4, to be retained and ownership transferred to the existing tenant).

3.0 SITE BACKGROUND/DESCRIPTION

The former DND Radar Base, located between the Moosonee airport (to the northeast) and the town of Moosonee (to the southwest), was operational between 1961 and 1975 as part of the Pine-Tree Line early warning system. It was designated as the Royal Canadian Air Force (RCAF) Radar Station, Site #44, Squadron 15AC&W, Moosonee. The Moosonee Area Development Board (MADB) uses the crown owned property for private business/commercial development in addition to municipal public works infrastructure maintenance and support.

3.1. Building 1

Building 1 is located approximately 120 m northeast of the intersection of Mistik Boulevard and Meechim Street. Building 1 is no longer occupied, has an approximate area of 57 m², and was historically referred to as the East Height Finder Tower. The two-storey building consists of a steel structure over a concrete foundation, enclosed with painted steel cladding and a flat steel roof. The building is not insulated. The steel cladding is painted bright yellow and is peeling in many areas.

3.2. Building 1A

Building 1A is located approximately 120 m west of Building 1 and northwest of the intersection of Mistik Boulevard and Meechim Street. Building 1A is no longer occupied, has an approximate area of 57 m², and was historically referred to as the West Height Finder Tower. The two-storey building consists of a steel structure over a concrete foundation, enclosed with painted steel cladding and a flat steel roof. The building is not insulated. The steel cladding is painted bright yellow and is peeling in many areas.

3.3. Building 3

Building 3 is located approximately 50 m north of the intersection of Mistik Boulevard and Meechim Street. Building 3 is no longer occupied. The building has an approximate area of 400 m² and was historically referred to as the Operations Tower. The four-storey building consists of a steel structure over a concrete foundation that extends up to include the main floor, enclosed with painted steel cladding and a flat roof. At the time of the survey, many areas were not accessible due to the questionable structural integrity of the building, which included a portion of the main floor that was observed to be flooded. There did not appear to be a basement or crawl space beneath the ground floor and none is known to exist.

3.4. Building 4

Building 4 is located on Mistik Boulevard, approximately 100 m west of Meechim Street. The building has an approximate area of 1,000 m² and was historically used as the power and central heating plant for the former DND Radar Base. The building consists of a double height warehouse and a single storey lean-to on the northeast façade. The warehouse is supported by a steel and wood structure with reinforced concrete block over a concrete foundation, and is enclosed with a mix of Transite cement board and steel cladding, painted wood frame windows and a flat steel roofing system. The warehouse is subdivided into two main unfinished spaces, with concrete block wall partitions over a concrete floor. The office lean-to consists of a steel structure with reinforced concrete block over a concrete foundation, and is enclosed with a mix of Transite cement board and steel cladding, and painted wood frame windows. The penthouse/roof was not

accessible at the time of the survey due to a portion of the access staircase being removed for security purposes.

4.0 METHODOLOGY

Intrusive survey techniques were used for Buildings 1, 1A, and 3 (e.g., the creation of openings in solid finishes to evaluate concealed conditions in walls, ceiling cavities etc.). The survey for Building 4 was non-destructive in nature, however, DST utilised existing openings to view concealed conditions where possible.

Materials suspected of containing designated substances were visually identified, based on the surveyor's knowledge of the historic composition of building products. Visual identification of materials suspected to contain asbestos or lead was supported by the collection and analysis of a limited number of representative samples, where applicable. Materials suspected of containing designated substances other than asbestos or lead were identified by appearance, age, and knowledge of historic applications.

In Ontario, a material is defined as an Asbestos-Containing Material (ACM) if the material has a minimum asbestos content of 0.5 per cent (%) by dry weight, as per *Ontario Regulation (O. Reg.) 278/05 Asbestos on Construction Projects and in Buildings and Repair Operations* enabled under the *Occupational Health and Safety Act (R.S.O. 1990, Chapter O.1)*, as amended. ACMs can be divided into two categories: friable and non-friable material. A friable ACM is a material that can be crumbled, powdered, or pulverized by hand pressure and can readily release fibres when disturbed. Common applications of friable ACMs are sprayed or trowelled surfacing materials (e.g. sprayed fireproofing and textured coatings) as well as mechanical and thermal insulation. Non-friable materials are materials that will generally release fibres only when cut or shaped. Common non-friable ACMs include vinyl floor products, caulking applications, asbestos textile products and asbestos cement products (Transite). Some of these products may become friable with time or when disturbed.

Representative bulk samples of suspected ACMs were collected by DST during the site investigation. Samples were collected in order to meet the bulk sampling requirements stipulated in *O.Reg. 278/05, as amended*. Bulk samples were submitted to and analyzed Paracel Laboratories Ltd. (Paracel). Paracel is an accredited laboratory through the Canadian Association for Laboratory Accreditation (CALA). The bulk samples were analyzed using polarised light microscopy (PLM). This analytical method complies with the United States Environmental Protection Agency (U.S. EPA) Method 600/R-93/116 dated July, 1993, which is the regulatory approved protocol for bulk asbestos analysis in Ontario.

With regards to lead in paint, although the Ontario Ministry of Labour (MoL) has published a guideline for control of lead exposures on construction projects in Ontario, it does not include criteria for the classification of lead-paint. Instead, it uses presumed airborne lead concentrations for specific tasks as criteria for classifying work. However, in regulations set by the United States (U.S.) Department of Housing and Urban Development, lead-based paint is classified as any paint application containing at least 1.0 milligrams of lead per square centimetre of surface area (1.0 mg/cm²), or at least 0.5% lead content by weight [(5,000 parts per million (ppm))]. This criterion was widely, although not universally, used in Canada. In Canada, the Federal Canada Consumer Product Safety Act's *Surface Coating Materials Regulations SOR/2005-109* has lowered the allowable concentration of lead in paints for new consumer products to 0.009% lead content by weight (90 ppm). For the purposes of the survey and this report, paint applications having detectable concentrations of lead are considered to be lead-containing.

Three (3) representative bulk samples of paint and one (1) representative bulk sample of mortar were collected by DST for lead content analysis. The samples were analyzed at Paracel. Paracel is certified by the Canadian Association of Laboratory Accreditation (CALA) to perform lead in paint sample analysis. The samples were analysed by Paracel using Inductively Coupled Plasma – Optical Emission Spectrometry (ICP-OES) in accordance with MOE E3470, ICP-OES.

Five (5) bulk lead leachate samples were collected by DST. The samples were analyzed for lead leachate toxicity using Toxicity Characteristic Leaching Procedure (TCLP) at Paracel Laboratories. Lead leachate results were compared to the 5 mg/L limit for lead leachate toxicity, as per *Ontario Regulation 347/90 - General – Waste Management, as amended*.

Select photographs of bulk samples as well as representative conditions are included in Appendix A. Bulk asbestos, lead and lead leachate (TCLP) analytical results for samples collected by DST are included in Appendix B. A room-by-room ACM database is included in Appendix C.

5.0 BACKGROUND REPORT REVIEW

A review of historical documents relating to Designated Substances and Hazardous Materials at the Moosonee DND Radar Base was conducted by DST prior to the survey. The following historical document was reviewed:

- Limited Designated Substance & Hazardous Material Survey, Former Department of National Defence Radar Base, Moosonee, Ontario. Prepared by DST Consulting Engineers Inc., dated January 31, 2006 (DST File Number OI05353).

Where possible, DST referenced the identifiable sampling and analytical results of the historical documents. As such, materials already quantitatively evaluated for asbestos or lead in the previous report was not re-sampled by DST. Where any possible discrepancies were identified, confirmatory or delineation sampling was also conducted. DST's field program also included the sampling of any additional ACMs and the identification of other Designated Substances not previously noted. Where applicable, a sufficient number of bulk asbestos samples were collected in order to satisfy the current bulk sampling requirements of O.Reg. 278/05, as amended.

6.0 FINDINGS

The following sections outline the consolidated findings of all accessible designated substances and hazardous building materials that were assessed at the four subject buildings at the Moosonee DND Radar Base.

6.1. Asbestos

The following sub-sections summarise the consolidated findings for ACMs at the four buildings surveyed at the Moosonee DND Radar Base on a per-building basis. For detailed summarised information relating to identified ACMs, such as location, description, friability, accessibility and condition, refer to the room-by-room ACM Database, attached as Appendix C.

6.1.1. Building 1

Table 1 summarizes the analytical results of bulk samples collected by DST as part of this survey and submitted for asbestos content for Building 1:

Table 1: Summary of Bulk Samples Analyzed for Asbestos Content by Polarized Light Microscopy (PLM) – Building 1			
Sample I.D.	Sample Location	Sample Description	Asbestos Content and Type
29911-1-01A	Interior Window	Grey Caulking	2% Chrysotile
29911-1-01B			Not Analyzed – Positive Stop
29911-1-01C			Not Analyzed – Positive Stop
29911-1-02A	Exterior – Roof Top	Black Tar	15% Chrysotile
29911-1-02B			Not Analyzed – Positive Stop
29911-1-02C			Not Analyzed – Positive Stop
29911-1-03A	Exterior - Wall	Grey Caulking	5% Chrysotile
29911-1-03B			Not Analyzed – Positive Stop
29911-1-03C			Not Analyzed – Positive Stop

Note: Bold items represent materials that contain regulated concentrations of asbestos (equal to or greater than 0.5%) as per O.Reg. 278/05, as amended.

Based on visual observations, and current bulk sampling and subsequent laboratory analysis results, the following materials have been identified as containing regulated concentrations of asbestos at Building 1:

- Non-friable grey caulking, observed around both the interior windows and exterior walls, contains 2% and 5% Chrysotile asbestos (DST samples 29911-1-01A and 29911-1-03A, respectively). The building was noted to contain eight (8) windows total with approximately four (4) linear metres of caulking per window; and approximately fifty (50) linear metres of grey caulking on the exterior walls; and
- Black Tar located on the roof top contains 15% Chrysotile asbestos (DST Sample 29911-1-02A). Approximately 175 square metres (m²) of this ACM was observed, in good condition.

6.1.2. Building 1A

Table 2 summarizes the analytical results of bulk samples collected by DST as part of this survey and submitted for asbestos content for Building 1A:

Table 2: Summary of Bulk Samples Analyzed for Asbestos Content by Polarized Light Microscopy (PLM) – Building 1A			
Sample I.D.	Sample Location	Sample Description	Asbestos Content and Type
29911-1A-01A	Ground Floor – Pipe Fitting	Grey Cement Compound Insulation	65% Chrysotile
29911-1A-01B			Not Analyzed – Positive Stop
29911-1A-01C			Not Analyzed – Positive Stop
29911-1A-02A	First Floor - Floor	Beige 9"x9" Vinyl Floor Tile	1% Chrysotile
			Not Analyzed – Positive Stop
			Not Analyzed – Positive Stop
29911-1A-02B		Black Mastic	None Detected
			None Detected
29911-1A-02C			None Detected
29911-1A-03A	Interior Window	Grey Caulking	2% Chrysotile
29911-1A-03B			Not Analyzed – Positive Stop
29911-1A-03C			Not Analyzed – Positive Stop
29911-1A-04A	Staircase – Piping	White Pre-Formed Insulation (Magblock)	30% Chrysotile
29911-1A-04B			Not Analyzed – Positive Stop
29911-1A-04C			Not Analyzed – Positive Stop

Table 2: Summary of Bulk Samples Analyzed for Asbestos Content by Polarized Light Microscopy (PLM) – Building 1A			
Sample I.D.	Sample Location	Sample Description	Asbestos Content and Type
29911-1A-05A	2nd Floor – Between Wood Panel and Metal Wall	Grey Caulking	15% Chrysotile
29911-1A-05B			Not Analyzed – Positive Stop
29911-1A-05C			Not Analyzed – Positive Stop

Note: **Bold** items represent materials that contain regulated concentrations of asbestos (equal to or greater than 0.5%) as per O.Reg. 278/05, as amended.

Based on visual observations, and current bulk sampling and subsequent laboratory analysis results, the following materials have been identified as containing regulated concentrations of asbestos at Building 1A:

- Friable grey cement compound insulation on pipe fittings contain 65% Chrysotile asbestos (DST Sample 29911-1A-01A). There are approximately fifty (50) pipe fittings insulated with asbestos-containing grey cement compound observed throughout the ground floor of the building, of which ten (10) pipe fittings are in poor condition, resulting in approximately sixty (60) square metres of grey cement compound debris on surfaces below, intermixed with non-asbestos miscellaneous solid waste throughout the ground floor;
- Friable white pre-formed pipe insulation (Magblock), contains 30% Chrysotile asbestos (DST Sample 29911-1A-05A). 2.5 linear metres of this ACM was observed in the stairwell between the ground and first floors, of which less than 1 m was observed in poor condition.
- Non-friable beige 9"x9" vinyl floor tiles contain 1% Chrysotile asbestos (DST Sample 29911-1A-02A vinyl floor tile layer). Approximately twenty-five (25) square metres of these vinyl floor tiles were observed on the first floor, all of which were in poor condition. The associated mastic was determined to be non-asbestos containing (DST Sample 29911-1A-02A-C, mastic layer.); and
- Non-friable grey caulking contains 2%-15% Chrysotile asbestos (DST Samples 29911-1A-01A and 29911-1A-05A). The building was noted to contain a total of eight (8) windows with approximately 4 linear meters of caulking per window, and approximately three (3) linear meters of grey caulking on the 2nd floor, applied to the joint between a wood panel and the metal wall.

The following asbestos-containing material is assumed to be present at Building 1A:

- Non-friable black Tar containing 15% Chrysotile asbestos (similar to DST Sample 29911-1-02A) is assumed to be present on the building's roof top. Although the roof top was inaccessible during the survey (staircase has been removed), due to the fact that Buildings 1 and 1A are very similar, 175 square metres of this ACM (that was identified at Building 1) is assumed present, unless confirmed otherwise.

6.1.3. Building 3

Table 3 summarizes the analytical results of bulk samples collected by DST as part of this survey and submitted for asbestos content for Building 3:

Table 3: Summary of Bulk Samples Analyzed for Asbestos Content by Polarized Light Microscopy (PLM) – Building 3			
Sample I.D.	Sample Location	Sample Description	Asbestos Content and Type
29911-3-01A	Ground Floor - Floor	Blue 9"x9" Vinyl Floor Tile	2% Chrysotile
29911-3-01B			Not Analyzed – Positive Stop
29911-3-01C			Not Analyzed – Positive Stop
29911-3-02A	Ground Floor - Ceiling	Fireproofing	10% Chrysotile
29911-3-02B			Not Analyzed – Positive Stop
29911-3-02C			Not Analyzed – Positive Stop
29911-3-02D			Not Analyzed – Positive Stop
29911-3-02E			Not Analyzed – Positive Stop
29911-3-02F			Not Analyzed – Positive Stop
29911-3-02G			Not Analyzed – Positive Stop
29911-3-03A	Ground Floor – Pipe Fitting	Grey Cement Compound Insulation	65% Chrysotile
29911-3-03B			Not Analyzed – Positive Stop
29911-3-03C			Not Analyzed – Positive Stop
29911-3-04A	Staircase – Wall	Drywall Joint Compound	2% Chrysotile
29911-3-04B			Not Analyzed – Positive Stop
29911-3-04C			Not Analyzed – Positive Stop
29911-3-05A	Ground Floor - Wall	Plaster – White and Grey Layers	None Detected
29911-3-05B			None Detected
29911-3-05C			None Detected
29911-3-05D			None Detected
29911-3-05E			None Detected

Note: Bold items represent materials that contain regulated concentrations of asbestos (equal to or greater than 0.5%) as per O.Reg. 278/05, as amended.

Based on visual observations, and current bulk sampling and subsequent laboratory analysis results, the following materials have been identified as containing regulated concentrations of asbestos at Building 3:

- Non-friable blue 9"x9" vinyl floor tiles contain 2% Chrysotile asbestos (DST Sample 29911-3-01A). Approximately 850 square metres of these vinyl floor tiles were noted throughout the building, in good condition;
- Friable spray-applied grey fireproofing, contains 10% Chrysotile asbestos (DST Sample 29911-3-02A). A total of 800 square metres of fireproofing was observed, applied to the concrete ceiling of the Ground Floor and the 4th Floor. All fireproofing observed was in poor condition, with associated debris that has contaminated all surfaces and standing water on the Ground Floor and 4th Floor;
- Friable grey cement compound insulation on pipe fittings contains 65% Chrysotile asbestos (DST Sample 29911-3-03A). One hundred (100) pipe fittings were observed throughout the Ground, 2nd, and 3rd floors, in good condition; and
- Non-friable drywall joint compound contains 2% Chrysotile asbestos (DST Sample 29911-3-04A). Approximately six (6) square metres of drywall joint compound was observed in the stairwell of the building, to be in good condition.

The following materials are assumed to contain asbestos:

- Non-friable roofing materials associated with the roof of Building 3, which was inaccessible at the time of the survey (staircase has been removed);
- Non-friable caulking in the joints of cast iron drainage pipes.

Bulk sampling, visual observations, and/or subsequent laboratory analysis has determined that the following materials do not contain regulated concentrations of asbestos:

- Plaster (white and grey layers) observed on the ground floor (DST Samples 29911-3-05A-E).

6.1.4. Building 4

Table 4 summarizes the analytical results of bulk samples collected by DST (2006 and 2017) and submitted for asbestos content for Building 4:

Table 4: Summary of Bulk Samples Analyzed for Asbestos Content by Polarized Light Microscopy (PLM) – Building 4			
Sample I.D.	Sample Location	Sample Description	Asbestos Content and Type
353-04-MI-01 (DST, 2006)	Workshop	Grey cement compound insulation on pipe fittings	65% Chrysotile
29911-4-01A	Exterior Wall	Transite cement panels	20% Chrysotile
29911-4-01B			Not Analyzed – Positive Stop
29911-4-01C			Not Analyzed – Positive Stop
29911-4-02A	Office Window	White Grout	None Detected
29911-4-02B			None Detected
29911-4-02C			None Detected
29911-4-03A	Exterior – Along Metal Structure behind Transite Panel	Grey Parging	None Detected
29911-4-03B			None Detected
29911-4-03C			None Detected
29911-4-04A	Exterior Wall – Between Metal and Transite Panel	Grey Caulking	5% Chrysotile
29911-4-04B			Not Analyzed – Positive Stop
29911-4-04C			Not Analyzed – Positive Stop
29911-4-05A	Exterior Window	Grey Caulking	2% Chrysotile
29911-4-05B			Not Analyzed – Positive Stop
29911-4-05C			Not Analyzed – Positive Stop
29911-4-06A	Interior/Exterior Wall	Concrete Block Mortar	None Detected
29911-4-06B			None Detected
29911-4-06C			None Detected
29911-4-06D			None Detected
29911-4-06E			None Detected
29911-4-06F			None Detected
29911-4-06G			None Detected

Note: **Bold** items represent materials that contain regulated concentrations of asbestos (equal to or greater than 0.5%) as per O.Reg. 278/05, as amended.

Based on visual observations, and current and previous bulk sampling and subsequent laboratory analysis results, the following materials have been identified as containing regulated concentrations of asbestos at Building 4:

- Friable grey cement compound insulation on pipe fittings contains 55% Chrysotile asbestos (DST 2006 Sample 353-04-MI-01). Grey cement compound on pipe fittings were observed in the following areas of the building, all of which were observed to be in good condition:
 - Five (5) pipe fittings in small workshop storage of lean-to,
 - Six (6) pipe fittings in hallway; and
 - Twenty (20) pipe fittings in the unfinished warehouse.
- Non-friable transite panels contain 20% Chrysotile asbestos (DST Sample 29911-4-01A). There is approximately 2,000 square metres of Transite paneling forming the exterior walls of Building 4, of which twenty (20) square metres is in fair condition (all other instances were in good condition);
- Non-friable grey caulking contains 2%-5% Chrysotile asbestos (DST Samples 29911-4-04A and 29911-4-05A). Grey caulking was observed on the joints between metal and Transite wall paneling, and on the windows of the building.

The following materials are assumed to contain asbestos:

- Non-friable roofing materials associated with the main roof of Building 4, which was inaccessible at the time of the survey (portion of staircase removed for security purposes). Based on discussions with a City of Moosonee representative, the he roofing materials associated with the lean-to at Building 4 was replaced within the last five (5) years, as such post-dates the use of asbestos in building materials and is not suspected to be asbestos-containing;
- Non-friable caulking in the joints of cast iron drainage pipes.

Bulk sampling, visual observations, and/or subsequent laboratory analysis has determined that the following materials do not contain regulated concentrations of asbestos:

- White grout associated with interior windows (DST Samples 29911-4-02A-C);
- Grey cementitious parge, observed along metal structure between Transite panels and interior concrete block wall (DST Samples 29911-4-03A-C); and
- Concrete block mortar (DST Samples 29911-4-06A-G);
- Drywall joint compound was observed on select walls in the lean-to and beige 12"x12" vinyl floor tiles in the office. As per on-site discussions with the City of Moosonee representative, the drywall walls were installed in 2003, and vinyl floor tiles in 2014. As such, these materials are not suspected to be asbestos-containing.

6.2. Benzene

Benzene may be a constituent ingredient of fuels within the following equipment:

- Above-Ground Storage Tanks (ASTs) associated with Building 4:
 - Two (2) 1,000-gallon diesel tanks.
 - One (1) 500-gallon gasoline tank.
 - One (1) 250-gallon re-fueling tank.

6.3. Lead

The following sub-sections summarize the consolidated findings for Lead at the subject buildings of the Moosonee DND Radar Base on a per-building basis.

6.3.1. Building 1

Table 5.1 summarizes the analytical result of paint sampling performed by DST (2006 and 2017):

Table 5.1: Bulk Paint Samples Analyzed for Lead Content Analysis by ICP-OES) – Building 1				
Sample I.D.	Sample Location	Sample Description	Lead Content (ppm or µg/g)	Approximate Quantity
353-01-LP-01 (DST 2006)	Exterior Metal Cladding	Yellow/Grey Paint	350 ppm	200 m²
29911-1-LP01 (DST, 2017)	Metal Floor	Grey Paint	1,370 ppm	57 m²

Note: **Bold** items exceed the 90 ppm limit for lead, as per *Canada Consumer Product Safety Act's Surface Coating Materials Regulations SOR/2005-109* (as amended).

Based on the analytical sample results for the lead in paint presented above, both paints sampled contain concentrations of lead that exceed the established 90 ppm limit. Approximately one hundred and sixty (160) m² of exterior yellow paint was noted to be in fair condition, and forty (40) m² was noted to be in poor condition at the time of the survey. The grey floor paint, although showing signs of rust, appeared to be in good condition at the time of the survey.

All other surface coatings not sampled throughout Building 1, including structural steel coatings, shall be assumed to be lead-containing, unless specific bulk sampling and laboratory analysis proves otherwise.

A bulk sample of the yellow/grey paint was then submitted by DST for TCLP analysis. Table 5.2 summarises the analytical result.

Table 5.2: Summary of Paint Samples and Substrate Analyzed for Lead Leachate Toxicity – Building 1			
Sample I.D.	Material Description	Lead (mg/L)	Approximate Quantity
29911-TCLP-1-01	Yellow/Grey Paint on exterior metal cladding	1.97 mg/L	200 m ²

Note: **Bold** items exceed the 5 mg/L limit for lead leachate, as per *O. Reg 347/90 – General – Waste Management* (as amended).

Based on the analytical laboratory results outlined in Table 5.2, the yellow/grey paint on exterior metal cladding was well below the 5 mg/L limit for lead leachate toxicity, as per O. Reg. 347/90 - General – Waste Management, as amended. This paint is considered non-hazardous for disposal with respect to lead.

Due to the good condition of the grey paint on metal flooring, DST could not collect a sufficient quantity of the paint for TCLP analysis. This paint should be assumed to be leachate hazardous with respect to lead unless future sampling can confirm otherwise.

Based upon the historic composition of building materials, lead is also assumed to be present in the solder on the joints of copper piping.

6.3.2. Building 1A

Table 6.1 summarizes the analytical result of paint sampling performed by DST:

Table 6.1: Bulk Paint Samples Analyzed for Lead Content Analysis by ICP-OES) – Building 1A				
Sample I.D.	Sample Location	Sample Description	Lead Content (ppm or µg/g)	Approximate Quantity
353-1A-LP-01 (DST, 2006)	Exterior Metal Cladding	Yellow Paint	2,800 ppm	200 m²

Note: **Bold** items exceed the 90 ppm limit for lead, as per *Canada Consumer Product Safety Act's Surface Coating Materials Regulations SOR/2005-109* (as amended).

Based on the analytical sample result for the lead in paint sampling summarised in Table 6.1, the yellow paint applied to exterior metal cladding contains 2,800 ppm lead, which exceeds the established 90 ppm limit, and is therefore considered to be lead-based. Approximately one hundred and sixty (160) m² of exterior yellow paint was noted to be in fair condition, and forty (40) m² was noted to be in poor condition at the time of the survey.

All other surface coatings not sampled at Building 1A, including structural steel coatings, shall be assumed to be lead-containing, unless specific bulk sampling and laboratory analysis proves otherwise.

A bulk sample of the yellow paint was submitted by DST for TCLP analysis. Table 6.2 summarises the analytical result.

Table 6.2: Summary of Paint Samples and Substrate Analyzed for Lead Leachate Toxicity – Building 1A			
Sample I.D.	Material Description	Lead (mg/L)	Approximate Quantity
29911-TCLP-1A-01	Yellow Paint on exterior metal cladding	11.6 mg/L	200 m²

Note: **Bold** items exceed the 5 mg/L limit for lead leachate, as per O. Reg 347/90 – General – Waste Management (as amended).

Based on the analytical laboratory results outlined in Table 6.2, the yellow paint applied to the exterior metal cladding exceeds the 5 mg/L limit for lead leachate toxicity, as per O. Reg. 347/90 - General – Waste Management, as amended (11.6 mg/L, DST Sample 29911-TCLP-1A-01). This paint is considered hazardous for disposal with respect to lead. The substrate is comprised of metal that is not considered a leachable material.

Based upon the historic composition of building materials, lead is also assumed to be present in solder on the joints of copper piping.

6.3.3. Building 3

Table 7.1 summarizes the analytical result of paint sampling performed by DST:

Table 7.1: Summary of Bulk Paint Samples Analyzed for Lead Content Analysis by ICP-OES – Building 3				
Sample I.D.	Sample Location	Sample Description	Lead Content (ppm or µg/g)	Approximate Quantity
353-03-LP-01 (DST, 2006)	Exterior Metal Cladding	Yellow/Off-White Paint	200 ppm	1,600 m²
29911-3-LP01	Walls/Stairs	Blue Paint	3,150 ppm	100 m²
29911-3-LP02	Cast Iron Drain Pipe	White Paint	5,800 ppm	10 linear metres

Note: **Bold** items exceed the 90 ppm limit for lead, as per *Canada Consumer Product Safety Act's Surface Coating Materials Regulations SOR/2005-109* (as amended).

Based on the analytical sample results for the lead in paint sampling summarised in Table 7.1, all paints sampled contain levels of lead that exceed the established 90 ppm limit. Two hundred (200) square metres of exterior yellow paint was noted to be in fair condition and one hundred (100) square metres in poor condition. Approximately ten (10) square metres of blue paint and less than one (1) square metre of white paint was noted to be in poor condition throughout the building at the time of the survey.

All other surface coatings not sampled at Building 3, including structural steel coatings, shall be assumed to be lead-containing, unless specific bulk sampling and laboratory analysis proves otherwise.

Bulk samples of each of the three paints summarized in Table 7.1 were then then submitted by DST for TCLP analysis. Table 7.2 summarizes the analytical results:

Table 7.2: Summary of Paint Samples and Substrate Analyzed for Lead Leachate Toxicity – Building 3			
Sample I.D.	Material Description	Lead (mg/L)	Approximate Quantity
29911-TCLP-3-01	Yellow/Off-White Paint on exterior metal cladding	21.4 mg/L	1,600 m²
29911-TCLP-3-02	Blue Paint on walls and stairs	1.08 mg/L	100 m ²
29911-TCLP-3-03	White Paint on cast-iron drainpipes	22.0 mg/L	10 m²

Note: **Bold** items exceed the 5 mg/L limit for lead leachate, as per *O. Reg 347/90 – General – Waste Management* (as amended).

Based on the analytical laboratory results outlined in Table 7.2, the yellow/off-white paint applied to the exterior metal cladding, and the white paint applied to cast-iron drainpipes throughout the building exceeds the 5 mg/L limit for lead leachate toxicity, as per O. Reg. 347/90 - General – Waste Management, as amended (yellow/off-white paint - 21.4 mg/L, DST Sample 29911-TCLP-3-01, and white paint – 22.0 mg/L, DST Sample 29911-TCLP-3-03). These paints are considered

hazardous for disposal with respect to lead. For both applications, the associated substrates are comprised of metal that is not considered a leachable material.

The blue paint was well below the 5mg/L limit for lead leachate toxicity (1.08 mg/L, DST Sample 29911-TCLP-3-02, and as such, this paint and associated substrate material is considered non-hazardous for disposal with respect to lead.

Based upon the historic composition of building materials, lead is also assumed to be present in the following materials:

- Solder on the joints of copper piping; and
- Caulking in the joints of cast iron drainage pipes.

6.3.4. Building 4

Table 8 summarizes the analytical results of paint and mortar sampling performed by DST (2006 and 2017) at the building:

Table 8: Summary of Bulk Paint Samples Analyzed for Lead Content Analysis by CP-OES – Building 4				
Sample I.D.	Sample Location	Sample Description	Lead Content (ppm or µg/g)	Approximate Quantity
353-04-LP-01 (DST 2006)	Ceiling of lean-to, above office main entrance	White Paint	50 ppm	100 m ²
29911-4-Pb01	Structural Walls	Concrete Block Mortar	8.5 ppm	3,000 m ²

Note: **Bold** items exceed the 90 ppm limit for lead, as per *Canada Consumer Product Safety Act's Surface Coating Materials Regulations SOR/2005-109* (as amended).

Based on the analytical sample results for the lead in paint chip sampling and mortar sampling summarised in Table 8, all samples were identified as containing detectable concentrations of lead, but below the established 90 ppm limit.

All other paints and surface coatings not sampled at Building 4, including structural steel coatings, shall be assumed to be lead-containing, unless specific bulk sampling and laboratory analysis proves otherwise.

Based upon the historic composition of building materials, lead is assumed to be present in the following materials:

- Ceramic tile glazing;
- Solder on the joints of copper piping; and
- Caulking in the joints of cast iron drainage pipes.

6.4. Mercury

Mercury is assumed to be present in the following:

- Fluorescent light fixtures containing fluorescent light tubes, observed throughout Buildings 3 and 4. Fluorescent light tubes contain mercury in a vapour form and in the phosphor coating on the lamp tube.

6.5. Silica

Based on the historic composition of building materials, silica is expected to be present in the following materials, which may be present at all four of the buildings, or a combination thereof:

- Concrete and cement materials,
- Concrete parge and texture coating materials,
- Drywall and associated materials,
- Mortars,
- Plaster materials,
- Ceramic tiles,
- Fireproofing; and
- Vinyl flooring and mastic products.

6.6. Other Hazardous Materials

6.6.1. Polychlorinated Biphenyls (PCBs)

PCBs are commonly found within electrical ballasts manufactured prior to 1981, found within fluorescent light fixtures and high intensity discharge lamps.

Light fixtures with T12 lamps are more likely to contain ballasts that were manufactured prior to 1981. T8 lamps are associated with light fixtures that were manufactured after the phase-out of PCB-containing ballasts. The letter “T” denotes the shape of the light fixture (e.g. tubular) and the number which follows indicates the diameter in eighths of an inch.

DST did not disassemble any of the light fixtures in the in the four buildings included this survey to identify the presence of ballasts, as there was uncertainty over whether power had been locked-out at the time of site visit. Based on limited visual observations, light fixtures observed in Building 3 were identified as T-12 fixtures, A total of fifteen (15) ballasts suspected of containing PCBs were identified in the T-12 light fixtures located in Building 3.

Light fixtures observed throughout Building 4 were identified to contain T8 light tubes, where the ballasts are not suspected to contain PCBs.

6.6.2. Halocarbons

Halocarbons are a family of synthetic organic compounds that are composed of carbon and the following elements: hydrogen, chlorine, fluorine, and/or bromine. They are inert, heat-absorbing molecules which are useful as refrigerants and fire suppression agents because they are inexpensive, non-flammable and very stable.

Halocarbons are used specifically as refrigerants in air-conditioning and refrigeration systems, fire extinguishing agents in fire extinguishing systems, blowing agents in the manufacture of foams, and as solvents. Halocarbons are regulated because many of them contribute to the depletion of the stratospheric ozone layer.

Halocarbon-containing equipment observed by DST at the four buildings included in this survey are as follows:

- A refrigerator and four (4) grocery display refrigeration units, which are suspected to contain halocarbons (no tags were identified on the units), located on the ground floor of Building 1A;
- A refrigerator located in the staff lunchroom in the lean-to of Building 4.

6.6.3. Mould

The term “mould” applies to a large group of micro-organisms, which together, with mushrooms and yeast, form the Fungi Kingdom of living matter. Mould organisms grow by degrading nutrients from organic substrates such as wood and wood products, fabrics, foodstuff, plant and soil. The growth of mould necessitates three essential conditions; a suitable temperature, an appropriate substrate and adequate moisture.

Public health and regulatory agencies acknowledge mould growth to be a risk factor for adverse health effects in occupants. Occupants may experience allergic responses such as asthma, headache, respiratory tract irritation, eye irritation, skin irritation, and sinus congestion. More severe health effects are rare and typically limited to individuals with suppressed immune systems, children, elderly people and persons with high occupational exposure.

Based on visual observations, water damage and suspected mould-impacted materials were identified in the following buildings:

- Less than ten (10) square metres of select ceiling tiles and associated debris, sporadically located on the 2nd floor of Building 1.
- Less than ten (10) square metres of select ceiling tiles and associated debris, sporadically located on the 2nd floor of Building 1A.
- Approximately fifteen (15) square metres (total) of drywall sporadically located throughout the Ground Floor of Building 3.

6.6.4. Other Hazardous Materials

The following additional hazardous materials were identified by DST at the four buildings included in this survey:

- Four (4) gas cylinders were noted on the main floor of Building 1. As they were all unlabeled, it is unknown what they contain or how much. As such, they should be assumed to contain hazardous contents until proven otherwise;
- Various metal drums were noted on a flooded, inaccessible portion of the Ground Floor of Building 3. As they were all unlabeled, it is unknown what they contain or how much. As such, they should be assumed to contain hazardous contents until proven otherwise;
- A chemical storage area, containing miscellaneous chemicals assumed to be hazardous, was noted in the garage of Building 4; and
- Various metal drums were outside of the unfinished warehouse of Building 4. As they were all unlabeled, it is unknown what they contain or how much. As such, they should be assumed to contain hazardous contents until proven otherwise.;

6.6.5. Other Designated Substances and Hazardous Materials Not Identified

The following Designated Substances and Hazardous Materials were neither observed, nor suspected of being present, in forms or quantities expected to have an impact on future work at Buildings 1, 1A, 3 and 4:

- Acrylonitrile,
- Arsenic,
- Coke Oven Emissions,
- Ethylene Oxide,
- Isocyanates, and
- Vinyl Chloride.

7.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the site investigation, sampling and analysis, the following Designated Substances and Hazardous Materials are present in forms and quantities expected to have an impact on the upcoming demolition/renovation work at Buildings 1, 1A, 3 and 4:

- Asbestos,
- Benzene,
- Lead,
- Mercury,
- Silica,
- PCBs,
- Halocarbons,
- Mould, and
- Other hazardous materials.

DST's recommendations for each material, which are based upon both regulatory compliance and best practice guidelines, are included in the following sections below.

7.1. Asbestos

The disturbance of ACMs on construction and demolition projects in the province of Ontario is governed by *O. Reg 278/05*, as amended. This regulation classifies all asbestos disturbances as Low Risk (Type 1), Moderate Risk (Type 2), or High Risk (Type 3), each of which has defined precautionary measures. All asbestos materials are subject to specific handling and disposal precautions, and must be removed prior to demolition. The Ontario Ministry of Labour (MoL) must be notified of any project involving removal of more than a minor amount (e.g. typically 1 square metre) of friable asbestos material.

Identified friable ACMs (e.g., fireproofing, grey cement compound on pipe fittings, and Magblock piping insulation) and friable ACM debris (including surfaces and equipment/furniture etc. that may have been contaminated by ACM debris), require a minimum of Type 2 abatement procedures under Ontario Regulation 278/05, as amended, when disturbing/ removing/repairing one (1) square metre or less of the material. Should disturbance be required of more than one (1) square metre of friable ACM, Type 3 abatement procedures are required. It should be noted that the removal of good condition pipe insulation can be completed using Type 2 glovebag procedures, provided the glovebag seal can be maintained throughout the removal process.

Please note: due to the identification of friable asbestos contamination throughout Buildings 1A and 3, access should be restricted and only those with appropriate respiratory protection and protective clothing be permitted entry until appropriate abatement has been completed.

The removal or disturbance of less than one square metre of drywall in which joint-filling compounds that are asbestos-containing material have been used can be completed using Type 1 asbestos procedures. The removal or disturbance of one square metre or more of drywall in which joint-filling compounds that are asbestos-containing material have been used must be completed using a minimum of Type 2 asbestos procedures.

Type 1 work procedures can be used for the removal of non-friable ACMs (caulking and vinyl floor tile), provided that the material can be wetted and removed using only non-powered hand tools. If these conditions cannot be met, then more stringent (e.g., Type 2 or Type 3) procedures are necessary.

The transport and disposal of asbestos waste is governed by *O. Reg. 347/90 – General – Waste Management*, as amended. This regulation requires that asbestos waste be sealed in appropriately labelled, double containers resistant to puncture and tears. The waste must be disposed at a licensed waste disposal site.

The time weight average exposure limit (TWAE) for airborne asbestos is prescribed by Ontario

Regulation 490/09 Designated Substances, as amended. Work procedures and personal protective equipment must be used to ensure that workers are not exposed to airborne asbestos levels that exceed this TWAE.

The following recommendations apply to ACMs and suspected ACMs:

- Appropriate work procedures and precautionary measures must be used, as outlined in *O. Reg. 278/05*, as amended, when performing work that may disturb ACMs or suspected ACMs, including prior to building demolition.
- Disturbance and/or removal of ACMs must be appropriately recorded as part of the building's Asbestos Management Plan.
- If ACMs or suspected ACMs become damaged and worker exposure to the material is likely to occur, the damaged material must be repaired or removed following work procedures outlined in *O. Reg. 278/05*, as amended.
- Disposal of asbestos waste is controlled by the Ontario Environmental Protection Act, *Regulation 347/90, General – Waste Management*, as amended. This regulation requires that asbestos waste be sealed in double containers resistant to puncture and tears, and appropriately labelled. The waste must be disposed at a licensed waste disposal site. Proper notification must be issued to the site representative prior to transportation of waste. The transport of the waste to the disposal site is controlled by the federal *Transportation of Dangerous Goods Act, 1992* (TDGA).

Throughout the survey, DST endeavored to thoroughly evaluate the buildings to identify and quantify hazardous materials present at each building. Despite these efforts, and due to the restrictions posed by the poor condition of the buildings (flooding, water-damaged materials etc.), some ACMs may be concealed and not observed at the time of the survey. As such, should any previously unidentified suspect ACMs be encountered as part of future work, these materials are to be treated as ACMs and handled accordingly, unless sampling proves otherwise.

Materials that have not been analyzed, but are visibly similar to other materials identified as asbestos-containing, must be considered asbestos-containing unless proven otherwise by laboratory analysis.

7.2. Benzene

There are no regulations that specifically govern the disturbance of benzene on construction projects. Industrial processes involving benzene (in this case, removing and disposing of fuels in ASTs) are regulated under “Designated Substances” O.Reg. 490/09, of the *Occupational Health and Safety Act*. The transport of the waste to the disposal site is controlled by the federal Transportation of Dangerous Goods Act (TDGA), as amended.

The time weighted average exposure limit (TWAEEL) for benzene is prescribed by Ontario Regulation 490/09 Designated Substances, as amended. Work procedures and personal protective equipment must be used to ensure that workers are not exposed to benzene levels that exceed this TWAEEL.

7.3. Lead

The Occupational Health and Safety Branch (OHS) of the Ontario MoL have published *Guideline: Lead on Construction Projects*. This document classifies all lead disturbances as Type 1, Type 2a, Type 2b, Type 3a or Type 3b work, and assigns different levels of respiratory protection and work procedures for each classification. Disturbance of lead-containing coatings shall follow the procedures of this guideline document.

Paints and other surface coatings containing elevated concentrations of lead can pose a health risk to humans if ingested or inhaled. Such lead-containing surface coatings are also a risk to the environment with the potential to contaminate soil and groundwater. Surface coatings with elevated lead content can also pose a health risk to workers while completing renovations within the building.

Although the Canada Consumer Product Safety Act's *Surface Coating Materials Regulations SOR/2005-109*, as amended, has set a limit of 90 parts per million (ppm) for surface coating materials, there may be a potential for exposure to high levels of airborne lead depending on the work activities performed that disturb the lead-containing materials, even at low lead content concentrations. Conducting a risk assessment to assess the potential for exposure to lead should be performed to determine the need to follow work procedures such as those in the MoL guideline referenced above.

In the event of conflict between lead precautionary measures and other precautionary measures (e.g. asbestos, silica), the more stringent procedures shall apply.

The time weighted average exposure limit (TWAEEL) for airborne lead is prescribed by *Ontario Regulation 490/09 Designated Substances*, as amended. Work procedures and personal protective equipment must be used to ensure that workers are not exposed to airborne lead levels that exceed this TWAEEL.

The disposal of construction waste containing lead is governed by *O. Reg. 347/90 - General – Waste Management*, as amended. The transport of the waste to the disposal site is controlled by the federal TDGA.

Based on TCLP sample results, three (3) representative paints (yellow paint on exterior cladding of Building 1A and Building 3, as well as white paint on cast-iron drain pipe located in Building 3) must be disposed as hazardous with respect to lead, in accordance with O.Reg. 347/90, as amended.

The grey floor paint observed in Building 1 (insufficient paint chip sample collected) shall be assumed to be leachate hazardous with respect to lead unless future sampling confirms otherwise.

Prior to or during demolition/renovation work, the following additional procedures should be performed with respect to other anticipated lead-containing materials:

- Copper piping and cast iron drain pipe joint caulking can be cut a small distance (e.g. 50 mm) from the joints to avoid direct disturbance of the lead material;
- Ceramic tile glazing can be removed with the use of hand tools as Type 1 work procedure. If these conditions cannot be met, then more stringent (e.g., Type 2 or Type 3) procedures are necessary.

7.4. Mercury

There are no regulations that specifically govern the disturbance of mercury on construction projects. However, the Occupational Health and Safety Division of the Ontario MoL has published *The Safe Handling of Mercury: A Guide for the Construction Industry*. This document provides advice on how to reduce the risk of mercury exposure, and outlines clean-up methods for spills. In the absence of specific legislation for mercury on construction projects, this guideline would serve as a reasonable, peer reviewed standard for work procedures.

When removal of the fluorescent light tubes is required, the tubes should be removed intact from the fixtures and appropriately stored. This prevents worker exposure to mercury vapour, particularly if the tubes were energized shortly before removal. Similarly, other sources of liquid mercury (thermometers) should be removed intact and disposed of as per applicable regulations

The TWael for mercury is prescribed by *Ontario Regulation 490/09 Designated Substances*, as amended. Work procedures and personal protective equipment must be used to ensure that workers are not exposed to airborne mercury levels that exceed this TWael.

Liquid mercury is classified as a hazardous waste under *O. Reg. 347/90, as amended*. The transport of the waste to a disposal site is controlled by *O. Reg. 347/90* and by the federal *TDGA*. It is now common practice to recycle fluorescent light tubes, and other items containing mercury, recovering the component materials, and avoiding the generation of hazardous waste.

7.5. Silica

The Occupational Health and Safety Branch of the Ontario MoL have published *Guideline: Silica on Construction Projects*. This document classifies all silica disturbances as Type 1, Type 2 or Type 3 work, and assigns different levels of respiratory protection and work procedures for each classification. This guideline should be followed during disturbance of silica-containing materials.

As a general rule, it is preferable to use more stringent dust suppression techniques and engineering controls as opposed to relying on respiratory protection to control worker exposure. Respiratory protection should only be relied on as a last resort when dust suppression techniques and engineering controls fail to control worker exposure.

The TWael for airborne silica is prescribed by *Ontario Regulation 490/09 Designated Substances*, as amended. Work procedures and personal protective equipment must be used to ensure that workers are not exposed to airborne silica levels that exceed this exposure limit.

7.6. Other Hazardous Materials

7.6.1. Polychlorinated Biphenyls (PCBs)

Prior to removal or disposal, the PCB content of equipment and/or liquids should be confirmed to determine proper procedures to be followed, unless conservatively assumed to contain PCBs. When the fluorescent light fixtures are taken out of service, these ballasts, as well as other ballasts, should be examined to determine whether they contain PCBs. This can be done by comparing the manufacturer date codes stamped on the ballasts to information contained in the document titled *Identification of Lamp Ballasts Containing PCBs*, published by Environment Canada. Ballasts that contain PCBs must be packaged, transported and disposed of in accordance with all appropriate provincial and federal regulations.

If PCB-containing equipment and/or materials are identified and must be removed, they should be disposed of in accordance with the Canadian Environment Protection Act's PCB Regulations, *O. Reg. 362/90 – Waste Management, PCBs* and *O. Reg. 347, General – Waste Management*, as amended, are regulated under the Environmental Protection Act to regulate the handling, storage and transportation of hazardous substances and waste dangerous goods. The transport of PCB waste to the disposal site is controlled by the federal Transportation of Dangerous Goods Act.

7.6.2. Halocarbons

The handling, transport and disposal of halocarbons is governed by the following:

- Ozone-depleting Substances Regulations, 1998, as amended;
- O.Reg. 463/10, Ozone Depleting Substances and Other Halocarbons; and,
- Federal Halocarbon Regulations, 2003 (FHR).

When suspected halocarbon-containing equipment is taken out of service, the halocarbon refrigerants must be captured and reclaimed by a licensed technician. The presence of halocarbon refrigerants within unit's no longer in service should be verified. If halocarbon refrigerants are found to be present, they must be captured and reclaimed by a licensed technician. Appropriate records of equipment decommissioning must be maintained in accordance with requirements of the FHR.

7.6.3. Mould

Currently, there are no regulations pertaining to mould or other microorganisms on construction projects. Most jurisdictions have issued alerts or bulletins concerning the hazard of mould in indoor environments. The Canadian Construction Association (CCA) published the following document as a response to concerns in the construction industry: CCA 82-2004, "Mould Guidelines for the Canadian Construction Industry", 2004. The Guideline recommends Level I, II and III mould abatement procedures for small (<1 m²), medium (1 m² to 10 m²) and large scale (>10 m²) mould abatement operations that are to be determined by professionals based on the extent and density of mould on site. The removal of suspected mould impacted building materials should follow the above noted guideline. In the case of conflict between mould and other requirements, the more stringent precautionary measures shall apply.

It should be noted that mould remediation is not required in advance of building demolition operations.

7.6.4. Chemicals Storage

The handling and use of chemicals should be undertaken by those with proper training (e.g. Workplace Hazardous Materials Information System, etc.) and adhere to any applicable guidelines and/or regulations. Prior to renovation operations, they should be disposed of appropriately.

The transport and disposal of chemical waste is governed by O. Reg. 347/90 – *General – Waste Management*, as amended.

8.0 CLOSURE

A Limitations of Report section, which forms an integral part of this report, is attached.

We trust that the information contained herein meets your needs. Should you have any questions or comments, please do not hesitate to contact us.

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LIMITATIONS OF REPORT

This report is intended for client use only. Any use of this document by a third party, or any reliance on or decisions made based on the findings described in this report, are the sole responsibility of such third parties, and DST Consulting Engineers Inc. accepts no responsibility for damages, suffered by any third party as a result of decisions made or actions conducted based on this report. No other warranties are implied or expressed.

The data, conclusions and recommendations which are presented in this report, and the quality thereof, are based on a scope of work authorized by the client. The sampling program included representative bulk sampling in select representative areas for laboratory analysis. There is a practical limitation on the number of samples that can be collected in a building. This requires the investigator to extrapolate observations and analytical results between sample locations. The uncertainty, and inherent risk, associated with this necessity increases with the distance between sampling locations. Note, however, that no scope of work, no matter how exhaustive, can guarantee to identify all contaminants. This report therefore cannot warranty that all building conditions are represented by those identified at specific locations.

Recommendations, when included, are made in good faith and are based on several successful experiences.

DST is not in a position to evaluate the health risks associated with exposure to the mould referenced in this report. Since human reactions to mould exposure vary widely amongst individuals, and specific segments of the population are generally recognized to be more susceptible than others, an evaluation of health risks can only be made on an individual basis and even then, only by a licensed medical practitioner equipped with knowledge of the individual's medical history.

Any use of this report by the client and any other party is contingent upon their understanding and acceptance of the following condition:

“Mould is a naturally occurring substance and regardless of the results of an assessment or how completely it is removed, it could reoccur.”

Regardless of the effectiveness of any remedial actions, mould growth may occur/reoccur anywhere within a building at any time, should conditions be favourable. It is therefore essential to maintain buildings, surfaces, appliances and furnishings under conditions which are not favourable to mould incubation and growth (warm, dry, and clean). The scope of services provided by DST for this assignment did not include a detailed evaluation of the thermal and moisture management characteristics of the exterior wall assembly, or a detailed building envelope investigation to ascertain every potential root cause of the water infiltration that created an environment favourable to mould proliferation. Similarly, DST has not been engaged to provide detailed designs for the reinstatement of building finishes or for improvements to the building envelope.

Note also that standards, guidelines and practices related to DST's scope of work may change with time. Those which were applied at the time of this program may be obsolete or unacceptable at a later date.

Any comments given in this report on potential remediation problems and possible methods are intended only for the guidance of the designer. The scope of work may not be sufficient to

determine all of the factors that may affect construction, clean-up methods and/or costs. Contractors bidding on this project or undertaking clean-ups should, therefore, make their own interpretation of the factual information presented and draw their own conclusions as to how the conditions may affect their work.

Any results from an analytical laboratory reported herein have been carried out by others, and DST Consulting Engineers Inc. cannot warranty their accuracy. Similarly, DST cannot warranty the accuracy of information supplied by the client.

APPENDIX A

Select Photographs

Representative Photographs



Photo 1 : Exterior view of Building 1 with yellow/grey paint on metal cladding (DST 2006, 353-01-LP-01). This paint was not identified as leachate hazardous with respect to lead.



Photo 2: View of 2nd floor of Building 1. Asbestos-containing grey caulking located around all windows (DST Sample 29911-1-01A) and grey floor paint (DST Sample 29911-1-LP-02).



Photo 3: View of asbestos-containing black tar located on roof top of Building 1 (DST Sample 29911-1-03A).



Photo 4: View of Building 1A with lead-containing yellow paint on metal cladding (DST 2006, 353-1A-LP-01). This paint has been identified as leachate hazardous with respect to lead.



Photo 5: View of asbestos-containing grey cement compound on pipe fittings (DST Sample 29911-1A-01A) and old grocery display refrigeration units, located in Building 1A.



Photo 6: Asbestos-containing beige 9"x9" vinyl floor tiles (DST Sample 29911-1A-02A), observed on the main floor of Building 1A). The associated mastic was found to not contain asbestos.



Photo 7: View of asbestos-containing grey window caulking (DST Sample 29911-1A-03A) observed around all windows throughout Building 1A.



Photo 8: Asbestos-containing white pre-formed pipe insulation (Magblock) (DST Sample 29911-1A-04A), observed in stairwell of Building 1A.



Photo 9: Asbestos-containing grey caulking (DST Sample 29911-1A-05A), noted between wood panels and the metal wall, on the 2nd floor of Building 1A.



Photo 10: View of Building 3 with lead-containing yellow/Off-White paint on metal cladding (DST 2006, 353-3-LP-01). This paint has been identified as leachate hazardous with respect to lead.



Photo 11: View of asbestos-containing fireproofing (red arrow, DST Sample 29911-3-02A), pipe fittings (blue arrow, DST Sample 29911-3-03A), and mould-impacted drywall (yellow arrow) on the main floor at Building 3.



Photo 12: View of lead-containing blue paint (DST Sample 29911-3-LP-01, non-hazardous for disposal) and asbestos-containing fireproofing debris, observed on the Ground Floor of Building 3.



Photo 13: View of asbestos-containing blue 9"x9" vinyl floor tiles (DST Sample 29911-3-01A), observed throughout Building 3.



Photo 14: View of Building 4 with asbestos-containing Transite exterior wall paneling (DST Sample 29911-4-01A). One (1) 1,000-gallon diesel, one (1) 500-gallon gasoline and one (1) 250-gallon red re-fueling tank are present at the building's exterior.



Photo 15: View of asbestos-containing grey cement compound on pipe fittings (DST 2006 Sample 353-04-MI-01) in a small workshop, observed throughout Building 4.



Photo 16: Asbestos-containing caulking (DST Sample 29911-4-04A) observed throughout the exterior of Building 4, between Transite paneling.



Photo 17: Asbestos-containing grey caulking (DST Sample 29911-4-05A) observed on the exterior windows throughout Building 4.

APPENDIX B

Laboratory Certificates of Analysis – Bulk Asbestos, Lead, and Lead TCLP Samples

Certificate of Analysis

DST Consulting Engineers Inc. (Ottawa)

203-2150 Thurston Dr.
Ottawa, ON K1G 5T9
Attn: Gary Zhao

Client PO:
Project: GV NO 029911
Custody:

Report Date: 17-Jul-2017
Order Date: 13-Jul-2017

Order #: 1728584

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Paracel ID	Client ID
1728584-01	29911-1-01A
1728584-02	29911-1-01B
1728584-03	29911-1-01C
1728584-04	29911-1-02A
1728584-05	29911-1-02B
1728584-06	29911-1-02C
1728584-07	29911-1-03A
1728584-08	29911-1-03B
1728584-09	29911-1-03C
1728584-10	29911-1A-01A
1728584-11	29911-1A-01B
1728584-12	29911-1A-01C
1728584-13	29911-1A-02A (VFT)
1728584-14	29911-1A-02B (VFT)
1728584-15	29911-1A-02C (VFT)
1728584-16	29911-1A-02A (Mastic)
1728584-17	29911-1A-02B (Mastic)
1728584-18	29911-1A-02C (Mastic)
1728584-19	29911-1A-03A
1728584-20	29911-1A-03B
1728584-21	29911-1A-03C
1728584-22	29911-1A-04A
1728584-23	29911-1A-04B
1728584-24	29911-1A-04C
1728584-25	29911-1A-05A
1728584-26	29911-1A-05B

Approved By:



Heather S.H. McGregor, BSc

Laboratory Director - Microbiology

Certificate of Analysis

Client: DST Consulting Engineers Inc. (Ottawa)

Report Date: 17-Jul-2017

Order Date: 13-Jul-2017

Client PO:

Project Description: GV NO 029911

1728584-27	29911-1A-05C
1728584-28	29911-3-01A (VFT)
1728584-29	29911-3-01B (VFT)
1728584-30	29911-3-01C (VFT)
1728584-31	29911-3-01A (Mastic)
1728584-32	29911-3-01B (Mastic)
1728584-33	29911-3-01C (Mastic)
1728584-34	29911-3-02A
1728584-35	29911-3-02B
1728584-36	29911-3-02C
1728584-37	29911-3-02D
1728584-38	29911-3-02E
1728584-39	29911-3-02F
1728584-40	29911-3-02G
1728584-41	29911-3-03A
1728584-42	29911-3-03B
1728584-43	29911-3-03C
1728584-44	29911-3-04A (Grey)
1728584-45	29911-3-04B (Grey)
1728584-46	29911-3-04C (Grey)
1728584-47	29911-3-04A (Beige)
1728584-48	29911-3-04B (Beige)
1728584-49	29911-3-04C (Beige)
1728584-50	29911-3-05A (White)
1728584-51	29911-3-05B (White)
1728584-52	29911-3-05C (White)
1728584-53	29911-3-05D (White)
1728584-54	29911-3-05E (White)
1728584-55	29911-3-05A (Grey)
1728584-56	29911-3-05B (Grey)
1728584-57	29911-3-05C (Grey)
1728584-58	29911-3-05D (Grey)
1728584-59	29911-3-05E (Grey)
1728584-60	29911-4-01A
1728584-61	29911-4-01B
1728584-62	29911-4-01C
1728584-63	29911-4-02A
1728584-64	29911-4-02B
1728584-65	29911-4-02C
1728584-66	29911-4-03A
1728584-67	29911-4-03B
1728584-68	29911-4-03C
1728584-69	29911-4-04A
1728584-70	29911-4-04B

Certificate of Analysis

Client: DST Consulting Engineers Inc. (Ottawa)

Report Date: 17-Jul-2017

Order Date: 13-Jul-2017

Client PO:

Project Description: GV NO 029911

1728584-71	29911-4-04C
1728584-72	29911-4-05A
1728584-73	29911-4-05B
1728584-74	29911-4-05C
1728584-75	29911-4-06A
1728584-76	29911-4-06B
1728584-77	29911-4-06C
1728584-78	29911-4-06D
1728584-79	29911-4-06E
1728584-80	29911-4-06F
1728584-81	29911-4-06G

Certificate of Analysis

Report Date: 17-Jul-2017

Client: **DST Consulting Engineers Inc. (Ottawa)**

Order Date: 13-Jul-2017

Client PO:

Project Description: **GV NO 029911**

Asbestos, PLM Visual Estimation **MDL - 0.5%**

<i>Paracel I.D.</i>	<i>Sample Date</i>	<i>Layers Analyzed</i>	<i>Colour</i>	<i>Description</i>	<i>Asbestos Detected:</i>	<i>Material Identification</i>	<i>% Content</i>
1728584-01	10-Jul-17	sample homogenized	Grey	Caulking	Yes	Client ID: 29911-1-01A	
						Chrysotile	2
						Non-Fibers	98
1728584-02	10-Jul-17					Client ID: 29911-1-01B	
						not analyzed	
1728584-03	10-Jul-17					Client ID: 29911-1-01C	
						not analyzed	
1728584-04	10-Jul-17	sample homogenized	Black	Tar	Yes	Client ID: 29911-1-02A	
						Chrysotile	15
						Non-Fibers	85
1728584-05	10-Jul-17					Client ID: 29911-1-02B	
						not analyzed	
1728584-06	10-Jul-17					Client ID: 29911-1-02C	
						not analyzed	
1728584-07	10-Jul-17	sample homogenized	Grey	Caulking	Yes	Client ID: 29911-1-03A	
						Chrysotile	5
						Non-Fibers	95
1728584-08	10-Jul-17					Client ID: 29911-1-03B	
						not analyzed	
1728584-09	10-Jul-17					Client ID: 29911-1-03C	
						not analyzed	
1728584-10	10-Jul-17	sample homogenized	Grey	Parging	Yes	Client ID: 29911-1A-01A	
						Chrysotile	65
						Non-Fibers	35
1728584-11	10-Jul-17					Client ID: 29911-1A-01B	
						not analyzed	
1728584-12	10-Jul-17					Client ID: 29911-1A-01C	
						not analyzed	
1728584-13	10-Jul-17	sample homogenized	Tan	Floor Tile	Yes	Client ID: 29911-1A-02A (VFT)	
						Chrysotile	1
						Non-Fibers	99
1728584-14	10-Jul-17					Client ID: 29911-1A-02B (VFT)	
						not analyzed	
1728584-15	10-Jul-17					Client ID: 29911-1A-02C (VFT)	
						not analyzed	

Certificate of Analysis

Report Date: 17-Jul-2017

Client: **DST Consulting Engineers Inc. (Ottawa)**

Order Date: 13-Jul-2017

Client PO:

Project Description: **GV NO 029911**

Asbestos, PLM Visual Estimation **MDL - 0.5%**

<i>Paracel I.D.</i>	<i>Sample Date</i>	<i>Layers Analyzed</i>	<i>Colour</i>	<i>Description</i>	<i>Asbestos Detected:</i>	<i>Material Identification</i>	<i>% Content</i>
1728584-16	10-Jul-17	sample homogenized	Black	Mastic	No	Client ID: 29911-1A-02A (Mastic)	
						Non-Fibers	100
1728584-17	10-Jul-17	sample homogenized	Black	Mastic	No	Client ID: 29911-1A-02B (Mastic)	
						Non-Fibers	100
1728584-18	10-Jul-17	sample homogenized	Black	Mastic	No	Client ID: 29911-1A-02C (Mastic)	
						Non-Fibers	100
1728584-19	10-Jul-17	sample homogenized	Grey	Caulking	Yes	Client ID: 29911-1A-03A	
						Chrysotile	2
						Non-Fibers	98
1728584-20	10-Jul-17					Client ID: 29911-1A-03B	
						not analyzed	
1728584-21	10-Jul-17					Client ID: 29911-1A-03C	
						not analyzed	
1728584-22	10-Jul-17	sample homogenized	White	Insulation	Yes	Client ID: 29911-1A-04A	
						Chrysotile	30
						Non-Fibers	70
1728584-23	10-Jul-17					Client ID: 29911-1A-04B	
						not analyzed	
1728584-24	10-Jul-17					Client ID: 29911-1A-04C	
						not analyzed	
1728584-25	10-Jul-17	sample homogenized	Grey	Caulking	Yes	Client ID: 29911-1A-05A	
						Chrysotile	15
						Non-Fibers	85
1728584-26	10-Jul-17					Client ID: 29911-1A-05B	
						not analyzed	
1728584-27	10-Jul-17					Client ID: 29911-1A-05C	
						not analyzed	
1728584-28	10-Jul-17	sample homogenized	Grey	Floor Tile	Yes	Client ID: 29911-3-01A (VFT)	
						Chrysotile	2
						Non-Fibers	98
1728584-29	10-Jul-17					Client ID: 29911-3-01B (VFT)	
						not analyzed	
1728584-30	10-Jul-17					Client ID: 29911-3-01C (VFT)	
						not analyzed	

Certificate of Analysis

Client: **DST Consulting Engineers Inc. (Ottawa)**

Client PO:

Report Date: 17-Jul-2017

Order Date: 13-Jul-2017

Project Description: **GV NO 029911**

Asbestos, PLM Visual Estimation **MDL - 0.5%**

<i>Paracel I.D.</i>	<i>Sample Date</i>	<i>Layers Analyzed</i>	<i>Colour</i>	<i>Description</i>	<i>Asbestos Detected:</i>	<i>Material Identification</i>	<i>% Content</i>
1728584-31	10-Jul-17					Client ID: 29911-3-01A (Mastic) [Z-01] not analyzed	
1728584-32	10-Jul-17					Client ID: 29911-3-01B (Mastic) [Z-01] not analyzed	
1728584-33	10-Jul-17					Client ID: 29911-3-01C (Mastic) [Z-01] not analyzed	
1728584-34	10-Jul-17	sample homogenized	Grey	Fireproofing	Yes	Client ID: 29911-3-02A Chrysotile MMVF Non-Fibers	 10 70 20
1728584-35	10-Jul-17					Client ID: 29911-3-02B not analyzed	
1728584-36	10-Jul-17					Client ID: 29911-3-02C not analyzed	
1728584-37	10-Jul-17					Client ID: 29911-3-02D not analyzed	
1728584-38	10-Jul-17					Client ID: 29911-3-02E not analyzed	
1728584-39	10-Jul-17					Client ID: 29911-3-02F not analyzed	
1728584-40	10-Jul-17					Client ID: 29911-3-02G not analyzed	
1728584-41	10-Jul-17	sample homogenized	Grey	Parging	Yes	Client ID: 29911-3-03A Chrysotile Non-Fibers	 65 35
1728584-42	10-Jul-17					Client ID: 29911-3-03B not analyzed	
1728584-43	10-Jul-17					Client ID: 29911-3-03C not analyzed	
1728584-44	10-Jul-17	sample homogenized	Grey	Drywall Joint Compound	Yes	Client ID: 29911-3-04A (Grey) Chrysotile Non-Fibers	 2 98
1728584-45	10-Jul-17					Client ID: 29911-3-04B (Grey) not analyzed	

Certificate of Analysis

Report Date: 17-Jul-2017

Client: **DST Consulting Engineers Inc. (Ottawa)**

Order Date: 13-Jul-2017

Client PO:

Project Description: **GV NO 029911**

Asbestos, PLM Visual Estimation **MDL - 0.5%**

<i>Paracel I.D.</i>	<i>Sample Date</i>	<i>Layers Analyzed</i>	<i>Colour</i>	<i>Description</i>	<i>Asbestos Detected:</i>	<i>Material Identification</i>	<i>% Content</i>
1728584-46	10-Jul-17					Client ID: 29911-3-04C (Grey) not analyzed	
1728584-47	10-Jul-17	sample homogenized	Tan	Drywall Joint Compound	Yes	Client ID: 29911-3-04A (Beige) Chrysotile Non-Fibers	2 98
1728584-48	10-Jul-17					Client ID: 29911-3-04B (Beige) not analyzed	
1728584-49	10-Jul-17					Client ID: 29911-3-04C (Beige) not analyzed	
1728584-50	10-Jul-17	sample homogenized	White	Plaster	No	Client ID: 29911-3-05A (White) Non-Fibers	100
1728584-51	10-Jul-17	sample homogenized	White	Plaster	No	Client ID: 29911-3-05B (White) Non-Fibers	100
1728584-52	10-Jul-17	sample homogenized	White	Plaster	No	Client ID: 29911-3-05C (White) Non-Fibers	100
1728584-53	10-Jul-17	sample homogenized	White	Plaster	No	Client ID: 29911-3-05D (White) Non-Fibers	100
1728584-54	10-Jul-17	sample homogenized	White	Plaster	No	Client ID: 29911-3-05E (White) Non-Fibers	100
1728584-55	10-Jul-17	sample homogenized	Grey	Plaster	No	Client ID: 29911-3-05A (Grey) Non-Fibers	100
1728584-56	10-Jul-17	sample homogenized	Grey	Plaster	No	Client ID: 29911-3-05B (Grey) Non-Fibers	100
1728584-57	10-Jul-17	sample homogenized	Grey	Plaster	No	Client ID: 29911-3-05C (Grey) Non-Fibers	100
1728584-58	10-Jul-17	sample homogenized	Grey	Plaster	No	Client ID: 29911-3-05D (Grey) Non-Fibers	100
1728584-59	10-Jul-17	sample homogenized	Grey	Plaster	No	Client ID: 29911-3-05E (Grey) Non-Fibers	100
1728584-60	10-Jul-17	sample homogenized	Grey	Transite	Yes	Client ID: 29911-4-01A Chrysotile Non-Fibers	20 80
1728584-61	10-Jul-17					Client ID: 29911-4-01B not analyzed	

Certificate of Analysis

Client: **DST Consulting Engineers Inc. (Ottawa)**

Client PO:

Report Date: 17-Jul-2017

Order Date: 13-Jul-2017

Project Description: **GV NO 029911**

Asbestos, PLM Visual Estimation **MDL - 0.5%**

<i>Paracel I.D.</i>	<i>Sample Date</i>	<i>Layers Analyzed</i>	<i>Colour</i>	<i>Description</i>	<i>Asbestos Detected:</i>	<i>Material Identification</i>	<i>% Content</i>
1728584-62	10-Jul-17					Client ID: 29911-4-01C not analyzed	
1728584-63	10-Jul-17	sample homogenized	White	Grout	No	Client ID: 29911-4-02A Non-Fibers	100
1728584-64	10-Jul-17	sample homogenized	White	Grout	No	Client ID: 29911-4-02B Non-Fibers	100
1728584-65	10-Jul-17	sample homogenized	White	Grout	No	Client ID: 29911-4-02C Non-Fibers	100
1728584-66	10-Jul-17	sample homogenized	Grey	Parging Cement	No	Client ID: 29911-4-03A Non-Fibers	100
1728584-67	10-Jul-17	sample homogenized	Grey	Parging Cement	No	Client ID: 29911-4-03B Non-Fibers	100
1728584-68	10-Jul-17	sample homogenized	Grey	Parging Cement	No	Client ID: 29911-4-03C Non-Fibers	100
1728584-69	10-Jul-17	sample homogenized	Grey	Caulking	Yes	Client ID: 29911-4-04A Chrysotile Non-Fibers	5 95
1728584-70	10-Jul-17					Client ID: 29911-4-04B not analyzed	
1728584-71	10-Jul-17					Client ID: 29911-4-04C not analyzed	
1728584-72	10-Jul-17	sample homogenized	Grey	Caulking	Yes	Client ID: 29911-4-05A Chrysotile Non-Fibers	2 98
1728584-73	10-Jul-17					Client ID: 29911-4-05B not analyzed	
1728584-74	10-Jul-17					Client ID: 29911-4-05C not analyzed	
1728584-75	10-Jul-17	sample homogenized	Grey	Mortar	No	Client ID: 29911-4-06A Non-Fibers	100
1728584-76	10-Jul-17	sample homogenized	Grey	Mortar	No	Client ID: 29911-4-06B Non-Fibers	100
1728584-77	10-Jul-17	sample homogenized	Grey	Mortar	No	Client ID: 29911-4-06C Non-Fibers	100

Certificate of Analysis

Client: DST Consulting Engineers Inc. (Ottawa)

Client PO:

Report Date: 17-Jul-2017

Order Date: 13-Jul-2017

Project Description: GV NO 029911

Asbestos, PLM Visual Estimation **MDL - 0.5%**

Paracel I.D.	Sample Date	Layers Analyzed	Colour	Description	Asbestos Detected:	Material Identification	% Content
1728584-78	10-Jul-17	sample homogenized	Grey	Mastic	No	Client ID: 29911-4-06D Non-Fibers	100
1728584-79	10-Jul-17	sample homogenized	Grey	Mortar	No	Client ID: 29911-4-06E Non-Fibers	100
1728584-80	10-Jul-17	sample homogenized	Grey	Mortar	No	Client ID: 29911-4-06F Non-Fibers	100
1728584-81	10-Jul-17	sample homogenized	Grey	Mortar	No	Client ID: 29911-4-06G Non-Fibers	100

* MMVF: Man Made Vitreous Fibers: Fiberglass, Mineral Wool, Rockwool, Glasswool

** Analytes in bold indicate asbestos mineral content.

Analysis Summary Table

Analysis	Method Reference/Description	Lab Location	NVLAP Lab Code	*	Analysis Date
Asbestos, PLM Visual Estimation	by EPA 600/R-93/116	2 - Ottawa West Lab	200812-0		17-Jul-17

* Reference to the NVLAP term does not permit the user of this report to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

Qualifier Notes

Sample Qualifiers :

Z-01: Insufficient sample for analysis.

Work Order Revisions / Comments

None

Certificate of Analysis

DST Consulting Engineers Inc. (Ottawa)

203-2150 Thurston Dr.
Ottawa, ON K1G 5T9
Attn: Andree Young

Client PO:
Project: GV NO 029911
Custody:

Report Date: 17-Jul-2017
Order Date: 13-Jul-2017

Order #: 1728406

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Paracel ID	Client ID
1728406-01	29911-1-LP01
1728406-02	29911-3-LP01
1728406-03	29911-3-LP02

Approved By:



Dale Robertson, BSc
Laboratory Director

Any use of these results implies your agreement that our total liability in connection with this work, however arising shall be limited to the amount paid by you for this work, and that our employees or agents shall not under circumstances be liable to you in connection with this work

Certificate of Analysis

Client: DST Consulting Engineers Inc. (Ottawa)

Client PO:

Report Date: 17-Jul-2017

Order Date: 13-Jul-2017

Project Description: GV NO 029911

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Metals, ICP-OES	based on MOE E3470, ICP-OES	14-Jul-17	14-Jul-17

Sample Data Revisions

None

Work Order Revisions/Comments:

None

Other Report Notes:

n/a: not applicable

ND: Not Detected

MDL: Method Detection Limit

Source Result: Data used as source for matrix and duplicate samples

%REC: Percent recovery.

RPD: Relative percent difference.

Certificate of Analysis

Report Date: 17-Jul-2017

Client: DST Consulting Engineers Inc. (Ottawa)

Order Date: 13-Jul-2017

Client PO:

Project Description: GV NO 029911

Sample Results

Lead				Matrix: Paint
				Sample Date: 10-Jul-17
Paracel ID	Client ID	Units	MDL	Result
1728406-01	29911-1-LP01	ppm	20	1370
1728406-02	29911-3-LP01	ppm	20	3150
1728406-03	29911-3-LP02	ppm	20	5800

Laboratory Internal QA/QC

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Matrix Blank									
Lead	ND	20	ppm						
Matrix Duplicate									
Lead	ND	20	ppm	ND			0.0	30	
Matrix Spike									
Lead	250		ug/L	ND	97.5	70-130			

Certificate of Analysis

DST Consulting Engineers Inc. (Ottawa)

203-2150 Thurston Dr.
Ottawa, ON K1G 5T9
Attn: Andree Young

Client PO:
Project: GV NO 029911
Custody:

Report Date: 17-Jul-2017
Order Date: 13-Jul-2017

Order #: 1728407

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Paracel ID	Client ID
1728407-01	29911-4-PB01

Approved By:



Dale Robertson, BSc
Laboratory Director

Any use of these results implies your agreement that our total liability in connection with this work, however arising shall be limited to the amount paid by you for this work, and that our employees or agents shall not under circumstances be liable to you in connection with this work

Certificate of Analysis

Client: DST Consulting Engineers Inc. (Ottawa)

Client PO:

Report Date: 17-Jul-2017

Order Date: 13-Jul-2017

Project Description: GV NO 029911

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Metals, ICP-OES	based on MOE E3470, ICP-OES	17-Jul-17	17-Jul-17

Sample Data Revisions

None

Work Order Revisions/Comments:

None

Other Report Notes:

n/a: not applicable

ND: Not Detected

MDL: Method Detection Limit

Source Result: Data used as source for matrix and duplicate samples

%REC: Percent recovery.

RPD: Relative percent difference.

Soil results are reported on a dry weight basis when the units are denoted with 'dry'.

Certificate of Analysis

Client: DST Consulting Engineers Inc. (Ottawa)

Client PO:

Report Date: 17-Jul-2017

Order Date: 13-Jul-2017

Project Description: GV NO 029911

Sample Results

Lead				Matrix: Other
				Sample Date: 10-Jul-17
Paracel ID	Client ID	Units	MDL	Result
1728407-01	29911-4-PB01	ppm	1.0	8.5

Laboratory Internal QA/QC

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Matrix Blank									
Lead	ND	1.0	ppm						
Matrix Duplicate									
Lead	9.84	1.0	ppm	12.1			20.3	30	
Matrix Spike									
Lead	424		ug/L	241	73.0	70-130			

Certificate of Analysis

DST Consulting Engineers Inc. (Ottawa)

203-2150 Thurston Dr.
Ottawa, ON K1G 5T9
Attn: Andree Young

Client PO:
Project: GV NO 029911
Custody:

Report Date: 19-Jul-2017
Order Date: 17-Jul-2017

Order #: 1729095

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Paracel ID	Client ID
1729095-01	29911-TCLP-1-01
1729095-03	29911-TCLP-1A-01
1729095-04	29911-TCLP-3-01
1729095-05	29911-TCLP-3-02
1729095-06	29911-TCLP-3-03

Approved By:



Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Client: DST Consulting Engineers Inc. (Ottawa)

Client PO:

Report Date: 19-Jul-2017

Order Date: 17-Jul-2017

Project Description: GV NO 029911

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Metals, ICP-MS	EPA 6020 - Digestion - ICP-MS	19-Jul-17	19-Jul-17
Solids, %	Gravimetric, calculation	19-Jul-17	19-Jul-17

Certificate of Analysis

Report Date: 19-Jul-2017

Client: DST Consulting Engineers Inc. (Ottawa)

Order Date: 17-Jul-2017

Client PO:

Project Description: GV NO 029911

Client ID:	29911-TCLP-1-01	29911-TCLP-1A-01	29911-TCLP-3-01	29911-TCLP-3-02
Sample Date:	10-Jul-17	10-Jul-17	10-Jul-17	10-Jul-17
Sample ID:	1729095-01	1729095-03	1729095-04	1729095-05
MDL/Units	Paint	Paint	Paint	Paint

Physical Characteristics

% Solids	0.1 % by Wt.	100	100	100	100
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EPA 1311 - TCLP Leachate Inorganics

Lead	0.05 mg/L	1.97	11.6	21.4	1.08
Client ID:	29911-TCLP-3-03	-	-	-	-
Sample Date:	10-Jul-17	-	-	-	-
Sample ID:	1729095-06	-	-	-	-
MDL/Units	Paint	-	-	-	-

Physical Characteristics

% Solids	0.1 % by Wt.	100	-	-	-
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EPA 1311 - TCLP Leachate Inorganics

Lead	0.05 mg/L	22.0	-	-	-
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Certificate of Analysis

Report Date: 19-Jul-2017

Client: DST Consulting Engineers Inc. (Ottawa)

Order Date: 17-Jul-2017

Client PO:

Project Description: GV NO 029911

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
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EPA 1311 - TCLP Leachate Inorganics

Lead	ND	0.05	mg/L						
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Certificate of Analysis

Report Date: 19-Jul-2017

Client: DST Consulting Engineers Inc. (Ottawa)

Order Date: 17-Jul-2017

Client PO:

Project Description: GV NO 029911

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
EPA 1311 - TCLP Leachate Inorganics									
Lead	1.74	0.05	mg/L	1.62			7.3	32	
Physical Characteristics									
% Solids	98.0	0.1	% by Wt.	97.5			0.5	25	

Certificate of Analysis

Report Date: 19-Jul-2017

Client: DST Consulting Engineers Inc. (Ottawa)

Order Date: 17-Jul-2017

Client PO:

Project Description: GV NO 029911

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
EPA 1311 - TCLP Leachate Inorganics									
Lead	47.9		ug/L		95.7	77-126			

Certificate of Analysis

Client: DST Consulting Engineers Inc. (Ottawa)

Client PO:

Report Date: 19-Jul-2017

Order Date: 17-Jul-2017

Project Description: GV NO 029911

Qualifier Notes:

None

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable

ND: Not Detected

MDL: Method Detection Limit

Source Result: Data used as source for matrix and duplicate samples

%REC: Percent recovery.

RPD: Relative percent difference.

Soil results are reported on a dry weight basis when the units are denoted with 'dry'.

Where %Solids is reported, moisture loss includes the loss of volatile hydrocarbons.

APPENDIX C

Room-by-room ACM Database

APPENDIX C - ASBESTOS-CONTAINING MATERIAL INVENTORY - BUILDINGS 1, 1A, 3 & 4, MOOSONEE FORMER DND RADAR BASE

Location			System	Description	Approximate Quantity		Condition	Access	Friability	Action	Priority	Additional Notes
Building	Floor	General Area			num	unit						
BUILDING 1												
Building 1	Throughout	Windows	Window caulking	Grey caulking	32	LM	Good	B	Non-Friable	7	Low	
Building 1	Exterior	Walls	Wall joints	Grey caulking	50	LM	Good	B	Non-Friable	7	Low	
Building 1	Exterior	Roof	Roofing material	Black tar	175	SM	Good	B	Non-Friable	7	Low	
BUILDING 1A												
Building 1A	Ground Floor	Open storage	Piping	Grey cement compound on pipe fittings	40	EA	Good	B	Friable	7	Low	
Building 1A	Ground Floor	Open storage	Domestic piping	Grey cement compound on pipe fittings	10	EA	Poor	B	Friable	5	Moderate	
Building 1A	Ground Floor	Open storage, various surfaces	Domestic piping	Grey cement compound debris	60	SM	Debris	A	Friable	1	High	Intermixed with non-asbestos solid waste
Building 1A	Ground/First	Stairwell, along wall	Piping	Magblock pipe insulation	1.5	LM	Good	A	Friable	7	Low	
Building 1A	Ground/ First	Stairwell, along wall	Domestic piping	Magblock pipe insulation	1	LM	Poor	A	Friable	1	High	No associated debris observed
Building 1A	First Floor	Floor	Floor Tiles	9"x9", beige	25	SM	Poor	A	Non-Friable	3	High	Mastic layer is non-asbestos
Building 1A	First Floor	Walls	Joint between a wood panel and metal wall	Grey caulking	3	LM	Good	B	Non-Friable	7	Low	
Building 1A	Throughout	Windows	Window caulking	Grey caulking	32	LM	Good	B	Non-Friable	7	Low	
Building 1A	Exterior	Roof	Roofing material	Black tar	175	SM	Good	B	Non-Friable	7	Low	No access, assumed ACM
BUILDING 3												
Building 3	Ground Floor	Floor	Floor Tiles	9"x9", blue	6	SM	Good	A	Non-Friable	7	Low	
Building 3	Ground Floor	Throughout	Ceiling	Spray-applied Fireproofing	400	SM	Good	C (e)	Friable	7	Low	
Building 3	Ground Floor	Floor	Debris	Fireproofing	400	SM	Debris	A	Friable	1	High	
Building 3	Ground Floor	Throughout	Piping	Grey cement compound on pipe fittings	50	EA	Good	C (e)	Friable	7	Low	
Building 3	Second Floor	Floor	Floor Tiles	9"x9", blue	54	SM	Good	A	Non-Friable	7	Low	
Building 3	Second Floor	Stairwell, along wall	Drywall	Drywall Joint Compound	6	SM	Good	A	Non-Friable	7	Low	
Building 3	Second Floor	Throughout	Piping	Grey cement compound on pipe fittings	40	EA	Good	C (e)	Friable	7	Low	
Building 3	Third Floor	Floor	Floor Tiles	9"x9", blue	400	SM	Good	A	Non-Friable	7	Low	
Building 3	Third Floor	Throughout	Piping	Grey cement compound on pipe fittings	10	EA	Good	C (e)	Friable	7	Low	
Building 3	Fourth Floor	Floor	Floor Tiles	9"x9", blue	400	SM	Good	A	Non-Friable	7	Low	
Building 3	Fourth Floor	Throughout	Ceiling	Spray-applied Fireproofing	400	SM	Good	C (e)	Friable	7	Low	
Building 3	Fourth Floor	Floor	Debris	Fireproofing	400	SM	Debris	A	Friable	1	High	
Building 3	Throughout	Throughout	Cast-iron drain pipe	Caulking	40	LM	Good	B	Non-Friable	7	Low	Assumed ACM
Building 3	Exterior	Roof	Roofing material	Black tar	175	SM	Good	B	Non-Friable	7	Low	No access, assumed ACM

APPENDIX C - ASBESTOS-CONTAINING MATERIAL INVENTORY - BUILDINGS 1, 1A, 3 & 4, MOOSONEE FORMER DND RADAR BASE

Location			System	Description	Approximate Quantity		Condition	Access	Friability	Action	Priority	Additional Notes
Building	Floor	General Area			num	unit						
BUILDING 4												
Building 4	Ground Floor	Small Workshop	Piping	Grey cement compound on pipe fittings	5	EA	Good	C (e)	Friable	7	Low	
Building 4	Ground Floor	Hallway	Piping	Grey cement compound on pipe fittings	6	EA	Good	C (e)	Friable	7	Low	
Building 4	Ground Floor	Unfinished Warehouse	Piping	Grey cement compound on pipe fittings	20	EA	Good	C (e)	Friable	7	Low	
Building 4	Ground Floor	Unfinished Warehouse	Cast-iron drain pipe	Caulking	20	LM	Good	C (e)	Non-Friable	7	Low	Assumed ACM
Building 4	Exterior	Walls	Walls	Transite Panels	2,000	SM	Good	A	Non-Friable	7	Low	
Building 4	Exterior	Walls	Walls	Transite	20	SM	Fair	A	Non-Friable	3	High	
Building 4	Exterior	Walls	Wall joints	Grey Caulking	2,000	LM	Good	A	Non-Friable	7	Low	
Building 4	Exterior	Windows	Window caulking	Grey Caulking	60	LM	Good	A	Non-Friable	7	Low	
Building 4	Exterior	Roof	Roofing material	Black tar	2,000	SM	Good	B	Non-Friable	7	Low	No access, assumed ACM
Legend												
System/Description		Condition and Access		Priority								
LM	- linear meters	Good	- 'Little or no perceived risk' associated with material in its present condition	High	- 1 or 2 action level							
ea.	- each	Fair	- Minor upgrades or repairs are required to reduce potential exposure hazard	Medium	- 3 or 4 action level							
SM	- square meters	Poor, Debris	- A significant exposure hazard exists, with immediate remedial action required	Low	- 5, 6 or 7 action level							
AHU	- air handling unit											
		(access) A	- Areas of the building within reach (from floor level) of all building users									
		(access) B	- Frequently entered maintenance areas within reach of maintenance staff, without the need for a ladder									
		(access) C(c)	- Areas of the building which require the removal of a building component, including lay-in ceilings, and access panels into solid ceiling or wall systems									
		(access) C(e)	- Areas of the building above 2.4M where use of a ladder is required to reach the asbestos									
		(access) 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									
		Action										
		1	Immediate clean-up of Debris that is likely to be disturbed									
		2	Type 2 precautions for entry into areas with ACM Debris									
		3	ACM removal required for compliance									
		4	Type 2 precautions for access into areas where ACM is present and likely to be disturbed by access									
		5	Proactive ACM removal									
		6	ACM repair									
		7	Routine surveillance									
General Notes												
1. Asbestos disturbance, abatement, transportation, and disposal shall be performed in accordance with requirements of O.Reg. 278/05, O.Reg. 347/90, as amended, and TDGA.												
2. Conditions, quantities and locations of asbestos-containing materials are to be confirmed on-site prior to removal or disturbance.												
3. Condition, Access, Friability and Recommended Action for each material is based upon the definitions outlined within the National Joint Council (NJC) Occupational Health and Safety Directive, Part XI – 11.6 Asbestos Management.												



**Designated Substances and
Hazardous Building Materials
Survey – Moosonee National
Defence Radar Base**

Moosonee National Defence
Radar Base
Moosonee, Ontario

September 3, 2019

Prepared for:

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MOOSONEE NATIONAL DEFENCE RADAR BASE, MOOSONEE, ONTARIO**

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DESIGNATED SUBSTANCES AND HAZARDOUS BUILDING MATERIALS SURVEY – MOOSONEE NATIONAL DEFENCE RADAR BASE, MOOSONEE, ONTARIO

Introduction
September 3, 2019

Executive Summary

Stantec Consulting Ltd. (Stantec) was commissioned by Public Works and Government Services Canada (PWGSC) to conduct a data gap analysis in support of the demolition of seven buildings (subject buildings) located at the Moosonee National Defence Radar Base (the site), located in Moosonee, Ontario. The purpose of the data gap review was to confirm the presence of and quantify designated substances and hazardous building materials present within the following seven buildings:

- Building 1 – Storage
- Building 1A – Storage
- Building 2 – Storage
- Building 3 – Office
- Building 4 – Central Heating Plant
- Building 5 – Clarifier 1
- Building 5A – Clarifier 2

The work was carried out in accordance with the requirements of the *PSPC Asbestos Management Standard, Canada Labour Code Part II (The Code), Canada Occupational Health and Safety Regulations (COHSR), The National Joint Council (NJC) Occupational Health and Safety Directive (OHS Directive)* and provincial regulations including *Ontario Regulation 278/05 Designated Substance - Asbestos on Construction Projects and in Buildings and Repair Operations*, as amended (O. Reg. 278/05), made under the *Occupational Health and Safety Act (OHSA)*.

The designated substances assessment list includes those substances designated under the OHSA and included asbestos, lead, mercury, and silica as the most likely to be present. In addition to designated substances, the hazardous building materials considered in this assessment included: polychlorinated biphenyls (PCBs); ozone-depleting substances (ODSs); urea-formaldehyde foam insulation (UFFI); mould; and radioactive sources. A visual assessment was also conducted for chemical, fuel, oil and/or waste oil storage.

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

Table 1: Summary of Findings

Building Materials	Comments
Asbestos	<p>The following building materials have been identified to be asbestos-containing through laboratory analysis completed by Stantec or in the DST Designated Substances and Hazardous Materials Survey Report dated July 2017 and were confirmed to be present during the assessment completed by Stantec:</p> <p><u>Building 1</u></p> <ul style="list-style-type: none">• Interior window glaze compound – grey



DESIGNATED SUBSTANCES AND HAZARDOUS BUILDING MATERIALS SURVEY – MOOSONEE NATONAL DEFENCE RADAR BASE, MOOSONEE, ONTARIO

Introduction
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Table 1: Summary of Findings

Building Materials	Comments
	<ul style="list-style-type: none"> Exterior joint caulking – grey Exterior black tar <p><u>Building 1A</u></p> <ul style="list-style-type: none"> Insulating cement on pipe fittings and debris Pre-formed straight pipe insulation 9"x9" vinyl floor tile – grey Interior window glaze compound – grey Interior joint caulking – grey (between wood panel and metal fan unit) <p><u>Building 2</u></p> <ul style="list-style-type: none"> Drywall joint-fill compound Mastic associated with 9"x9" vinyl floor tile - green Exterior vent and door caulking – grey <p><u>Building 3</u></p> <ul style="list-style-type: none"> Sprayed fireproofing and debris Insulating cement on pipe fittings Pre-formed tank/body insulation – condensate return tank Drywall joint-fill compound 9"x9" vinyl floor tile – grey <p><u>Building 4</u></p> <ul style="list-style-type: none"> Insulating cement on pipe fittings Cement board panels (exterior walls) Exterior joint caulking – grey Exterior window caulking – grey <p>Asbestos-containing materials were observed to be in poor condition.</p> <p>The following building materials were observed to be present but not sampled, and are listed as presumed asbestos-containing materials (PACMs):</p> <p><u>Building 1A</u></p> <ul style="list-style-type: none"> Roof caulking Roofing materials <p><u>Building 2</u></p> <ul style="list-style-type: none"> Roof insulation Duct insulation – black Cement board panels Roof caulking Roofing materials <p><u>Building 3</u></p> <ul style="list-style-type: none"> Gasket material Caulking materials – cast iron drains Fire rated doors Roof caulking Roofing materials <p><u>Building 4</u></p> <ul style="list-style-type: none"> Corrugated paper-like straight pipe insulation Caulking materials – cast iron drains Fire rated doors Roof caulking



DESIGNATED SUBSTANCES AND HAZARDOUS BUILDING MATERIALS SURVEY – MOOSONEE NATIONAL DEFENCE RADAR BASE, MOOSONEE, ONTARIO

Introduction
September 3, 2019

Table 1: Summary of Findings

Building Materials	Comments
	<ul style="list-style-type: none"> Roofing materials <p><u>Building 5</u></p> <ul style="list-style-type: none"> Roof caulking Roofing materials <p><u>Building 5A</u></p> <ul style="list-style-type: none"> Roof caulking Roofing materials <p>Roofing materials, roof caulking and roof insulation were observed to be in poor condition in building 2. The roof of building 2 was collapsing and holes were visible in the ceiling in three locations. Duct insulation was observed to be in poor condition (deteriorating) in room 2 (approximately 5 sq. m).</p> <p>The remaining materials were observed to be in good condition.</p> <p>Roofing materials and roof caulking were not sampled as they were not accessible due to the height of the roof. Fire rated doors were not sampled to preserve their integrity. Caulking materials on cast iron drain pipes and gasket materials on mechanical installations were not sampled as they were not accessible. The corrugated paper-like straight pipe insulation was not accessible for sampling in building 4 due to the height of the ceiling in bay 2.</p> <p>Building 2 was not entered for health and safety reasons as the roof was collapsing in, therefore, materials including duct insulation, cement board panels and roof insulation observed from the entrance were not accessible for sampling.</p> <p>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.</p>
Lead	<p>Samples of five paint applications were collected and submitted for lead content analysis. Seven samples of paint applications were previously collected and submitted for lead content analysis in the DST Designated Substances and Hazardous Materials Survey Report dated July 2017.</p> <p>Ten of the results indicated that the tested materials contain lead in concentrations that are greater than 90 ppm as follows:</p> <ul style="list-style-type: none"> Building 1 – Yellow/grey coloured paint on exterior metal cladding Building 1 – Grey coloured paint on the metal floor Building 1A – Yellow/grey coloured paint on exterior metal cladding Building 1A – Grey coloured paint on the interior steel framing Building 2 – Cream coloured paint on the interior walls Building 3 – Yellow/off-white coloured paint on the exterior metal cladding Building 3 – Blue coloured paint on the interior walls Building 3 – White coloured paint on the cast iron pipes Building 3 – Red coloured paint on the interior walls Building 3 – Green coloured paint on the interior walls <p>The following paint applications that contain lead in concentrations greater than 90 ppm were observed to be in poor condition:</p> <ul style="list-style-type: none"> Building 1 – Yellow/grey coloured paint on exterior metal cladding (200 sq. m) Building 1A – Yellow/grey coloured paint on exterior metal cladding (200 sq. m) Building 2 – Cream coloured paint on the interior walls (50 sq. m) Building 3 – Yellow/off-white coloured paint on the exterior metal cladding (300 sq. m) Building 3 – Blue coloured paint on the interior walls (10 sq. m)



DESIGNATED SUBSTANCES AND HAZARDOUS BUILDING MATERIALS SURVEY – MOOSONEE NATONAL DEFENCE RADAR BASE, MOOSONEE, ONTARIO

Introduction
September 3, 2019

Table 1: Summary of Findings

Building Materials	Comments
	<ul style="list-style-type: none"> • Building 3 – White coloured paint on the cast iron pipes (1 sq. m) • Building 3 – Red coloured paint on the interior walls (2 sq. m) • Building 3 – Green coloured paint on the interior walls (10 sq. m) <p>Two of the results indicated that the tested materials contain lead in concentrations that are below 90 ppm:</p> <ul style="list-style-type: none"> • Building 2 – Pink coloured paint on the exterior block walls • Building 4 – White coloured paint on the ceiling of the lean-to <p>These paint applications were observed to be in good condition.</p> <p>Lead may also be present in the following materials:</p> <ul style="list-style-type: none"> • Older electrical wiring materials and sheathing • Other paint applications not tested • Solder used on water lines • Solder used in electrical equipment • Exide batteries
Mercury	<p>Mercury is likely to be present in fluorescent light tubes and batteries observed in the following locations:</p> <ul style="list-style-type: none"> • Building 3 – 32 Exide batteries • Building 4 – 100 fluorescent light tubes <p>Light fixtures with fluorescent light tubes may be present in buildings and areas of buildings that were not accessible. Mercury may also be present in some paints and adhesives.</p>
Silica	<p>The presence of silica in building materials such as concrete, vinyl floor finishes, ceramic tile, drywall finishes, plaster finishes, siporex, etc. was noted in the subject buildings.</p>
Polychlorinated Biphenyls (PCBs)	<p>Polychlorinated Biphenyls are not suspected to be present in the light ballasts within the fluorescent light fixtures in Building 4 and Building 1, as the light fixtures observed had T8 light tubes which use electronic ballasts. One electronic light ballast was inspected in a dismantled light fixture observed in the Building 1.</p> <p>PCBs may be present in the fluorescent light ballasts of 15 light fixtures in Building 3. The referenced DST reports identify the light fixtures as T-12 fixtures which are more likely to have PCB-containing ballasts. The ballasts could not be inspected at the time of the assessment as they were not accessible for health and safety reasons.</p>
Ozone-Depleting Substance (ODS)	<p>The following equipment is suspected to be ODS-containing as the labels were not accessible:</p> <ul style="list-style-type: none"> • Building 1A – two refrigerators • Building 1A – four display refrigeration units



DESIGNATED SUBSTANCES AND HAZARDOUS BUILDING MATERIALS SURVEY – MOOSONEE NATIONAL DEFENCE RADAR BASE, MOOSONEE, ONTARIO

Introduction
September 3, 2019

Table 1: Summary of Findings

Building Materials	Comments
Mould	<p>Suspect mould was observed as follows:</p> <ul style="list-style-type: none"> • Building 1A – on the ceiling tiles located on the second floor (approximately 15 sq. m) • Building 2 – on the wood decking of room 2 (approximately 40 sq. m) and on the drywall walls in room 2 (approximately 10 sq. m) • Building 3 – on the pipe insulation (approximately 35 m) and on the drywall walls (approximately 12 sq. m) • Building 4 – on the north exterior wall (approximately 2 sq. m) <p>Standing water was observed on the first and second floor of Building 3. Various building materials appeared to be water damaged (deteriorating and rusting) throughout the building.</p>
Urea Formaldehyde Foam Insulation (UFFI)	Evidence of the application of UFFI was not observed.
Radioactive Sources	Evidence of radioactive sources was not observed.
Chemical, Fuel Oil and/or Waste Oil Storage	<p>The following hazardous chemicals were observed within the subject buildings:</p> <ul style="list-style-type: none"> • Building 1 – four unlabeled gas cylinders • Building 3 – one unlabeled gas cylinder • Building 3 – one unlabeled metal drum • Building 4 – gas cylinders (one oxygen and seven propane cylinders) • Building 4 – above ground fuel storage tank • Building 4 – above ground waste oil storage tank • Building 4 – five-gallon oil pails various other chemicals <p>Unlabeled containers are presumed to contain hazardous contents.</p>
Other Designated Substances	Acrylonitrile, arsenic, benzene, coke oven emissions, ethylene oxides, isocyanates, and vinyl chloride are not typically a concern in building materials, and therefore these substances were not investigated.

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 building materials are provided within this report.



DESIGNATED SUBSTANCES AND HAZARDOUS BUILDING MATERIALS SURVEY – MOOSONEE NATIONAL DEFENCE RADAR BASE, MOOSONEE, ONTARIO

Introduction
September 3, 2019

1.0 INTRODUCTION

Stantec Consulting Ltd. (Stantec) was commissioned by Public Works and Government Services Canada (PWGSC) to conduct a data gap analysis in support of the demolition of seven buildings (subject buildings) located at the Moosonee National Defence Radar Base (the site), located in Moosonee, Ontario. The purpose of the data gap review was to confirm the presence of and quantify designated substances and hazardous building materials present within the following seven buildings:

- Building 1 – Storage
- Building 1A – Storage
- Building 2 – Storage
- Building 3 – Office
- Building 4 – Central Heating Plant
- Building 5 – Clarifier 1
- Building 5A – Clarifier 2

The work was carried out in accordance with the requirements of the *PSPC Asbestos Management Standard, Canada Labour Code Part II (The Code), Canada Occupational Health and Safety Regulations (COHSR), The National Joint Council (NJC) Occupational Health and Safety Directive (OHS Directive)* and provincial regulations including *Ontario Regulation 278/05 Designated Substance - Asbestos on Construction Projects and in Buildings and Repair Operations*, as amended (O. Reg. 278/05), made under the *Occupational Health and Safety Act (OHSA)*

The designated substances assessment list includes those substances designated under the OHSA and included asbestos, lead, mercury, and silica as the most likely to be present. In addition to designated substances, the hazardous building materials considered in this assessment included: polychlorinated biphenyls (PCBs); ozone-depleting substances (ODSs); urea-formaldehyde foam insulation (UFFI); mould; and radioactive sources. A visual assessment was also conducted for chemical, fuel, oil and/or waste oil storage.

The site work was conducted by Tait van Wyk of Stantec on March 6, 2019 and March 7, 2019.

1.1 UNDERSTANDING OF THE PROJECT

PWGSC commissioned this assessment as a measure of diligence in maintaining compliance with federal and provincial regulations pertaining to the identification of designated substances and hazardous materials prior to demolition of the seven buildings located on the site. Designated substances and hazardous building materials may be present including, but not limited to asbestos, lead, mercury, silica, PCBs, ODSs and mould.



DESIGNATED SUBSTANCES AND HAZARDOUS BUILDING MATERIALS SURVEY – MOOSONEE NATIONAL DEFENCE RADAR BASE, MOOSONEE, ONTARIO

Scope
September 3, 2019

2.0 SCOPE

The scope of work for this assessment involved the following:

- A review of existing information, including site drawings, previous assessment and/or abatement documentation and discussions with site personnel, where available
- A visual assessment of readily accessible areas for the presence of designated substances and hazardous building materials
- The collection of representative bulk samples from building materials suspected of containing asbestos fibres
- The collection of paint chip samples for the determination of the lead content in paint finishes
- Submission of samples collected for laboratory analysis
- Evaluation and interpretation of field findings and previous analytical results to develop conclusions and recommendations pertaining to designated substances and hazardous building materials identified to be present

2.1 BACKGROUND

PWGSC commissioned this assessment as a measure of diligence in maintaining compliance with provincial regulations pertaining to the identification of designated substances and hazardous materials. In addition, the subject buildings are slated for demolition. DST conducted a designated substance and hazardous materials survey in July 2017 to identify designated substances and hazardous building materials present within the subject buildings. Stantec was commissioned to conduct a data gap analysis to confirm the presence of and quantify previously identified asbestos-containing materials (ACMs) and presumed asbestos-containing materials (PACMs).

2.2 DOCUMENT REVIEW

The following documentation was reviewed prior to undertaking the assessment:

- *Designated Substances and Hazardous Materials Survey, Four Buildings, National Defence Radar Base, Moosonee, Ontario*, dated July 2017, and prepared for Public Works and Government Services Canada by DST Consulting Engineers Inc.
- *Moosonee National Defence Radar Base: Aerial Photograph*, July 2017, DST Consulting Engineers Inc.

This documentation provided Stantec with an understanding of ACMs that are anticipated to be present and enabled Stantec to perform a data gap analysis of the site.



DESIGNATED SUBSTANCES AND HAZARDOUS BUILDING MATERIALS SURVEY – MOOSONEE NATIONAL DEFENCE RADAR BASE, MOOSONEE, ONTARIO

Designated Substances and Hazardous Building Materials Assessment
September 3, 2019

3.0 DESIGNATED SUBSTANCES AND HAZARDOUS BUILDING MATERIALS ASSESSMENT

This report reflects the observations made within accessed areas and the results of analyses performed on specific materials sampled, as indicated herein. Analytical results reflect the sampled materials at the specific sampling locations.

Sampling was conducted pertaining to suspected ACMs and suspected lead-containing paints (LCPs) only. The assessment for the presence of other designated substances and hazardous building materials was visual in nature and was conducted pertaining to readily visible surfaces within accessible spaces only. Interior and exterior finishes, solid ceilings, walls, flooring and structural elements were not removed to access concealed areas.

Samples of paint applications suspected to contain lead were collected from surfaces of major paint applications where visually different paint colours and/or types were identified. Although the surfaces where samples were collected may be covered with more than one coat of paint, the paint samples are described by the surface (visible) colour only. Attempts were made to represent all layers of paint in the samples collected. As analytical results are referenced to the surface paint colour only, the lead content of all painted surfaces similar to that represented by the surface paint colour will be presumed to be the same, regardless of differing sub surface paints, if any.

The presence of mercury or mercury-containing equipment in inaccessible areas or as internal parts of HVAC mechanisms or other equipment, was not assessed.

Due to height restrictions and the risk of electrical shock in handling operational light fixtures, the ballasts present in the fixtures observed, were not inspected for PCB labels or other PCB identifiers. The ballasts present were observed to have light fixtures with T-8 fluorescent light tubes. 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, will not be commented on.

The assessment was limited to a visual review in accessed areas of readily accessible building-related cooling and refrigeration equipment which could contain ODSs. Testing was not conducted. Equipment or materials that were not included as part of this assessment but that may contain ODSs include, but are not limited to solvents, aerosol spray propellants and fire extinguishing equipment.

Visual assessment for the presence of suspected visible mould and/or suitable conditions for mould growth (e.g., moist and/or water-stained building materials) were conducted. The conclusions made in this report provide description(s) of the potential source(s) of moisture that may have led to suitable conditions for mould growth, only in those cases where potential source(s) of moisture were identified. The visual assessment did not include an intrusive assessment. These conclusions will not necessarily identify all sources of moisture leading to suitable conditions for mould growth within the impacted



DESIGNATED SUBSTANCES AND HAZARDOUS BUILDING MATERIALS SURVEY – MOOSONEE NATIONAL DEFENCE RADAR BASE, MOOSONEE, ONTARIO

Designated Substances and Hazardous Building Materials Assessment
September 3, 2019

area(s). This assessment does not constitute a building envelope/building systems assessment, which would include an intrusive investigation to assess the internal condition, potential moisture sources, and expected remaining service life of the various components and systems comprising the envelope of a building.

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

The results of the 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 building materials. Selected site photographs are provided in **Appendix B**. The floor plan showing the locations of ACMs, PACMs and bulk sample locations is provided in **Appendix C**.

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

- Room component that contains ACM or PACM
- Location of the ACM or PACM within the room space
- ACM or PACM description
- Estimated quantity
- Original sample number or representative sample number
- Friability
- Condition

The evaluation criterion for assessing ACMs and PACMs is provided in **Appendix G**.

3.1 PROJECT-SPECIFIC LIMITATIONS

The presence and asbestos content of some building materials could not be confirmed or denied and are to be considered PACMs if present. Building materials that may contain asbestos but were not accessible and their presence could not be confirmed include, but are not limited to the following:

- Sub-grade materials (e.g., asbestos cement drainage pipe)
- Insulation material present inside walls
- Drywall and/or wall plaster and associated finish materials concealed behind new and/or additional walls
- Woven tape inside duct connection joints
- Mechanical (e.g., piping and ducting) insulation within wall cavities
- Insulation materials inside building materials, including fire doors and window frames
- Heating, ventilation and air conditioning (HVAC) units mechanical inner linings and/or inner ducting insulation
- Heat protection materials inside mechanical installations and light fixtures



DESIGNATED SUBSTANCES AND HAZARDOUS BUILDING MATERIALS SURVEY – MOOSONEE NATIONAL DEFENCE RADAR BASE, MOOSONEE, ONTARIO

Designated Substances and Hazardous Building Materials Assessment
September 3, 2019

The following areas were not accessed, for the reasons indicated:

- Building 2 was not entered for health and safety reasons as the roof was collapsing and the floor was deteriorating (rotting and rusted out). As such, the interior of room 2 was visually assessed from the south doorway and room 1 was visually assessed from a vent on the north side of the building. Quantity of contents within the building limited the visual assessment.
- Gasket materials were assessed from the ground within building 3 and not directly assessed due to the height of the ceiling, limited access and for health and safety reasons, as piles of building material debris were scattered throughout the first floor and mezzanine. Caulking materials located in the joints of cast iron drain pipes were not accessible for sampling within building 3 and building 4. Gasket and caulking materials are therefore presumed to be asbestos-containing until proven otherwise by laboratory analysis.
- The third and fourth floors of building 3 were not accessed for health and safety reasons. As such, comments provided on the presence, quantity or condition of designated substances and hazardous building materials on the third and fourth floors will be based on information provided in previous reports.
- The roofs of the subject buildings were visually assessed from the ground and not directly accessed due to the height of the roof, limited access, and for health and safety reasons.
- Buildings and/or areas within buildings that were not accessed were determined to be inaccessible for health and safety reasons by a structural engineer on site at the time of the assessment

3.2 FACILITY DESCRIPTION

The Moosonee National Defence Radar Base is located in Moosonee, Ontario, and is occupied by seven buildings including three storage buildings, an office building, a building previously identified as the central heating plant and two decommissioned clarifiers. The parcel of land included in the assessment is located north of Mistik Boulevard and is bound by Tacan Road to the east and a rail line to the north. The land to the immediate west of the site consists of former aircraft hangars used by PWGSC. The assessed buildings were operational from 1961 to 1975 (DST, 2017).

Building 1 and building 1A consist of similar structural components. Both buildings are two-level buildings with concrete foundations and steel framing. Both buildings are currently being used for storage. The typical structural components and finishes associated with the buildings consist of metal cladding on the exterior walls, steel corrugated flooring, and exposed metal cladding on the interior walls. The buildings have flat roofs and were not observed to be insulated.

Building 2 consists of a one-level building with a flat roof. The building was also reportedly used for storage. The typical structural components and finishes associated with the building consists of masonry concrete block exterior walls, wood and steel corrugated flooring faced with vinyl floor tile, and interior drywall and cement board wall finishes with exposed steel joists and wood decking on the ceiling.

Building 3 consists of a four-level building formerly used as an office building. The building is a steel-framed structure with a concrete foundation protruding approximately 2 metres from the ground. The typical structural components and finishes associated with this building consist of corrugated metal cladding on the exterior walls, various types of flooring including concrete, vinyl floor tile and vinyl sheet



DESIGNATED SUBSTANCES AND HAZARDOUS BUILDING MATERIALS SURVEY – MOOSONEE NATIONAL DEFENCE RADAR BASE, MOOSONEE, ONTARIO

Designated Substances and Hazardous Building Materials Assessment
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flooring, and interior concrete, drywall and plaster walls with exposed metal decking and concrete ceilings.

Building 4, formerly referred to as the central heating plant, consists of a one-level building with steel framing and a concrete block foundation. The building is currently being used for storage and vehicle maintenance. The building consists of two large maintenance/garage bays separated by a concrete block partition wall extending the height of the ceiling with office space on the east portion of the building. The office space consists of two offices, a kitchen, a washroom and a storage room. The typical structural components and finishes associated with this building consist of cement board panels on the exterior walls, vinyl floor tile and concrete floors, and interior concrete block and drywall walls. The ceiling throughout the building was observed to be comprised of siporex.

Building 5 and Building 5A are located on the east portion of the site and consist of two decommissioned clarifiers. The two buildings consist of cylindrical concrete structures with flat roofs.

3.3 ASBESTOS

3.3.1 Methodology

The construction date of the buildings reportedly took place in the late 1960s, early 1970s. This construction time period is consistent with those dates when designated substances and hazardous building materials were commonly used.

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 building materials were identified. Samples of representative materials were then collected at these locations.

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

Samples of suspect ACMs from various building materials were collected and submitted to EMSL Canada Inc. (EMSL), located in Ottawa, ON for analysis using Polarized Light Microscopy (PLM) with dispersion staining. The analysis was conducted following the U.S. EPA/600/R-93/116 Method. EMSL is certified under the National Voluntary Laboratory Accreditation Program (NVLAP) to perform asbestos analysis of bulk samples. ACMs in Ontario are defined as a material that contains 0.5 per cent or more asbestos by dry weight.

A positive stop option is used during the analysis of samples. Multiple samples of visually similar material are collected and submitted for laboratory analysis. Once a sample within the set is identified to contain asbestos, further analysis of the subsequent samples is deemed to be unnecessary and not conducted.



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3.3.2 Findings

A summary list of the bulk samples collected during the assessment and confirmed to be ACM or non-ACMs by laboratory analysis are provided in the table below.

Table 2: Summary of Results of Analysis of Bulk Samples for Asbestos

Sample Number	Sampling Location	Description	Asbestos Content
B1A-BS-01A	Building 1A - First Floor - Northwest Corner	Mastic associated with 9"x9" vinyl floor tile - grey	None Detected
B1A-BS-01B	Building 1A - First Floor - Northwest Corner	Mastic associated with 9"x9" vinyl floor tile - grey	None Detected
B1A-BS-01C	Building 1A - First Floor - Northwest Corner	Mastic associated with 9"x9" vinyl floor tile - grey	None Detected
B1-BS-01A	Building 1 - Second Floor - Fan Unit (Plywood)	Interior caulking - grey	None Detected
B1-BS-01B	Building 1 - Second Floor - Fan Unit (Plywood)	Interior caulking - grey	None Detected
B1-BS-01C	Building 1 - Second Floor - Fan Unit (Plywood)	Interior caulking - grey	None Detected
B2-BS-01A	Building 2 - Exterior - Vent	Exterior caulking - grey	1.7% chrysotile
B2-BS-01B	Building 2 - Exterior - Vent	Exterior caulking - grey	Positive Stop (Not Analyzed)
B2-BS-01C	Building 2 - Exterior - Vent	Exterior caulking - grey	Positive Stop (Not Analyzed)
B2-BS-02A	Building 2 - Exterior - East Wall	Exterior caulking - white	<0.1% chrysotile
B2-BS-02B	Building 2 - Exterior - East Wall	Exterior caulking - white	<0.1% chrysotile
B2-BS-02C	Building 2 - Exterior - East Wall	Exterior caulking - white	<0.1% chrysotile
B2-BS-03A	Building 2 - Main Floor - Room 2, Wall	Drywall joint-fill compound	3% chrysotile
B2-BS-03B	Building 2 - Main Floor - Room 2, Wall	Drywall joint-fill compound	Positive Stop (Not Analyzed)
B2-BS-03C	Building 2 - Main Floor - Room 2, Wall	Drywall joint-fill compound	Positive Stop (Not Analyzed)
B2-BS-03D	Building 2 - Main Floor - Room 2, Wall	Drywall joint-fill compound	Positive Stop (Not Analyzed)
B2-BS-03E	Building 2 - Main Floor - Room 2, Wall	Drywall joint-fill compound	Positive Stop (Not Analyzed)
B2-BS-04A-FLOOR TILE	Building 2 - Main Floor - Room 2	9"x9" vinyl floor tile - green	<0.25% chrysotile
B2-BS-04A-MASTIC	Building 2 - Main Floor - Room 2	Mastic associated with 9"x9" vinyl floor tile - green	1.2% chrysotile



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Table 2: Summary of Results of Analysis of Bulk Samples for Asbestos

Sample Number	Sampling Location	Description	Asbestos Content
B2-BS-04B-FLOOR TILE	Building 2 - Main Floor - Room 2	9"x9" vinyl floor tile - green	<0.25% chrysotile
B2-BS-04B-MASTIC	Building 2 - Main Floor - Room 2	Mastic associated with 9"x9" vinyl floor tile - green	Positive Stop (Not Analyzed)
B2-BS-04C-FLOOR TILE	Building 2 - Main Floor - Room 2	9"x9" vinyl floor tile - green	<0.25% chrysotile
B2-BS-04C-MASTIC	Building 2 - Main Floor - Room 2	Mastic associated with 9"x9" vinyl floor tile - green	Positive Stop (Not Analyzed)
B2-BS-05A	Building 2 - Exterior - East Wall Cavity	Vermiculite insulation	None Detected
B2-BS-05B	Building 2 - Exterior - East Wall Cavity	Vermiculite insulation	None Detected
B2-BS-05C	Building 2 - Exterior - East Wall Cavity	Vermiculite insulation	None Detected
B3-BS-01A-BASE COAT	Building 3 - First Floor - Communications, Wall	Plaster	None Detected
B3-BS-01A-SKIM COAT	Building 3 - First Floor - Communications, Wall	Plaster	None Detected
B3-BS-01B-BASE COAT	Building 3 - First Floor - Communications, Wall	Plaster	None Detected
B3-BS-01B-SKIM COAT	Building 3 - First Floor - Communications, Wall	Plaster	None Detected
B3-BS-01C-BASE COAT	Building 3 - First Floor - Communications, Wall	Plaster	None Detected
B3-BS-01C-SKIM COAT	Building 3 - First Floor - Communications, Wall	Plaster	None Detected
B3-BS-01D-BASE COAT	Building 3 - First Floor - Communications, Wall	Plaster	None Detected
B3-BS-01D-SKIM COAT	Building 3 - First Floor - Communications, Wall	Plaster	None Detected
B3-BS-01E-BASE COAT	Building 3 - First Floor - Communications, Wall	Plaster	None Detected
B3-BS-01E-SKIM COAT	Building 3 - First Floor - Communications, Wall	Plaster	None Detected
B3-BS-02A	Building 3 - Mezzanine - Entrance	Mastic associated with 9"x9" vinyl floor tile - grey	None Detected
B3-BS-02B	Building 3 - Mezzanine - Entrance	Mastic associated with 9"x9" vinyl floor tile - grey	None Detected
B3-BS-02C	Building 3 - Mezzanine - Entrance	Mastic associated with 9"x9" vinyl floor tile - grey	None Detected
B3-BS-03A-BACKING	Building 3 - First Floor - Communications	Vinyl sheet flooring - grey	None Detected



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Table 2: Summary of Results of Analysis of Bulk Samples for Asbestos

Sample Number	Sampling Location	Description	Asbestos Content
B3-BS-03A-VINYL SHEET FLOORING	Building 3 - First Floor - Communications	Vinyl sheet flooring - grey	None Detected
B3-BS-03B-BACKING	Building 3 - First Floor - Communications	Vinyl sheet flooring - grey	None Detected
B3-BS-03B-VINYL SHEET FLOORING	Building 3 - First Floor - Communications	Vinyl sheet flooring - grey	None Detected
B3-BS-03C-BACKING	Building 3 - First Floor - Communications	Vinyl sheet flooring - grey	None Detected
B3-BS-03C-VINYL SHEET FLOORING	Building 3 - First Floor - Communications	Vinyl sheet flooring - grey	None Detected
B3-BS-04A	Building 3 - First Floor - Storage, Condensate Return Tank	Pre-formed tank/body insulation	75% chrysotile
B3-BS-04B	Building 3 - First Floor - Storage, Condensate Return Tank	Pre-formed tank/body insulation	Positive Stop (Not Analyzed)
B3-BS-04C	Building 3 - First Floor - Storage, Condensate Return Tank	Pre-formed tank/body insulation	Positive Stop (Not Analyzed)
B3-BS-05A-INSULATION 1	Building 3 - Second Floor - HVAC Unit	Duct insulation	None Detected
B3-BS-05A-INSULATION 2	Building 3 - Second Floor - HVAC Unit	Duct insulation	None Detected
B3-BS-05B-INSULATION 1	Building 3 - Second Floor - HVAC Unit	Duct insulation	None Detected
B3-BS-05B-INSULATION 2	Building 3 - Second Floor - HVAC Unit	Duct insulation	None Detected
B3-BS-05C-INSULATION 1	Building 3 - Second Floor - HVAC Unit	Duct insulation	None Detected
B3-BS-05C-INSULATION 2	Building 3 - Second Floor - HVAC Unit	Duct insulation	None Detected
B4-BS-01A	Building 4 - Main Floor - Kitchen, Wall	Ceramic tile grout	None Detected
B4-BS-01B	Building 4 - Main Floor - Kitchen, Wall	Ceramic tile grout	None Detected
B4-BS-01C	Building 4 - Main Floor - Kitchen, Wall	Ceramic tile grout	None Detected
B4-BS-02A	Building 4 - Exterior - North Wall	Parging	None Detected
B4-BS-02B	Building 4 - Exterior - North Wall	Parging	None Detected
B4-BS-02C	Building 4 - Exterior - North Wall	Parging	None Detected



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Table 2: Summary of Results of Analysis of Bulk Samples for Asbestos

Sample Number	Sampling Location	Description	Asbestos Content
B4-BS-03A	Building 4 - Main Floor - Bay 2, East Wall	Block mortar	None Detected
B4-BS-03B	Building 4 - Main Floor - Bay 2, West Wall	Block mortar	None Detected
B4-BS-03C	Building 4 - Main Floor - Bay 2, West Wall	Block mortar	None Detected
B4-BS-04A-FLOOR TILE	Building 4 - Main Floor - Office 2	12"x12" vinyl floor tile - white with grey specks	None Detected
B4-BS-04A-MASTIC	Building 4 - Main Floor - Office 2	Mastic associated with 12"x12" vinyl floor tile - white with grey specks	None Detected
B4-BS-04B-FLOOR TILE	Building 4 - Main Floor - Office 2	12"x12" vinyl floor tile - white with grey specks	None Detected
B4-BS-04B-MASTIC	Building 4 - Main Floor - Office 2	Mastic associated with 12"x12" vinyl floor tile - white with grey specks	None Detected
B4-BS-04C-FLOOR TILE	Building 4 - Main Floor - Office 2	12"x12" vinyl floor tile - white with grey specks	None Detected
B4-BS-04C-MASTIC	Building 4 - Main Floor - Office 2	Mastic associated with 12"x12" vinyl floor tile - white with grey specks	None Detected
B4-BS-05A-ADHESIVE	Building 4 - Main Floor - Kitchen, Wall	Ceramic tile mortar/adhesive	None Detected
B4-BS-05A-CERAMIC TILE	Building 4 - Main Floor - Kitchen, Wall	Ceramic tile mortar/adhesive	None Detected
B4-BS-05A-MORTAR	Building 4 - Main Floor - Kitchen, Wall	Ceramic tile mortar/adhesive	None Detected
B4-BS-05B-ADHESIVE	Building 4 - Main Floor - Kitchen, Wall	Ceramic tile mortar/adhesive	None Detected
B4-BS-05B-CERAMIC TILE	Building 4 - Main Floor - Kitchen, Wall	Ceramic tile mortar/adhesive	None Detected
B4-BS-05B-MORTAR	Building 4 - Main Floor - Kitchen, Wall	Ceramic tile mortar/adhesive	None Detected
B4-BS-05C-ADHESIVE	Building 4 - Main Floor - Kitchen, Wall	Ceramic tile mortar/adhesive	None Detected
B4-BS-05C-CERAMIC TILE	Building 4 - Main Floor - Kitchen, Wall	Ceramic tile mortar/adhesive	None Detected
B4-BS-05C-MORTAR	Building 4 - Main Floor - Kitchen, Wall	Ceramic tile mortar/adhesive	None Detected
B4-BS-06A	Building 4 - Main Floor - Office 2, Wall	Drywall joint-fill compound	None Detected
B4-BS-06B	Building 4 - Main Floor - Office 1, Wall	Drywall joint-fill compound	None Detected
B4-BS-06C	Building 4 - Main Floor - Office 2, Wall	Drywall joint-fill compound	None Detected



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Table 2: Summary of Results of Analysis of Bulk Samples for Asbestos

Sample Number	Sampling Location	Description	Asbestos Content
B4-BS-07A-AIR CELL 1	Building 4 - Main Floor - Bay 2	Corrugated straight pipe insulation	None Detected
B4-BS-07A-AIR CELL 2	Building 4 - Main Floor - Bay 2	Corrugated straight pipe insulation	None Detected
B4-BS-07B-AIR CELL 1	Building 4 - Main Floor - Bay 2	Corrugated straight pipe insulation	None Detected
B4-BS-07B-AIR CELL 2	Building 4 - Main Floor - Bay 2	Corrugated straight pipe insulation	None Detected
B4-BS-07C-AIR CELL 1	Building 4 - Main Floor - Bay 2	Corrugated straight pipe insulation	None Detected
B4-BS-07C-AIR CELL 2	Building 4 - Main Floor - Bay 2	Corrugated straight pipe insulation	None Detected
B4-BS-08A	Building 4 - Main Floor - Bay 2, East Window	Window glaze compound - white	<0.1% chrysotile
B4-BS-08B	Building 4 - Main Floor - Bay 2, East Window	Window glaze compound - white	<0.1% chrysotile
B4-BS-08C	Building 4 - Main Floor - Bay 2, West Window	Window glaze compound - white	<0.1% chrysotile

A copy of the laboratory Certificate of Analysis is provided in **Appendix E**. Photos of ACMs are provided in **Appendix B**.

3.3.2.1 Friable Asbestos-Containing Materials

Friable building materials have been identified to be asbestos-containing through laboratory analysis completed by Stantec or in the DST Designated Substances and Hazardous Materials Survey Report dated July 2017 and were confirmed to be present during the assessment completed by Stantec.

Building 1A

- Insulating cement on pipe fittings and debris
- Pre-formed straight pipe insulation

Building 3

- Sprayed fireproofing and debris
- Insulating cement on pipe fittings
- Pre-formed tank/body insulation – condensate return tank

Building 4

- Insulating cement on pipe fittings

The following building materials were observed to be in poor condition.



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Building 1A

- Pre-formed straight pipe insulation was observed to be in poor condition (approximately 1 m exposed) in the stairwell
- Insulating cement on pipe fittings were observed to be in poor condition (exposed and/or deteriorating) on 39 fittings on the first and second floor mechanical
- Broken pipe assemblies with asbestos-containing insulating cement on pipe fittings (approximately 10 fittings) were observed on the floor of the first floor

Building 3

- Insulating cement on pipe fittings were observed to be in poor condition (exposed and/or deteriorating) on 31 fittings
- Pre-formed tank/body insulation was observed to be in poor condition (approximately 1 m exposed) on the condensate return tank within the storage room
- Spray applied fireproofing is present on the ceiling of the first and fourth floors of building 3. The sprayed fireproofing was observed to be in poor condition (deteriorating) throughout. Fireproofing debris was also observed on the floor of the mezzanine and first floor storage room. The fourth floor of building 3 was not accessible at the time of the assessment but fireproofing debris is reportedly present on the floor of the fourth floor (DST, 2017).

Building 4

- Insulating cement on pipe fittings were observed to be in poor condition (exposed and/or deteriorating) on 9 fittings located in the storage room and bay 2

These remaining materials were observed to be in good condition.

Photos of ACMs and damaged materials are provided in **Appendix B**. The locations and quantities of ACMs are provided in the Summary of Occurrence of Asbestos-Containing Materials Table in **Appendix D**.

3.3.2.2 Non-Friable Asbestos-Containing Materials

Friable building materials have been identified to be asbestos-containing through laboratory analysis completed by Stantec or in the DST Designated Substances and Hazardous Materials Survey Report dated July 2017 and were confirmed to be present during the assessment completed by Stantec.

Building 1

- Interior window glaze compound – grey
- Exterior caulking – grey
- Exterior black tar

Building 1A

- 9"x9" vinyl floor tile – grey
- Interior window glaze compound – grey
- Interior caulking – grey



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- Interior joint caulking – grey (between wood panel and metal fan unit)

Building 2

- Drywall joint-fill compound
- Mastic associated with 9"x9" vinyl floor tile – green
- Exterior vent and door caulking – grey

Building 3

- Drywall joint-fill compound
- 9"x9" vinyl floor tile – grey

Building 4

- Cement board panels (exterior walls)
- Exterior joint caulking – grey
- Exterior window caulking – grey

The following building materials were observed to be in poor condition

Building 1

- Interior window glaze compound – grey was observed to be in poor condition (cracking) on the interior windows (approximately 42 m)

Building 1A

- Interior window glaze compound – grey was observed to be in poor condition (cracking) on the interior windows (approximately 48 m)
- 9"x9" vinyl floor tile – grey was observed to be in poor condition (cracking and lifting) on the first floor of building (approximately 40 sq. m)

Building 2

- Drywall joint-fill compound was observed to be in poor condition (damaged and deteriorating) in Room 2. Approximately 100 square metres of damaged drywall was observed from the doorway of building 2. Room 1 and room 3 were not accessible at the time of the assessment and drywall with asbestos-containing drywall joint-fill compound may be present and damaged
- 9"x9" vinyl floor tile – green with asbestos-containing mastic were observed to be in poor condition (lifting and broken) in Room 2 (approximately 200 sq. m)
- Exterior vent and door caulking – grey was observed to be in poor condition (peeling/flaking) on the exterior vents and door of building 2 (approximately 20 m)

Building 3

- 9"x9" vinyl floor tile – grey was also observed to be in poor condition (cracking and lifting) within the mezzanine, second floor, third floor and fourth floor (approximately 1,250 sq. m)
- Drywall joint-fill compound was observed to be in poor condition (damaged and deteriorating) in the first-floor storage room, mezzanine, and stairwell (approximately 160 sq. m)



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Building 4

- Cement board panels were observed to be in poor condition (cracked and broken) on the exterior of building 4. Approximately 21 sq. m was observed to be damaged.

These remaining materials were observed to be in good condition.

Photos of ACMs and damaged ACMs are provided in **Appendix B**. The locations and quantities of asbestos-containing materials are provided in the Summary of Occurrence of Asbestos-Containing Materials Table in **Appendix D**.

3.3.2.3 Presumed Asbestos-Containing Materials

The following building materials were observed to be present but not sampled, and are listed as PACMs:

Building 1A

- Roof caulking
- Roofing materials

Building 2

- Roof insulation
- Duct insulation – black
- Cement board panels
- Roof caulking
- Roofing materials

Building 3

- Gasket material
- Caulking materials – cast iron drains
- Fire rated doors
- Roof caulking
- Roofing materials

Building 4

- Corrugated paper-like straight pipe insulation
- Caulking materials – cast iron drains
- Fire rated doors
- Roof caulking
- Roofing materials

Building 5

- Roof caulking
- Roofing materials



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Building 5A

- Roof caulking
- Roofing materials

Roofing materials, roof caulking and roof insulation were observed to be in poor condition in building 2. The roof of building 2 was collapsing and holes were visible in the ceiling in three locations. Duct insulation was observed to be in poor condition (deteriorating) in room 2 (approximately 5 sq. m).

The remaining materials were observed to be in good condition.

Roofing materials and roof caulking were not sampled as they were not accessible due to the height of the roof. Fire rated doors were not sampled to preserve their integrity. Caulking materials on cast iron drain pipes and gasket materials on mechanical installations were not sampled as they were not accessible. The corrugated paper-like straight pipe insulation was not accessible for sampling in building 4 due to the height of the ceiling in bay 2.

Building 2 was not entered for health and safety reasons as the roof was collapsing in, therefore, materials including duct insulation, cement board panels and roof insulation observed from the entrance were not accessible for sampling.

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. The locations and quantities of presumed asbestos-containing materials are provided in the Summary of Occurrence of Asbestos-Containing Materials Table in **Appendix D**.

3.3.2.4 Potential for Vermiculite Insulation

Vermiculite insulation was observed to be present within the block walls of building 2. A hole in the block wall on the east side of the building provided limited access for sampling. The vermiculite was identified by laboratory analysis to be non-asbestos-containing.

It should be noted that various walls of other buildings were comprised of masonry (concrete) blocks. Asbestos-contaminated vermiculite was historically used as insulating material in masonry block or brick walls. To assess for this potential ACM, destructive sampling is required, which was not conducted as part of this assessment. Although various holes were observed, and no vermiculite was present, the presence of this potential ACM cannot be ruled out without destructive testing.



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3.3.3 Recommendations

The disturbance of ACMs on construction and demolition projects is governed by the *Occupational Health and Safety Regulations*, *PSPC Asbestos Management Standard*, and O. Reg. 278/05. These regulations classify asbestos disturbances as Type 1 (Low Risk), Type 2 (Moderate Risk) and Type 3 (High Risk) and define the precautionary measures and handling and disposal precautions for each type of operation.

Based on the visual assessment and laboratory analysis, Stantec recommends the following with regards to meeting the requirements of O. Reg. 278/05 and *PSPC Asbestos Management Standard*. A list of the locations and quantity of ACMs and PACMs is provided in the occurrence report in **Appendix C**.

Building 1

- Interior window glazing compound – grey should be removed following Type 1 (Low Risk) procedures
- Exterior joint caulking – grey should be removed following Type 1 (Low Risk) procedures
- Roofing black tar should be removed following Type 1 (Low Risk) procedures

Building 1A

- Pre-formed pipe straight insulation and debris should be removed following Type 3 abatement procedures
- Insulating cement on pipe fittings and debris should be removed following Type 3 (High Risk) abatement procedures.
- 9"x9" vinyl floor tile – beige should be removed as part of the Type 3 (High Risk) abatement procedures
- Interior window glazing compound – grey should be removed as part of the Type 3 (High Risk) abatement procedures
- Interior joint caulking – grey should be removed as part of the Type 3 (High Risk) abatement procedures
- Roofing materials and roof caulking should be removed following Type 1 (Low Risk) procedures

Building 2

- Duct insulation black should be removed following Type 3 (High Risk) abatement procedures
- Vinyl floor tiles - green with asbestos containing mastic should be removed as part of the Type 2 (Moderate Risk) abatement procedures
- Drywall joint-fill compound should be removed as part of the Type 2 (Moderate Risk) abatement procedures
- Exterior vent and door caulking – grey should be removed following Type 1 (Low Risk) procedures
- Roofing materials, roofing insulation and roof caulking should be removed following Type 1 (Low Risk) procedures
- Cement board panels should be removed following Type 2 (Moderate Risk) procedures

Building 3

- Sprayed fireproofing and fireproofing debris should be removed following Type 3 (High Risk) abatement procedures
- Insulating cement on pipe fittings and debris should be removed following Type 3 (High Risk) abatement procedures



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- Pre-formed tank/bod insulation should be removed following Type 3 (High Risk) abatement procedures
- Gasket materials should be removed following Type 3 (High Risk) abatement procedures
- Drywall joint-fill compound should be removed as part of the Type 3 (High Risk) abatement procedures
- Caulking materials should be removed as part of the Type 3 (High Risk) abatement procedures
- 9"x9" vinyl floor tile – grey should be removed as part of the Type 3 (High Risk) abatement procedures
- Fire rated doors should be removed and disposed of following Type 1 (Low Risk) procedures
- Roofing materials and roof caulking should be removed following Type 1 (Low Risk) procedures

Building 4

- Insulating cement on pipe fittings and debris should be removed following Type 3 (High Risk) abatement procedures
- Corrugated paper-like straight pipe insulation should be removed following Type 3 (High Risk) abatement procedures
- Fire rated doors should be removed and disposed of following Type 1 (Low Risk) procedures
- Caulking materials should be removed as part of the Type 3 (High Risk) abatement procedures
- Exterior window and wall caulking – grey should be removed following Type 1 (Low Risk) procedures
- Cement board panels should be removed following Type 2 (Moderate Risk) procedures
- Roofing materials and roof caulking should be removed following Type 1 (Low Risk) procedures

Building 5

- Roofing materials and roof caulking should be removed following Type 1 (Low Risk) procedures

Building 5A

- Roofing materials and roof caulking should be removed following Type 1 (Low Risk) procedures

Should a material suspected to contain asbestos fibres become uncovered during the renovation activities, 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 in accordance with O. Reg. 278/05.

Due to the accessibility, quantity and condition of asbestos-containing materials within buildings 1a, 2 and 3, these buildings should be considered as an active asbestos hazard and should not be entered unless Type 2 (at minimum) controls have been implemented and the appropriate PPE is worn.

The following are Type 1 (Low Risk) operations:

- Installing or removing non-friable asbestos-containing material other than ceiling tiles if the material is installed or removed without being broken, cut, drilled, abraded, ground, sanded or vibrated.
- Breaking, cutting, drilling, abrading, grinding, sanding, or vibrating of non-friable materials if the work is wetted to control the spread of dust and done by means of non-powered hand tools.
- Removing less than one square metre of drywall in which joint-filling compounds that are asbestos-containing material have been used.



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The following are Type 2 (Moderate Risk) operations:

- Removing one square metre or more of drywall in which joint filling compounds that are asbestos-containing have been used.
- Breaking, cutting, drilling, abrading, grinding, sanding or vibrating non-friable asbestos-containing material if,
 - The material is not wetted to control the spread of dust or fibres
 - The work is done only by means of non-powered hand-held tools
- Breaking, cutting, drilling, abrading, grinding, sanding or vibrating non-friable asbestos-containing material if the work is done by means of power tools that are attached to dust-collecting devices equipped with HEPA filters.
- Removing insulation that is asbestos-containing material from a pipe, duct or similar structure using a glove bag.

The following are Type 3 (High Risk) operations:

- The removal or disturbance of more than one square metre of friable asbestos-containing material during the repair, alteration, maintenance or demolition of all or part of a building, aircraft, ship, locomotive, railway car or vehicle or any machinery or equipment.
- Breaking, cutting, drilling, abrading, grinding, sanding or vibrating non-friable asbestos-containing material, if the work is done by means of power tools that are not attached to dust-collecting devices equipped with HEPA filters.

3.4 LEAD

3.4.1 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.

Representative paint samples were collected and submitted to EMSL Canada Inc. (EMSL) located in Ottawa, Ontario for lead content analysis by Flame Atomic Absorption Spectrophotometry, following US EPA Method No. 7420.

The sampling of paint applications involved the collection of paint chip samples of paint layers to the substrate. A minimum volume of 5 cc or ½ teaspoon of paint chips was typically collected. Wherever necessary and possible, paint was separated from any backing material such as paper, concrete or wood and placed in a sealed clearly labelled plastic bag.

3.4.2 Findings

A summary list of the paint samples collected during assessment is provided in the table below.



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Table 3: Summary of Results of Analysis of Paint Chip Samples

Sample Number	Sampling Location	Description	Lead Content
B1A-PS-01	Building 1A – First Floor - Framing	Grey Colour Paint	340 ppm
B2-PS-01	Building 2 – Exterior Wall	Pink Colour Paint	<82 ppm
B2-PS-02	Building 2 – Main Floor- Room 2, Wall	Cream Colour Paint	1200 ppm
B3-PS-02	Building 3 – First Floor – Storage, Wall	Red Colour Paint	4800 ppm
B3-PS-01	Building 3 – First Floor – Storage, Wall	Green Colour Paint	2100 ppm

A copy of the laboratory Certificate of Analysis for the lead paint chip testing is provided in **Appendix F**. The sampling locations are indicated on the floor plans provided in **Appendix C**.

A summary list of the locations of paint applications observed during the assessment including their lead content and condition are provided in the table below. PSPC uses the *Surfacing Coating Materials Regulation SOR/2016-193* limit of 90 ppm as the criteria to manage paint applications.

Table 4: Lead-Containing (>90 ppm of Lead) Paints Applications

Paint Applications and Locations	Sampled Number	Lead Concentration (ppm)	Condition	Damaged Quantity
Building 1				
Yellow/grey coloured paint on exterior metal cladding	353-01-LP-01 (DST, 2006)	350	poor (flaking)	200 sq. m
Grey coloured paint on the metal floor	29911-1-LP01 (DST, 2017)	1,370	good	-
Building 1A				
Yellow/grey coloured paint on exterior metal cladding	353-1A-LP-01 (DST, 2006)	2,800	poor (flaking)	200 sq. m
Grey coloured paint on the interior steel framing	B1A-PS-01	340	good	-
Building 2				
Cream coloured on the interior drywall walls	B2-PS-02	1,200	poor (flaking)	50 sq. m
Building 3				
Yellow/off-white coloured paint on exterior metal cladding	353-03-LP-01 (DST, 2006)	200	poor (flaking)	300 sq. m
Blue coloured paint on the interior walls	29911-3-LP01 (DST, 2017)	3,150	poor (flaking)	10 sq. m
White coloured paint on the cast iron pipes	29911-3-LP02 (DST, 2017)	5,800	poor (flaking and rusting)	1 sq. m



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Table 4: Lead-Containing (>90 ppm of Lead) Paints Applications

Paint Applications and Locations	Sampled Number	Lead Concentration (ppm)	Condition	Damaged Quantity
Green coloured paint on the interior walls	B3-PS-01	2,100	poor (flaking)	10 sq. m
Red coloured paint on the interior walls	B3-PS-02	4,800	poor (flaking)	2 sq. m

Based on the laboratory results, the following paint applications contain lead in concentrations less than 90 ppm.

Table 5: Low Level (<90 ppm of Lead) Paint Applications

Paint Applications and Locations	Sample Number	Lead Concentration (ppm)	Condition	Damaged Quantity
Building 2				
Pink coloured paint on the exterior block walls	B2-PS-01	<82	good	-
Building 4				
White coloured paint on the ceiling of the lean-to	353-04-LP-01 (DST, 2006)	50	good	-

The DST Designated Substances and Hazardous Materials Survey Report, dated July 2017, includes paint applications submitted for toxicity characteristic leaching procedure (TCLP) analysis. The following table summarizes the results of TCLP analysis.

Table 6: Lead Leachate Toxicity in Paint Applications

Paint Applications and Locations	Sample Number	Lead Concentration (mg/L)	Condition	Damaged Quantity
Building 1				
Yellow/grey coloured paint on exterior metal cladding	29911-TCLP-1-01	1.97	poor (flaking)	200 sq. m
Building 1A				
Yellow/grey coloured paint on exterior metal cladding	29911-TCLP-1A-01	11.6	poor (flaking)	200 sq. m
Building 3				
Yellow/off-white coloured paint on exterior metal cladding	29911-TCLP-3-01	21.4	poor (flaking)	300 sq. m
Blue coloured paint on the walls and stairs	29911-TCLP-3-02	1.08	poor (flaking)	10 sq. m



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Table 6: Lead Leachate Toxicity in Paint Applications

Paint Applications and Locations	Sample Number	Lead Concentration (mg/L)	Condition	Damaged Quantity
White coloured paint on cast iron drain pipes	29911-TCLP-3-03	22.0	poor (flaking and rusting)	1 sq. m

The following paint applications exceed the 5 mg/L limit for lead leachate toxicity, as per O.Reg. 347/90:

Building 1A

- Yellow/grey coloured paint on exterior metal cladding

Building 3

- Yellow/off-white coloured paint on exterior metal cladding
- White coloured paint on cast iron drain pipes

Lead may also be present in the following materials:

- Older electrical wiring materials and sheathing
- Other paint applications not tested
- Solder used on domestic water lines
- Solder used in electrical equipment
- Exide batteries

3.4.3 Recommendations

The *EACO lead Guideline for Construction, Maintenance or Repair*, dated October 2014 sets out requirements when disturbing any lead-containing paints. The document outlines the following with respect to lead: Legal Requirements, Health Effects, Controlling the Lead Hazard, Classification on Work (Class 1, Class 2, Class 3) and Measures and Procedures for Working with Lead.

Paint applications were identified to contain lead greater than 90 ppm. Lead precautions should be followed during the demolition of materials containing lead.

Based on the TCLP results in the DST report the yellow paint on exterior cladding of Building 1A and Building 3, as well as white paint on cast-iron drain pipe in Building 3 should be disposed of as hazardous waste in accordance with O. Reg. 347/90.

The work tasks required and the ways in which lead based paints will be impacted will determine the appropriate respirators, measures and procedures that should be followed to protect workers from lead exposure, and protect the natural environment including soils, water, and other adjacent surfaces. This is to be determined by the Contractor through their own Risk Assessment.



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Actions that will disturb lead-containing materials, including paints and materials are to be conducted in such a manner to keep airborne exposure to lead dust to less than limit in O. Reg. 490/09 respecting Designated Substances - Lead made under the Occupational Health and Safety Act as amended by O. Reg. 148/12 and O. Reg. 149/12.

Prior to removal from the site and disposal, materials containing lead should be subject to toxicity characteristic leaching procedure (TCLP) testing to determine toxicity with respect to lead prior to disposal in accordance with R.R.O. 1990, Regulation 347 General - Waste Management, as amended (R.R.O. 1990, Reg. 347) under the Environmental Protection Act (EPA). If TCLP testing is not completed, contractor to assume paint to be disposed of as lead waste.

Minimum lead precautions are to be followed when performing the following Class 1 operations on lead-containing paint applications.

- Removal of lead based coatings with a chemical gel or paste and fibrous laminated cloth wrap
- Removal of lead based coatings or materials using a power tool with an effective dust collection system equipped with a HEPA filter.
- Removal of lead based coatings or materials with non-powered hand tool, other than manual scraping and sanding.

Moderate lead precautions are to be followed when performing the following Class 2 operations on lead-containing paint applications.

- Removal of lead based paints using a power tool that has an effective dust collection system equipped with a HEPA filter.
- Removal of lead based paint from by scraping or sanding using non-powered hand tools.

Maximum lead precautions are to be followed when performing the following Class 3 operations on lead based paint and lead containing paint applications.

- Removal of lead based paint from using power tools without an effective dust collection system equipped with HEPA filter.
- Abrasive blasting of lead based paint.

3.5 MERCURY

3.5.1 Methodology

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

3.5.2 Findings

Mercury vapour is likely to be present in fluorescent light tubes, and batteries observed in the following locations:

- Building 3 – 32 Exide batteries
- Building 4 – 100 fluorescent light tubes



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Light fixtures with fluorescent light tubes may be present in buildings and areas of buildings that were not accessible. Mercury may also be present in some paints and adhesives. No suspected mercury containing thermostats were observed at the time of the assessment.

3.5.3 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 demolition activities that may disturb the equipment. Prior to demolition work or renovation, the light tubes and batteries 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.

Mercury in paints and adhesives is not expected to cause a hazard during the renovation activities. No further action is needed. Precautions taken for lead abatement will be sufficient to control exposure to other heavy metals including mercury.

3.6 SILICA

3.6.1 Methodology

An assessment for the presence of silica was conducted. The presence of silica in building materials such as concrete, masonry, stone, terrazzo, refractory brick, ceramic tile, ceiling tile etc. was noted.

3.6.2 Findings

Silica is expected to be present in concrete, vinyl floor finishes, ceramic tile, siporex, and plaster and drywall wall finishes observed.

3.6.3 Recommendations

The Guideline: Silica on Construction Projects issued by the MOL, dated April 2011 outlines: legal requirements, health effects, controlling the silica hazard, classification on work and measures, and procedures for working with silica and should be followed during disturbance of silica-containing materials.

The Guideline defines the classification of work. It is the classification of the work that determines the appropriate respirators, measures and procedures that should be followed to protect the worker from silica exposure. In the guideline, silica-containing construction operations are classified into three groups, Type 1, Type 2, and Type 3 operations, and can be thought of as being of low, medium, and high risk. From Type 1 to Type 3 operations, the corresponding respirator, and measures and procedures become increasingly stringent.



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Precautions should be taken as required during renovation projects impacting materials expected to contain silica (i.e., concrete block walls and drywall) where dust may be generated. Whenever practical changing how a process is performed to lower the silica exposure is preferable. Wet methods reduce dust and should be used whenever practical, particularly in cutting, grinding, and drilling operations.

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 respirable airborne silica (cristobalite) is 0.05 mg/m³ and 0.10 mg/m³ for quartz/Tripoli. However, the more stringent level of 0.025 mg/m³ for respirable crystalline silica (quartz, cristobalite) applies as noted in the ACGIH 2018 TLVs for Chemical Substances and Physical Agents. The assessment and control program and medical surveillance requirements are for non-construction projects as defined in O. Reg. 490/09.

3.7 POLYCHLORINATED BIPHENYLS

3.7.1 Methodology

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

3.7.2 Findings

Polychlorinated Biphenyls are not suspected to be present in the light ballasts within the fluorescent light fixtures in Building 4 and Building 1, as the light fixtures observed had T8 light tubes which use electronic ballasts. One electronic light ballast was inspected in a dismantled light fixture observed in the Building 1.

PCBs may be present in the fluorescent light ballasts of 15 light fixtures in Building 3. The referenced DST reports identify the light fixtures as T-12 fixtures which are more likely to have PCB-containing ballasts. The ballasts could not be inspected at the time of the assessment as they were not accessible for health and safety reasons.

3.7.3 Recommendations

A certified election is to remove light fixtures to be impacted by the renovations. The fluorescent lamp ballast is to be inspected by the environmental consultant to confirm whether any of the lamp ballast are PCB-Containing. The lamp ballast that are identified to be PCB-containing are to be removed for disposal at a licensed waste facility. Temporary on-site storage of PCB-containing materials should be conducted in accordance with the applicable regulations.

The remaining fluorescent lamp ballasts that are not to be impacted that may contain PCBs can be managed in place. No further action is currently required until such time that renovation or demolition activities are to be conducted, or until 2025, when PCB-containing ballasts will require removal and disposal.



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3.8 OZONE DEPLETING SUBSTANCES

3.8.1 Methodology

An assessment for equipment likely to contain ODSs was completed. Information on the type of equipment, manufacturer and type and quantity of refrigerants was recorded, where available.

3.8.2 Findings

The following equipment is suspected to be ODS-containing as the labels were not accessible:

Equipment	Location	Refrigerant
Refrigerator (2 units)	Building 1A – first floor	Suspect ODS-containing
Display refrigerator (4 units)	Building 1A – first floor	Suspect ODS-containing

The floor plans showing the locations of the suspect ODS-containing equipment is provided in **Appendix C**.

3.8.3 Recommendations

When refrigeration equipment that is confirmed or suspected to be ODS-containing is decommissioned, it should be inspected by a refrigeration mechanic certified under Section 34 of O. Reg. 463/10 of the EPA. Additional requirements apply if any of the refrigerants present are or contain Class 1 ODS.

3.9 MOULD

3.9.1 Methodology

An assessment for the potential presence of mould was completed. This involved a visual assessment of accessible surfaces for obvious evidence of mould, moisture or water damage.

3.9.2 Findings

Suspect mould was observed as follows:

- Building 1A – on the ceiling tiles located on the second floor (approximately 15 sq. m)
- Building 2 – on the wood decking of room 2 (approximately 40 sq. m) and on the drywall walls in room 2 (approximately 10 sq. m)
- Building 3 – on the pipe insulation (approximately 35 m) and on the drywall walls (approximately 12 sq. m)
- Building 4 – on the north exterior wall (approximately 2 sq. m)

Standing water was observed on the first and second floor of Building 3. Various building materials appeared to be water damaged (deteriorating and rusting) throughout the building.



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3.9.3 Recommendations

Mould precautions should be followed in accordance with the following documentation during the demolition at the site.

- *CCA Mould Guidelines for the Canadian Construction Industry*, dated 2004
- *EACO Mould Abatement Guidelines*, dated 2010

3.10 UREA FORMALDEHYDE FOAM INSULATION

3.10.1 Methodology

An assessment for the potential presence of UFFI was completed. This involved the assessment of exterior and interior walls for evidence of repaired openings (i.e., nozzle holes) made to facilitate the installation of the insulation. Wherever possible, an assessment of wall cavities through existing openings was made.

3.10.2 Findings

Evidence of the application of UFFI was not observed to be present.

3.10.3 Recommendations

As evidence of the application of UFFI was not observed, no recommendations have been provided.

3.11 RADIOACTIVE SOURCES

3.11.1 Methodology

An assessment for the presence of radioactive sources within smoke detectors was completed.

3.11.2 Findings

No smoke detectors were observed at the time of the assessment.

3.11.3 Recommendations

As evidence of radioactive sources was not observed, no recommendations have been provided.

3.12 CHEMICAL, FUEL OIL AND/OR WASTE OIL STORAGE

3.12.1 Methodology

Visual assessment for potential presence of chemical, fuel oil and/or waste oil storage was completed.



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3.12.2 Findings

The following hazardous chemicals were observed within the subject buildings:

- Building 1 – four unlabeled gas cylinders
- Building 3 – one unlabeled gas cylinder
- Building 3 – one unlabeled metal drum
- Building 4 – gas cylinders (one oxygen and seven propane cylinders)
- Building 4 – above ground fuel storage tank
- Building 4 – above ground waste oil storage tank
- Building 4 – five-gallon oil pails various other chemicals

Unlabeled containers are presumed to contain hazardous contents.

3.12.3 Recommendations

The chemicals, fuel oil, waste oil and storage tanks should be removed from site prior to demolition activities. The chemicals stored in building 4 are not expected to be impacted by demolition activities. No further actions are required.

Chemicals, fuel oil and/or waste oil should be stored in accordance with the documents entitled:

- *Fire Protection and Prevention Act, 1997*
- *Occupational Health and Safety Act*

Chemicals, fuel oil and/or waste oil should be store in a manner to ensure that spills and accidental losses of chemicals and/or wastes are contained.

3.13 OTHER DESIGNATED SUBSTANCES: ACRYLONITRILE, ARSENIC, BENZENE, COKE OVEN EMISSIONS, ETHYLENE OXIDES, ISOCYANATE, VINYL CHLORIDE

3.13.1 Methodology

Designated substances including acrylonitrile, arsenic, benzene, coke oven emissions, ethylene oxides, isocyanates, and vinyl chloride are not typically a concern in building 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.
- Arsenic or arsenic compounds may be present in paints and adhesives.
- Benzene as a constituent of hydrocarbon-based mixtures and is present in a stable form in roofing materials, paints and adhesives. Benzene in these forms is not expected to be of a worker exposure concern.
- 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.



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4.0 CLOSURE

This report has been prepared for the sole benefit of the Public Works and Government Services Canada. The report may not be used by any other person or entity without the express written consent of Stantec Consulting Ltd. and Public Works and Government Services Canada.

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/or sampling locations and can only be extrapolated to an undefined limited area around these locations. The extent of the limited area depends on building construction and conditions, weather, building 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.



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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.

This report was prepared by Tait van Wyk and reviewed by Matthew Magnus and Rob Robinson.

Regards,

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APPENDICES

DESIGNATED SUBSTANCES AND HAZARDOUS BUILDING MATERIALS SURVEY – MOOSONEE NATIONAL DEFENCE RADAR BASE, MOOSONEE, ONTARIO

Appendix A Designated Substances and Hazardous Building Materials Background Information and
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Appendix A DESIGNATED SUBSTANCES AND HAZARDOUS BUILDING 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.

On Federal sites, asbestos requirements in the Canada Labour Code and Canada Occupational Health and Safety Regulations will apply.

Canada Labour Code (Part II) defines the requirements for an asbestos exposure control plan to be developed before undertaking any work activities that involves asbestos-containing materials. The Canada Labour Code (*Part II*) also stipulate the requirements for air monitoring during removal procedures.

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 work days.



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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 buildings that have been identified to contain asbestos. The Canada Labour Code also stipulates in Part II that every employer shall ensure that the health and safety at work of every person employed by the employer is protected.

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 and Climate Change (MOECC). 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 MOECC.

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° C, as in welding and flame cutting or burning.



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The United States Department of Housing and Urban Development (HUD) set a criteria 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. For the purposes of this report, and material with >90 ppm of lead is considered as lead-containing.

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 milligrams 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 EACO document entitled *Lead Guideline for Construction, Renovation Maintenance or Repair*, issued October 2014 sets out guidelines for operations involving the handling, application, removal, 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.

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.

Mercury

Mercury is commonly found in buildings, as it is contained in mercury vapour lighting, thermostats, thermometers, and electrical mercury switches. If mercury is exposed to the air, odourless vapours are formed. The regulated occupational exposure limit for airborne mercury is $0.025 \text{ mg}/\text{m}^3$ (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.



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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/m³).

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/m³ (O. Reg. 490/09 and R.R.O. 1990, Reg. 833). However the more stringent level of 0.025 mg/m³ for respirable crystalline silica (quartz, cristobalite) applies as noted in the ACGIH 2018 TLVs for Chemical Substances and Physical Agents.

Silica is included in O. Reg. 490/09 and the regulation provides information on the application of the regulation. The assessment and control program and medical surveillance requirements are for non-construction projects as defined in O. Reg. 490/09.

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 building 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 building 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.



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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 ($10 \mu\text{g}/\text{m}^3$) as prescribed by O. Reg. 490/09 and R.R.O. 1990, Reg. 833. The STEL for arsenic is $50 \mu\text{g}/\text{m}^3$ 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 buildings. However, over time, the benzene component typically volatilizes out of the paints, solvents and roofing bitumens and is released into the ambient air. Therefore, it is likely that only trace levels of benzene presently exist in these building materials. It is not expected that benzene emissions from any existing building 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 buildings. The TWA for a worker with respect to coke oven emissions is $150 \mu\text{g}/\text{m}^3$ 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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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 in building such as plumbing pipes, protective coatings on insulated pipes and interior finishes (i.e., vinyl baseboard trim). 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.

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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/ m³ 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.



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Ozone-Depleting Substances

Ozone-depleting substances (ODSs) are chemical agents known as chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs) used in various refrigeration equipment including air-conditioning, heat pump, refrigeration or freezer units. They have also been used in solvents, as aerosol additives in the production of foam insulation and in fire extinguishing equipment. The use of refrigerants (including those that are ODSs or contain ODSs) is regulated by Ontario Regulation 463/10, *Ozone Depleting Substances and Other Halocarbons* (O. Reg. 463/10), under the EPA. The regulation imposes restrictions on the purchasing of refrigerants and on the servicing, dismantling, disposing of or decommissioning of equipment containing refrigerants or halon fire extinguishing agents.

On federal land, aboriginal land and federal works, buildings and undertakings, *Federal Halocarbon Regulation 2003* (SOR/2003-289) applies. All other buildings and uses of refrigerants and other agents are under the *Ozone-Depleting Substances Regulations 1998* (SOR/99-7), under CEPA. The regulations prohibit the release of halocarbons contained in refrigeration systems, air conditioning systems, fire extinguishers (except to fight a fire that is not a fire caused for training purposes) or containers or equipment used in the re-use, recycling, reclamation or storage of a halocarbon.

The regulations also impose restrictions on the servicing and dismantling, disposing of or decommissioning of any system containing halocarbons and requires the recovery of halocarbons into an appropriate container by a certified individual. The regulation also details an owner's record-keeping obligations.

Mould

Mould can be found everywhere in the outside environment, on plants, in soil and on dead and decaying matter (i.e., dead leaves). Mould requires two main conditions in order to grow - a source of food (a substrate typically comprised of cellulose) and water. Sources of food for mould are plentiful in outdoor and indoor environments; however, it is the presence of water in an indoor environment that will determine mould growth. The source of water can be a result of a water pipe leak or even excess condensation. Thus, the key to controlling mould indoors is to control the presence of water.

At present, there are no specific laws or regulations governing acceptable levels of mould in buildings. The lack of specific regulatory standards is due in part to an inability to establish exposure-response relationships. Variation in individual susceptibility, limitations in sampling and analytical techniques, and the vast number of fungal agents and their products make it difficult to establish safe levels of exposure for all individuals. With a lack of defined exposure criteria, current Health Canada and other agency guidelines on the assessment and control of mould contamination in public buildings are largely based on prudent avoidance (i.e., remove any indoor growth or amplification site of mould, regardless of the concentration of moulds or their products in the indoor environment).

Although there are currently no regulations in Canada pertaining specifically to mould in buildings, based on an Ontario MOL alert, employers are required by Section 25(2)(h) of the Occupational Health and Safety Act to take every precaution reasonable in the circumstances for the protection of workers.



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The OHSA places a responsibility on constructors (Section 23), employers (Section 25), and supervisors (Section 27) to ensure the health and safety of workers. This includes protecting workers from mould in workplace buildings. Various sections of the Industrial, Construction, Mining or Health Care regulations may also apply to maintenance and remediation activities.

The Ontario MOL has published an Alert (MOL, 2000) indicating that sustained and/or extensive growth of visible mould on interior surfaces of a building is unacceptable and stating that mould growth on the interior surfaces of buildings is a risk factor for health problems.

Several guidelines and other resources describe procedures for the investigation and remediation of mould. The following documents indicate that mould observed in occupied building should be remediated in accordance with these procedures:

- *Environmental Abatement Council of Ontario's (EACO) Mould Abatement Guidelines*, 2010 – Edition 2;
- *Mould Guidelines for The Canadian Construction Industry*, Canadian Construction Association – 82, 2004;
- *Guidelines on Assessment and Remediation of Fungi in Indoor Environment*, New York City Department of Health and Mental Hygiene, November 2008;
- *Bioaerosols: Assessment and Control*, American Conference of Governmental Industrial Hygienists (ACGIH), 1999;
- *Fungal Contamination in Public Buildings: Health Effects and Investigation Methods*, Federal-Provincial Committee on Environmental and Occupational Health, 2004;
- *Field Guide for the Determination of Biological Contaminants in Environmental Samples*, American Industrial Hygiene Association (AIHA), 1996; and,
- *Clean-Up Procedures for Mould in Houses*, Canada Mortgage and Housing Corporation (CMHC), 2004.

Urea Formaldehyde Foam Insulation

Urea-formaldehyde foam insulation (UFFI) was developed in Europe in the 1950s as an improved means of insulating difficult-to-reach cavities in building walls. It is typically made at a construction site from a mixture of urea-formaldehyde resin, a foaming agent and compressed air. When the mixture is injected into the wall, urea and formaldehyde unite and "cure" into an insulating foam plastic.

During the 1970s, when concerns about energy efficiency led to efforts to improve home insulation in Canada, UFFI became an important insulation product for existing houses. Most installations occurred between 1977 and its ban in Canada in 1980.

In the insulating process, a slight excess of formaldehyde was often added to ensure complete "curing" with the urea to produce the urea-formaldehyde foam. Formaldehyde is a pungent, colourless gas commonly used in water solution as a preservative and disinfectant. It is also a basis for major plastics, including durable adhesives. It occurs naturally in the human body and in the outdoor environment. Formaldehyde is used to bond plywood, particleboard, carpets and fabrics. Formaldehyde is also a by-product of combustion; it is found in tobacco smoke, vehicle exhaust and the fumes from furnaces, fireplaces and wood stoves.



DESIGNATED SUBSTANCES AND HAZARDOUS BUILDING MATERIALS SURVEY – MOOSONEE NATIONAL DEFENCE RADAR BASE, MOOSONEE, ONTARIO

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While small amounts of formaldehyde are harmless, it is an irritating and toxic gas in significant concentrations. Symptoms of overexposure to formaldehyde include irritation to eyes, nose and throat; persistent cough and respiratory distress; skin irritation; nausea; headache; and dizziness.

Health Canada has determined that 0.1 parts per million (ppm) is a safe level of formaldehyde in the home. Sensitivity to this level may vary based on individual age and health.

Tests show that UFFI is not a source of over-exposure to formaldehyde after the initial curing and release of excess gas. As it was last installed in 1980, it would certainly not be causing excess indoor formaldehyde today. Buildings with UFFI show no higher formaldehyde levels than those without it. However, if UFFI comes in contact with water or moisture, it could begin to break down. Wet or deteriorating UFFI should be removed by a specialist and the source of the moisture problem should be repaired.

There are currently no regulations in Canada pertaining specifically to UFFI in buildings. However, the Occupational Health and Safety Act places a responsibility on constructors (Section 23), employers (Section 25), and supervisors (Section 27) to ensure the health and safety of workers.

Zinc

Zinc is a natural, healthy, and abundant element that was first used in construction in 79 AD. Zinc metal has a number of characteristics that make it a well-suited corrosion protective coating for iron and steel products. Zinc's excellent corrosion resistance in most environments accounts for its successful use as a protective coating on a variety of products and in many exposure conditions.

There are currently no regulation in Canada pertaining specifically to Zinc. However, the Occupational Health and Safety Act places a responsibility on constructors (Section 23), employers (Section 25), and supervisors (Section 27) to ensure the health and safety of workers.



**DESIGNATED SUBSTANCES AND HAZARDOUS BUILDING MATERIALS SURVEY –
MOOSONEE NATONAL DEFENCE RADAR BASE, MOOSONEE, ONTARIO**

Appendix B Site Photographs
September 3, 2019

Appendix B SITE PHOTOGRAPHS





Photo 1: Building 1 – View of the exterior of the building.



Photo 2: Building 1 – Asbestos-containing (2% chrysotile) interior window glaze compound – grey observed to be in poor condition (cracking).



Photo 3: Building 1 – Asbestos-containing (5% chrysotile) exterior caulking – grey.



Photo 4: Building 1 – lead-containing (350 ppm) yellow/grey coloured paint on the exterior metal cladding.



Photo 5: Building 1A – View of the exterior of the building.



Photo 6: Building 1A – Asbestos-containing (65% chrysotile) insulating cement on pipe fittings.



Photo 7: Building 1A – Asbestos-containing (65% chrysotile) insulating cement on pipe fittings observed debris on floor.



Photo 8: Building 1A – Asbestos-containing (30% chrysotile) pre-formed pipe straight insulation.



Photo 9: Building 1A – Asbestos-containing (2% chrysotile) interior window glaze compound – grey.



Photo 10: Building 1A – Asbestos-containing (1% chrysotile) 9"x9" vinyl floor tile – grey.



Photo 11: Building 1A – Asbestos-containing (15% chrysotile) interior joint caulking – grey.



Photo 12: Building 1A – Suspect ODS-containing refrigerator display units.



Photo 13: Building 2 – View of the exterior of the building.



Photo 14: Building 2 – Asbestos-containing (1.7% chrysotile) exterior caulk – grey located on the exterior of the building (north vent).



Photo 15: Building 2 – Asbestos-containing (3% chrysotile) drywall joint-fill compound located in room 2.



Photo 16: Building 2 – Asbestos-containing (1.2% chrysotile) mastic associated with 9"x9" vinyl floor tile – green located in room 2.



Photo 17: Building 2 – Presumed asbestos-containing cement board panel located in room 1.



Photo 18: Building 2 – Presumed asbestos-containing duct insulation – black located in room 2.



Photo 19: Building 2 – Presumed asbestos containing roof insulation, roof caulking and roofing materials.

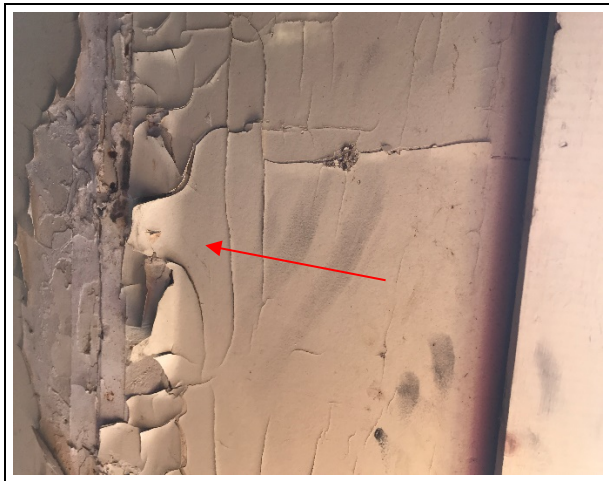


Photo 20: Building 2 – Lead-containing (1,200 ppm) cream coloured paint located on the drywall walls in room 2.



Photo 21: Building 3 – View of the exterior of the building.



Photo 22: Building 3 – Asbestos-containing (65% chrysotile) insulating cement on pipe fittings located in the entrance.



Photo 23: Building 3 – Asbestos-containing (75% chrysotile) pre-formed tank/body insulation on the condensate return tank located in the storage room.



Photo 24: Building 3 – Asbestos-containing (10% chrysotile) sprayed fireproofing located in the storage room.



Photo 25: Building 3 – Asbestos-containing (10% chrysotile) sprayed fireproofing debris located on the floor in the entrance.



Photo 26: Building 3 – Asbestos-containing (2% chrysotile) 9"x9" vinyl floor tile – grey located in the entrance.



Photo 27: Building 3 – Asbestos-containing (2% chrysotile) 9"x9" vinyl floor tile – grey located on the second floor.



Photo 28: Building 3 – Asbestos-containing (2% chrysotile) drywall joint-fill compound located in the storage room.



Photo 29: Building 3 – Presumed asbestos-containing fire rated door located between communications and the storage room.



Photo 30: Building 3 – Presumed asbestos-containing fire rated door located in the entrance.



Photo 31: Building 3 – Lead-containing (200 ppm) yellow/off-white coloured paint located on the exterior metal cladding.

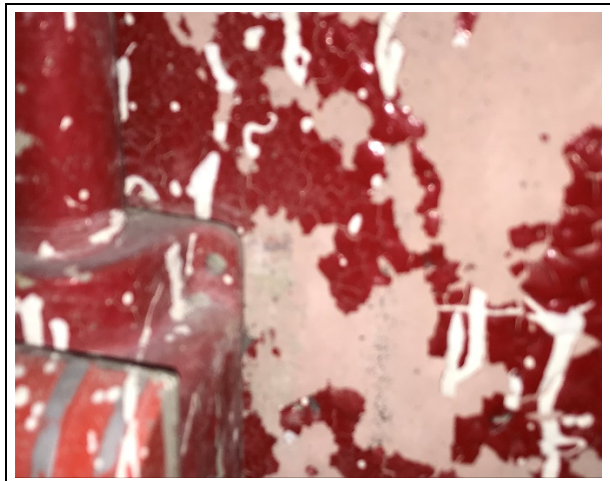


Photo 32: Building 3 – Lead-containing (4,800 ppm) red coloured paint located on the interior walls of the storage room.



Photo 33: Building 3 – Lead-containing (2,100 ppm) green coloured paint on the interior walls of the storage room.



Photo 34: Building 3 – Suspect mercury containing batteries located in the communications room.



Photo 35: Building 3 – Suspect PCB-containing ballasts associated with light fixtures.

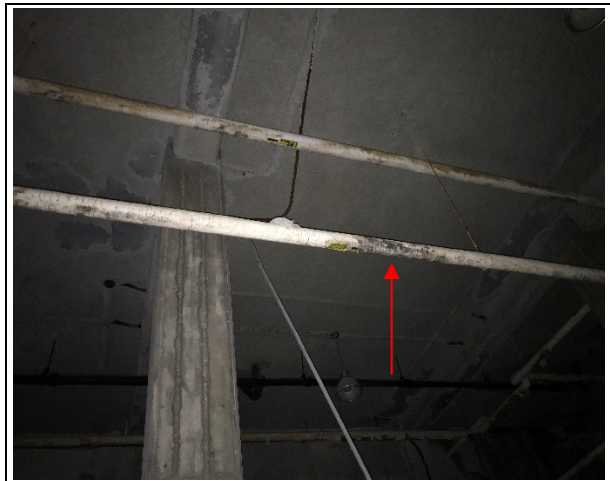


Photo 36: Building 3 – Suspect mould located on the pipe insulation within the storage room.



Photo 37: Building 4 – View of the exterior of the building.



Photo 38: Building 4 – Asbestos-containing (65% chrysotile) insulating cement on pipe fittings located in the storage room.



Photo 39: Building 4 – Asbestos-containing (20% chrysotile) cement board panels located on the exterior of the building (north wall).



Photo 40: Building 4 – Asbestos-containing (5% chrysotile) exterior caulking – grey located on the exterior walls.



Photo 41: Building 4 – Asbestos-containing (2% chrysotile) exterior window caulking – grey located on the storage room window.



Photo 42: Building 4 – Presumed asbestos-containing fire rated door located in bay 2 (west wall).



Photo 43: Building 4 – Non-PCB-containing electric ballast associated with the light fixture in office 1.



Photo 44: Building 4 – Suspect mould located on the exterior north wall.



Photo 45: Building 5&5A – View of the exterior of building 5 and building 6 (decommissioned clarifiers).



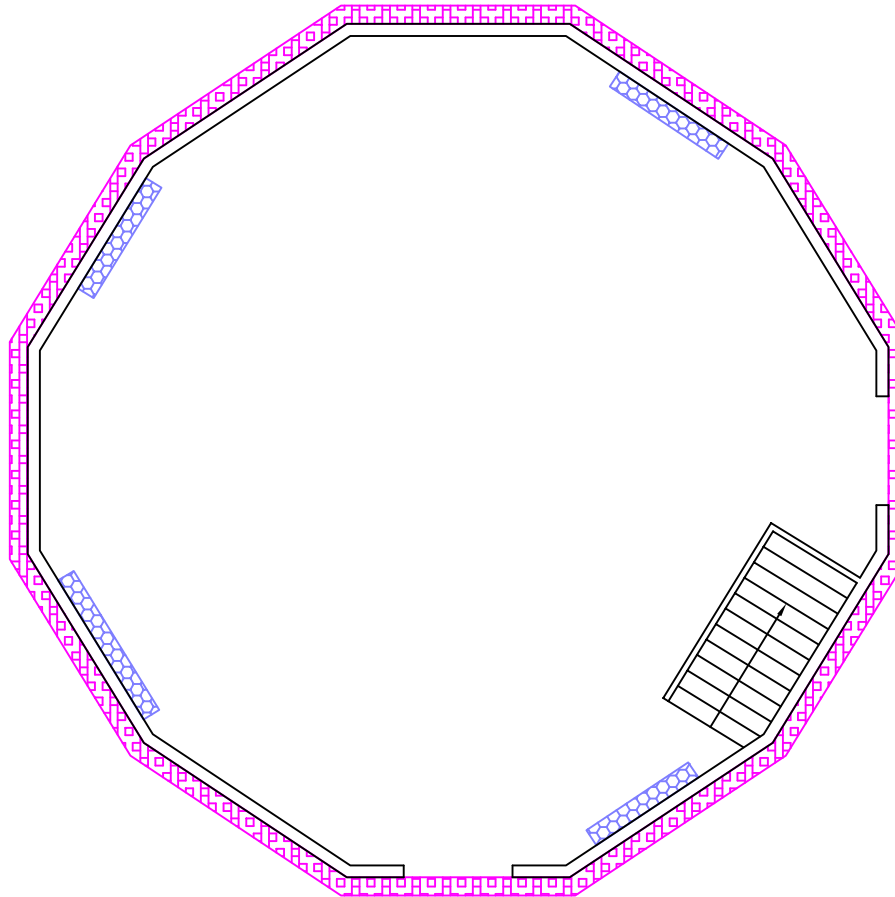
Photo 46: Building 5&5A – Presumed asbestos-containing roofing materials and roof caulking.

**DESIGNATED SUBSTANCES AND HAZARDOUS BUILDING MATERIALS SURVEY –
MOOSONEE NATONAL DEFENCE RADAR BASE, MOOSONEE, ONTARIO**

Appendix C Floor Plan
September 3, 2019



Appendix C FLOOR PLAN





BUILDING 1 - FIRST FLOOR

LEGEND

-  ASBESTOS-CONTAINING INTERIOR WINDOW GLAZE COMPOUND
-  ASBESTOS-CONTAINING EXTERIOR CAULKING

NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC CONSULTING LTD. REPORT AND MUST NOT BE USED FOR OTHER PURPOSES.

FLOOR PLAN

BUILDING 1, MOOSONEE NATIONAL DEFENCE RADAR BASE, MOOSONEE, ONTARIO

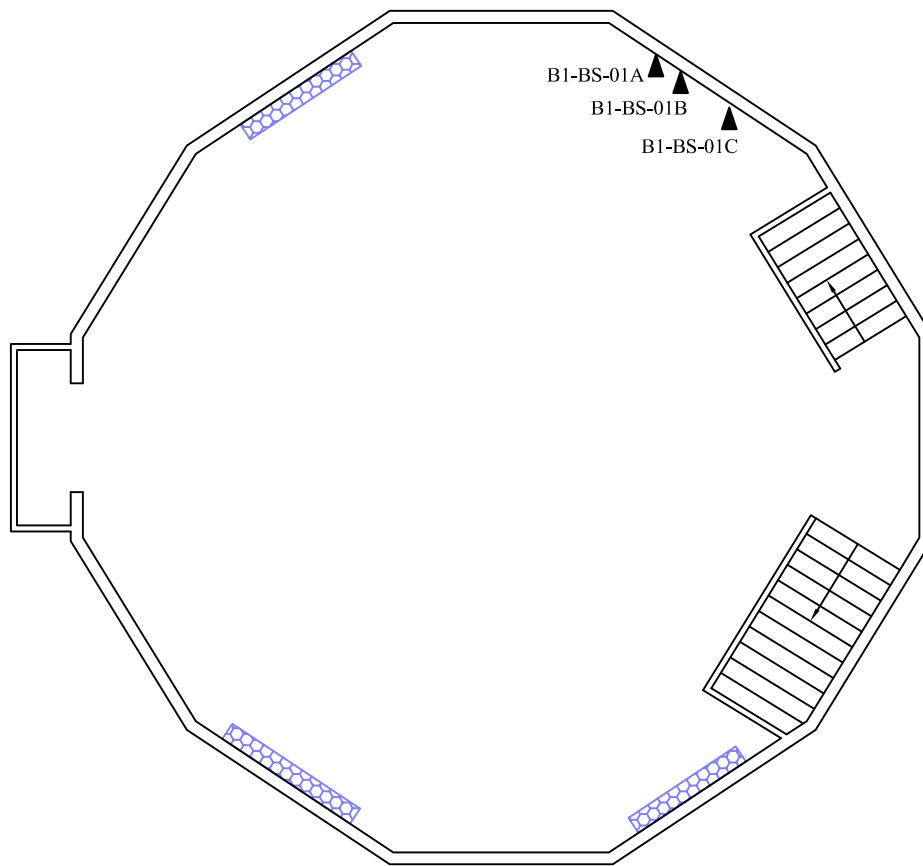
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Scale: N.T.S.
Date: 19/03/26
Dwn. By: CD <small>SL2019030443</small> CS/DM
App'd By: MM

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1





BUILDING 1 - SECOND FLOOR

LEGEND

-  BULK SAMPLE
-  ASBESTOS-CONTAINING INTERIOR WINDOW GLAZE COMPOUND

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FLOOR PLAN

BUILDING 1, MOOSONEE NATIONAL DEFENCE RADAR BASE, MOOSONEE, ONTARIO

Client: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

Project No.: 163302647

Scale: N.T.S.

Date: 19/03/26

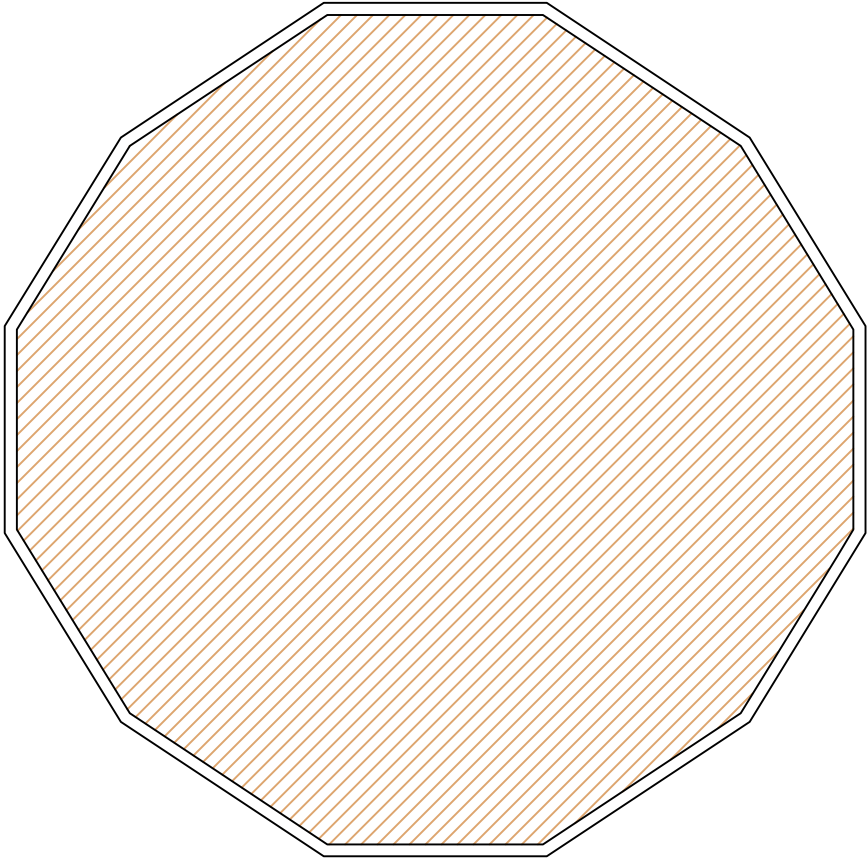
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CS/DM

App'd By: MM

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BUILDING 1 - ROOF

LEGEND


 ASBESTOS-CONTAINING
TAR

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FLOOR PLAN

BUILDING 1, MOOSONEE NATIONAL DEFENCE RADAR BASE, MOOSONEE, ONTARIO

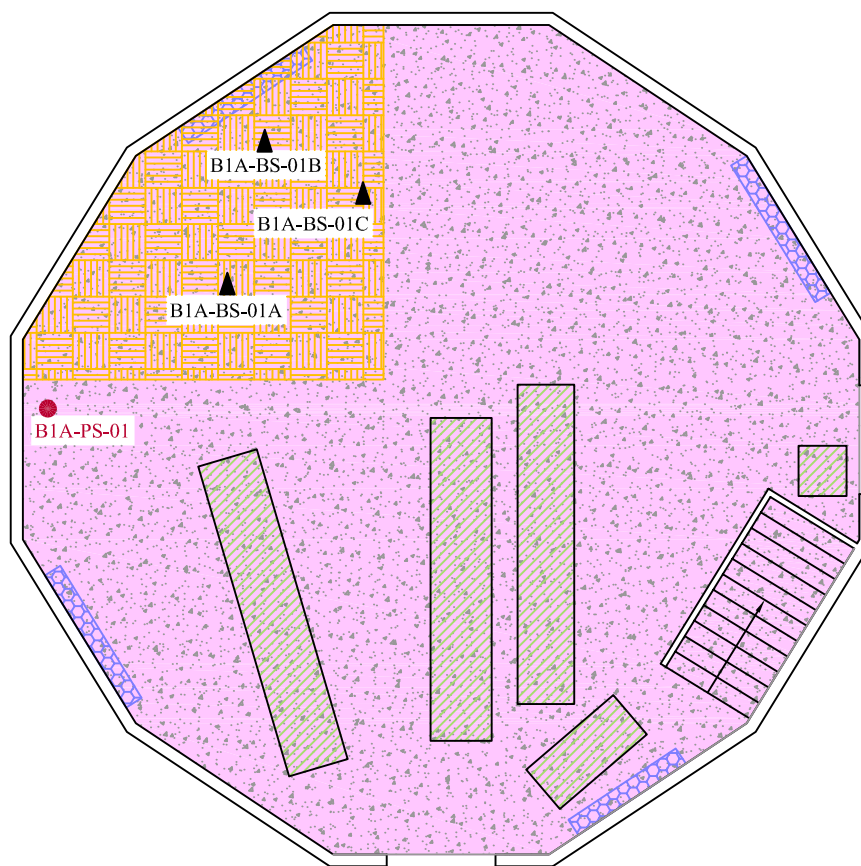
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Dwn. By:	CD <small>SL2019030445</small> CS/DM
App'd By:	MM

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3





BUILDING 1A - FIRST FLOOR

LEGEND

- ▲ BULK SAMPLE
- PAINT CHIP SAMPLE
- ASBESTOS-CONTAINING INTERIOR WINDOW GLAZE COMPOUND
- ASBESTOS-CONTAINING VINYL FLOOR TILES
- ASBESTOS-CONTAINING THERMAL SYSTEM INSULATION
- ASBESTOS-CONTAINING THERMAL SYSTEM INSULATION DEBRIS
- SUSPECT ODS-CONTAINING REFRIGERATOR

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FLOOR PLAN

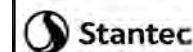
BUILDING 1A, MOOSONEE NATIONAL DEFENCE RADAR BASE, MOOSONEE, ONTARIO

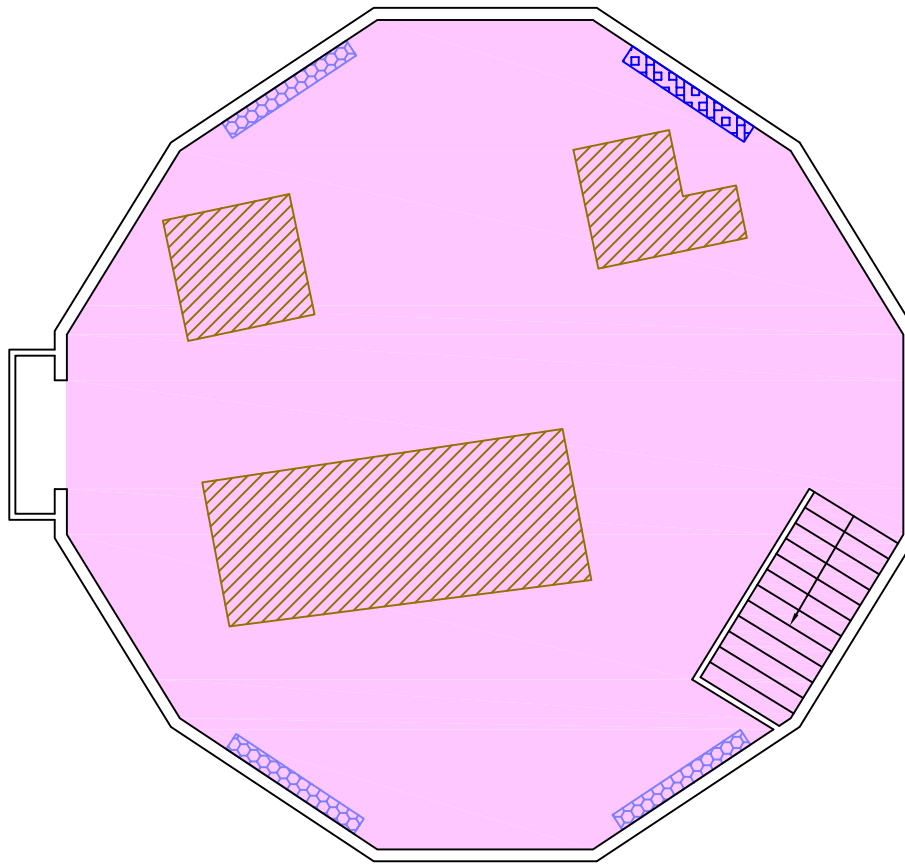
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


4





BUILDING 1A - SECOND FLOOR

LEGEND

-  ASBESTOS-CONTAINING INTERIOR CAULKING
-  ASBESTOS-CONTAINING INTERIOR WINDOW GLAZE COMPOUND
-  ASBESTOS-CONTAINING THERMAL SYSTEM INSULATION
-  SUSPECT MOULD IMPACTED BUILDING MATERIALS

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FLOOR PLAN

BUILDING 1A, MOOSONEE NATIONAL DEFENCE RADAR BASE, MOOSONEE, ONTARIO

Client: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

Project No.: 163302647

Scale: N.T.S.

Date: 19/03/27

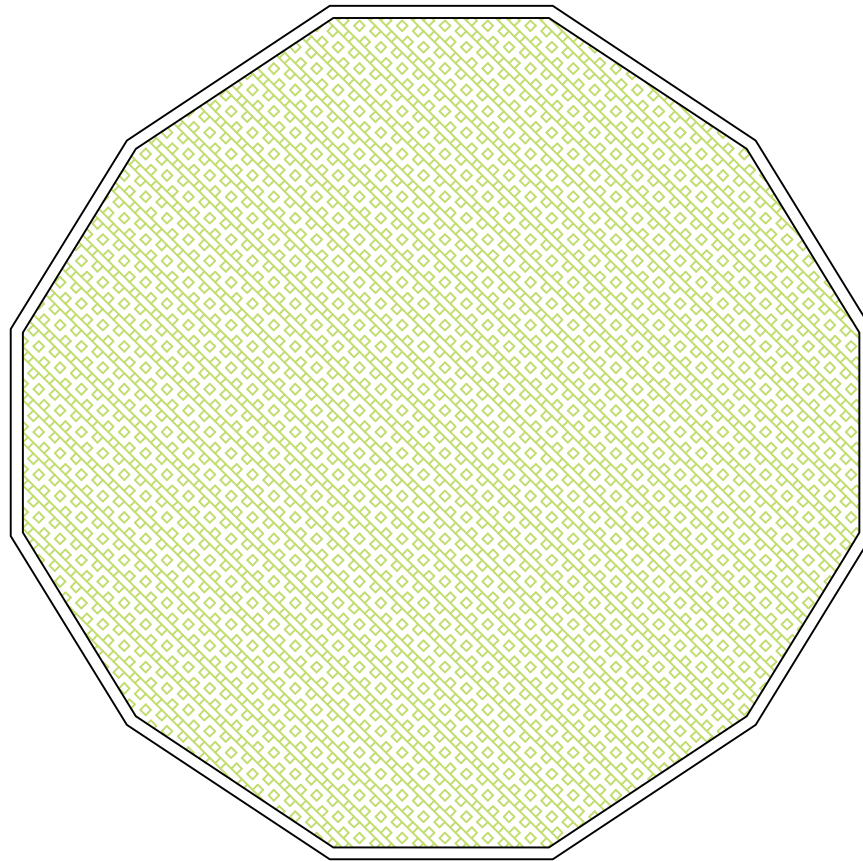
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5





BUILDING 1A - ROOF

LEGEND

 PRESUMED ASBESTOS-CONTAINING
ROOFING MATERIALS AND ROOF CAULKING

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FLOOR PLAN

BUILDING 1A, MOOSONEE NATIONAL DEFENCE RADAR BASE, MOOSONEE, ONTARIO

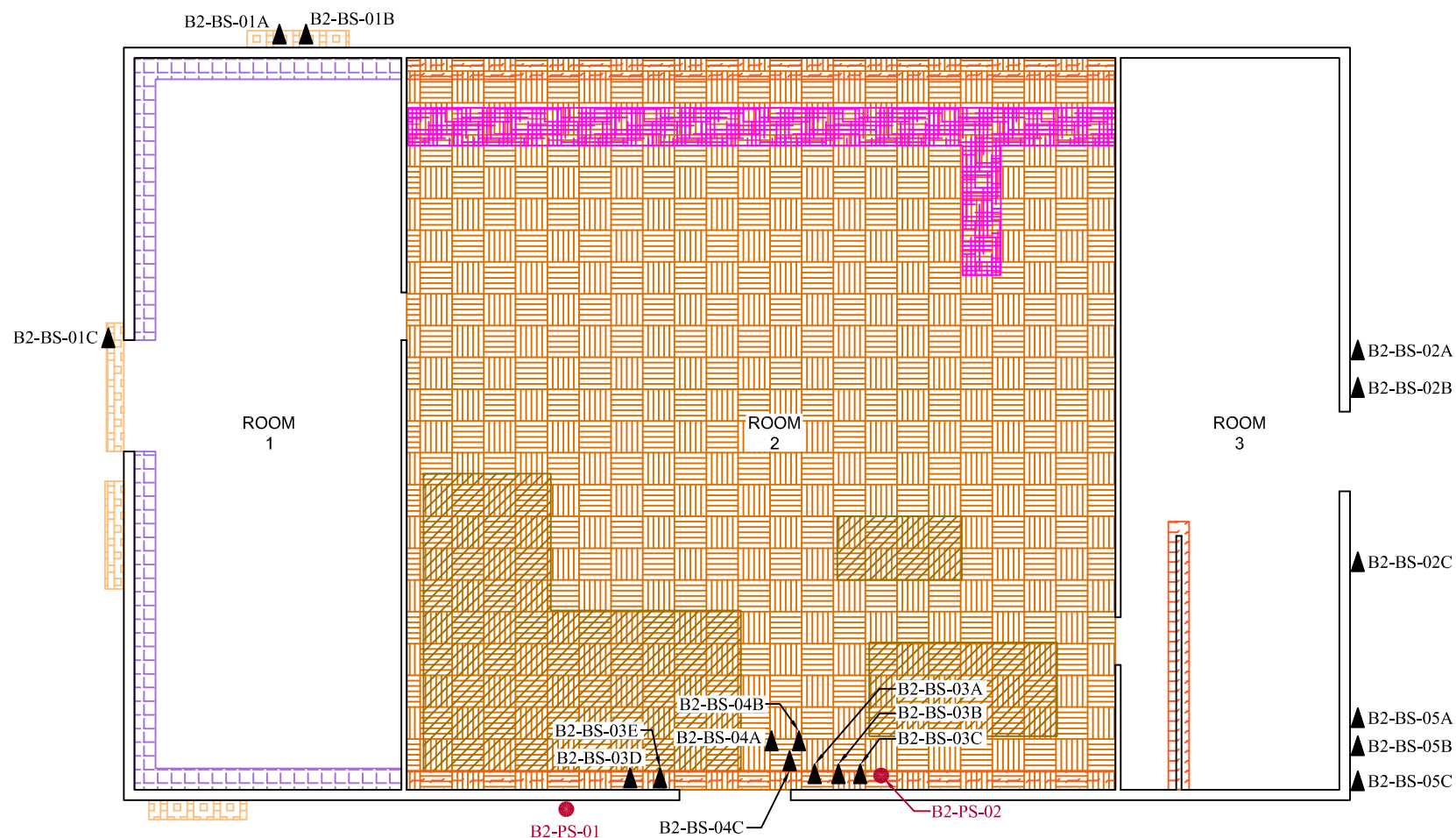
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Dwg. No.:

6





BUILDING 2 - MAIN FLOOR

LEGEND

- ▲ BULK SAMPLE
- PAINT CHIP SAMPLE
- ASBESTOS-CONTAINING DRYWALL JOINT-FILL COMPOUND
- PRESUMED ASBESTOS-CONTAINING CEMENT BOARD
- ASBESTOS-CONTAINING CAULKING
- PRESUMED ASBESTOS-CONTAINING DUCT INSULATION
- ASBESTOS-CONTAINING MASTIC
- SUSPECT MOULD IMPACTED BUILDING MATERIALS

NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC CONSULTING LTD. REPORT AND MUST NOT BE USED FOR OTHER PURPOSES.

FLOOR PLAN

BUILDING 2, MOOSONEE NATIONAL DEFENCE RADAR BASE, MOOSONEE, ONTARIO

Client:

PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

Project No.: 163302647

Scale: N.T.S.

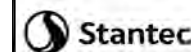
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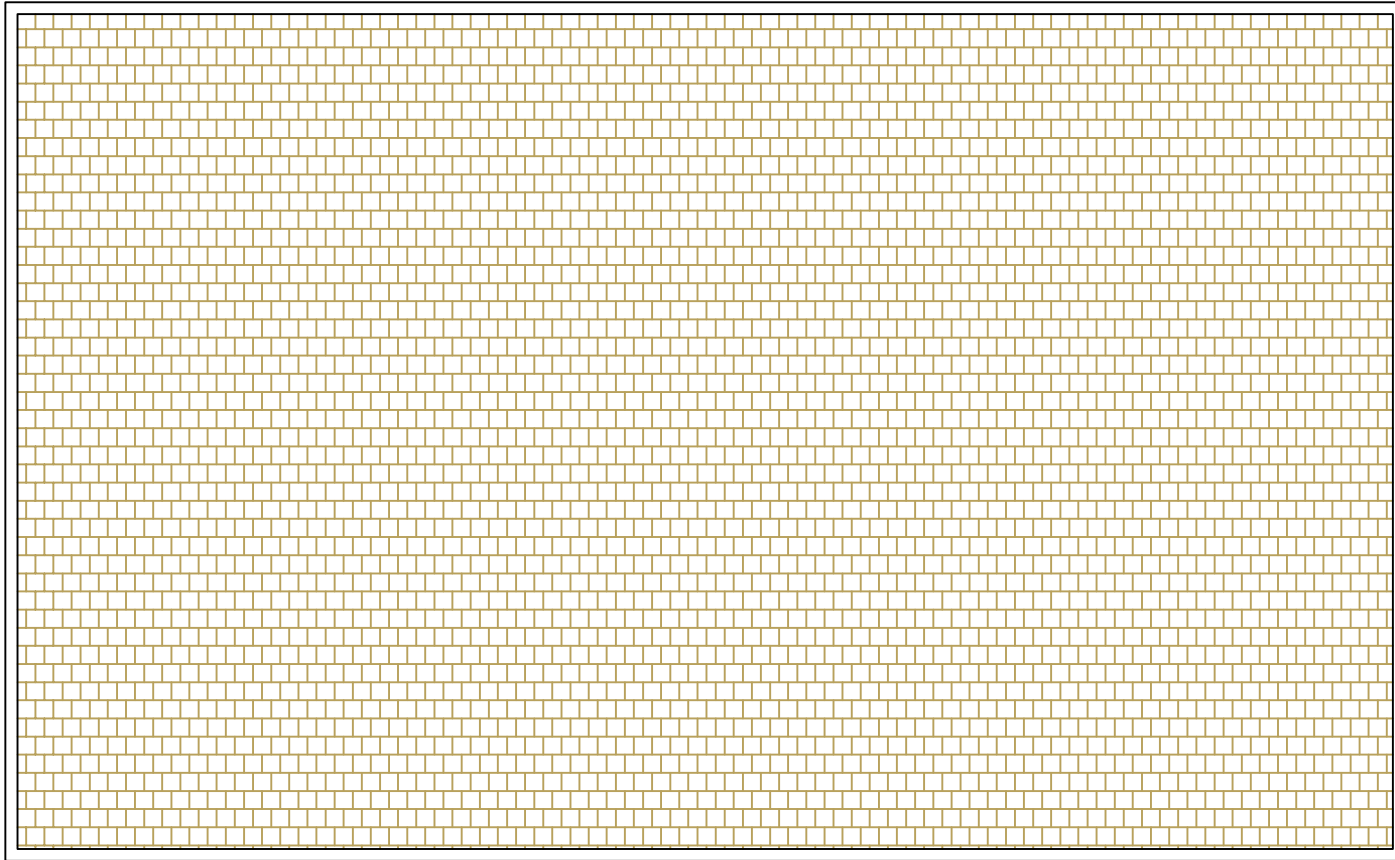
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CS/DM

App'd By: MM

Dwg. No.:

7





BUILDING 2 - ROOF

LEGEND

-  PRESUMED ASBESTOS-CONTAINING
ROOFING MATERIALS, ROOF
CAULKING AND ROOF INSULATION

NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC CONSULTING LTD. REPORT AND MUST NOT BE USED FOR OTHER PURPOSES.

FLOOR PLAN

BUILDING 2, MOOSONEE NATIONAL DEFENCE RADAR BASE, MOOSONEE, ONTARIO

Client: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

Project No.: 163302647

Scale: N.T.S.

Date: 19/03/26

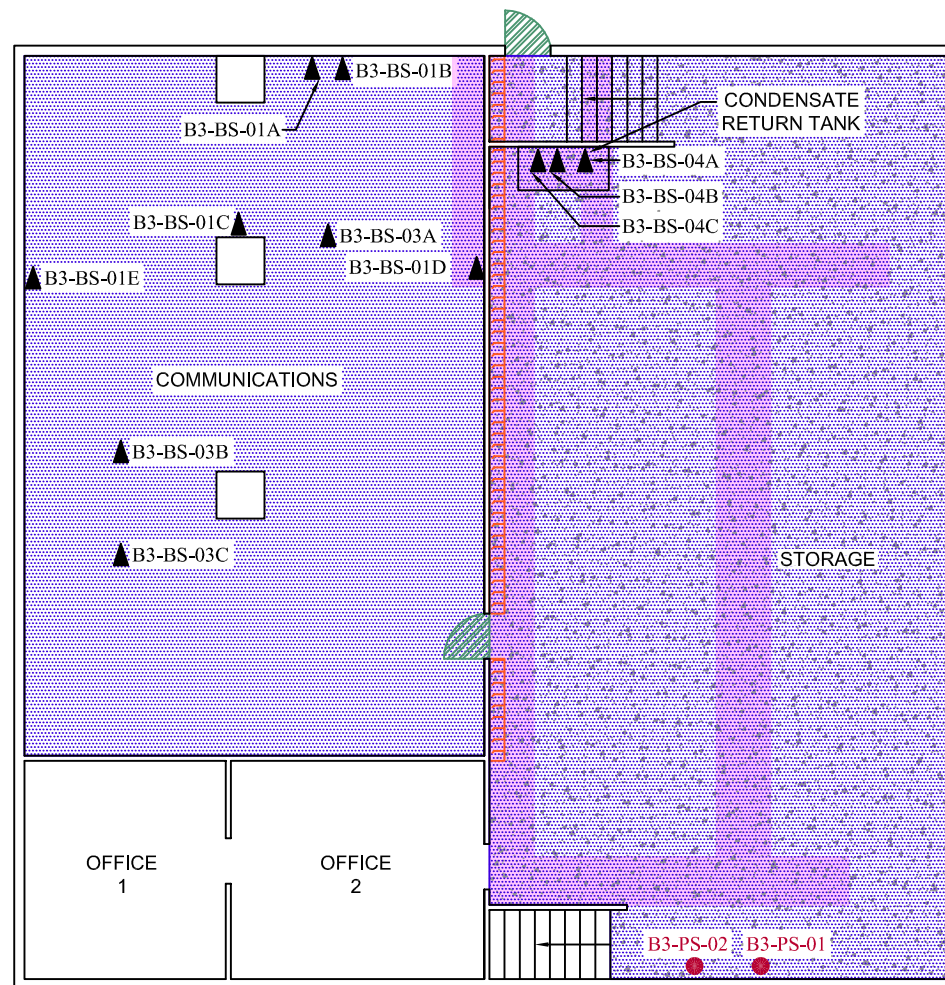
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CS/DM

App'd By: MM

Dwg. No.:

8





BUILDING 3 - FIRST FLOOR

NOTES: 1. CAULKING MATERIALS ON CAST IRON DRAIN PIPES ARE PRESUMED TO BE ASBESTOS-CONTAINING.
 2. GASKET MATERIALS ON MECHANICAL PIPING IS 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.

LEGEND

- ▲ BULK SAMPLE
- PAINT CHIP SAMPLE
- ASBESTOS-CONTAINING DRYWALL JOINT-FILL COMPOUND
- ASBESTOS-CONTAINING SPRAYED FIREPROOFING
- ASBESTOS-CONTAINING SPRAYED FIREPROOFING DEBRIS
- ASBESTOS-CONTAINING THERMAL SYSTEM INSULATION
- PRESUMED ASBESTOS-CONTAINING FIRE RATED DOORS

FLOOR PLAN

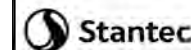
BUILDING 3, MOOSONEE NATIONAL DEFENCE RADAR BASE, MOOSONEE, ONTARIO

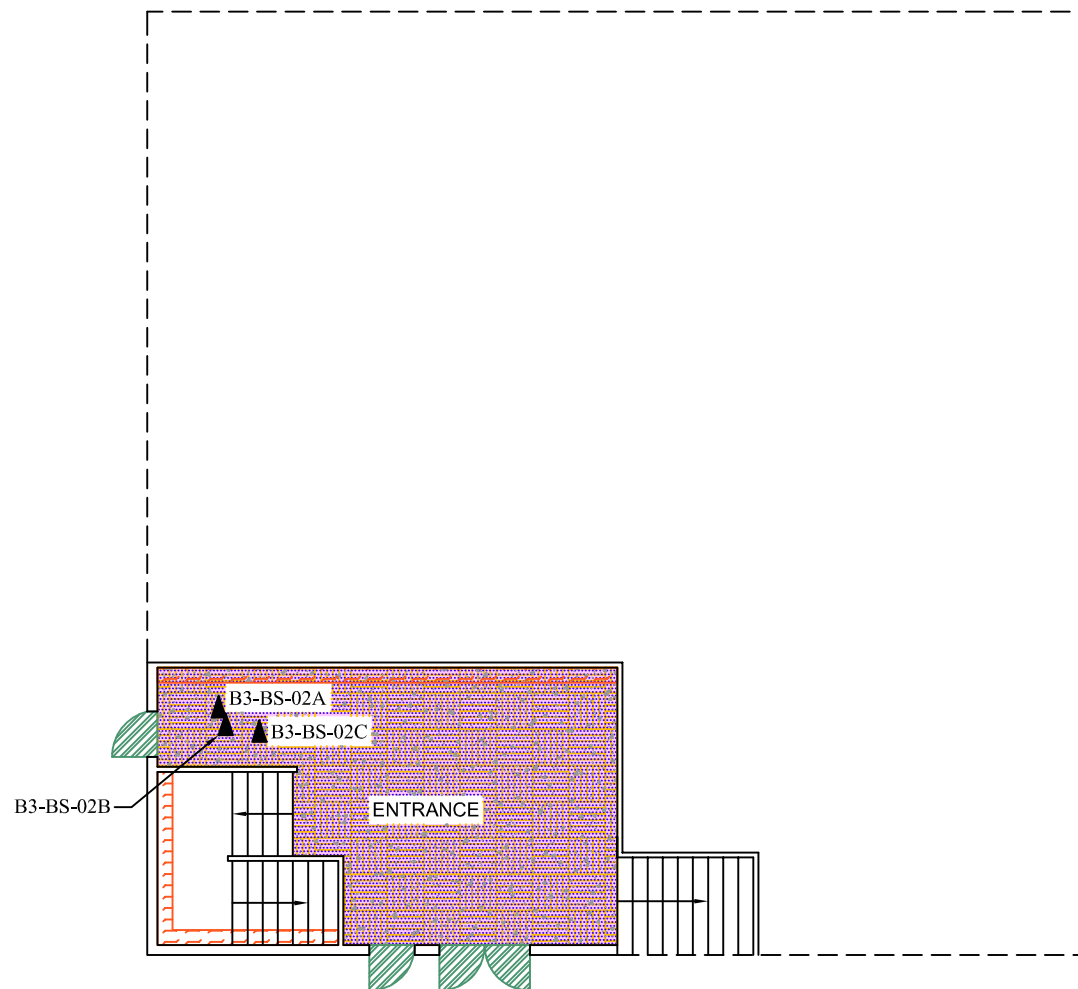
Client: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

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Dwg. No.:








9





BUILDING 3 - FIRST FLOOR MEZZANINE

LEGEND

-  BULK SAMPLE
-  ASBESTOS-CONTAINING VINYL FLOOR TILES
-  ASBESTOS-CONTAINING DRYWALL JOINT-FILL COMPOUND
-  ASBESTOS-CONTAINING FIREPROOFING
-  ASBESTOS-CONTAINING SPRAYED FIREPROOFING DEBRIS
-  ASBESTOS-CONTAINING THERMAL SYSTEM INSULATION
-  PRESUMED ASBESTOS-CONTAINING FIRE RATED DOORS

NOTES: 1. CAULKING MATERIALS ON CAST IRON DRAIN PIPES ARE PRESUMED TO BE ASBESTOS-CONTAINING.
 2. GASKET MATERIALS ON MECHANICAL PIPING IS 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.

FLOOR PLAN

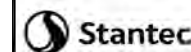
BUILDING 3, MOOSONEE NATIONAL DEFENCE RADAR BASE, MOOSONEE, ONTARIO

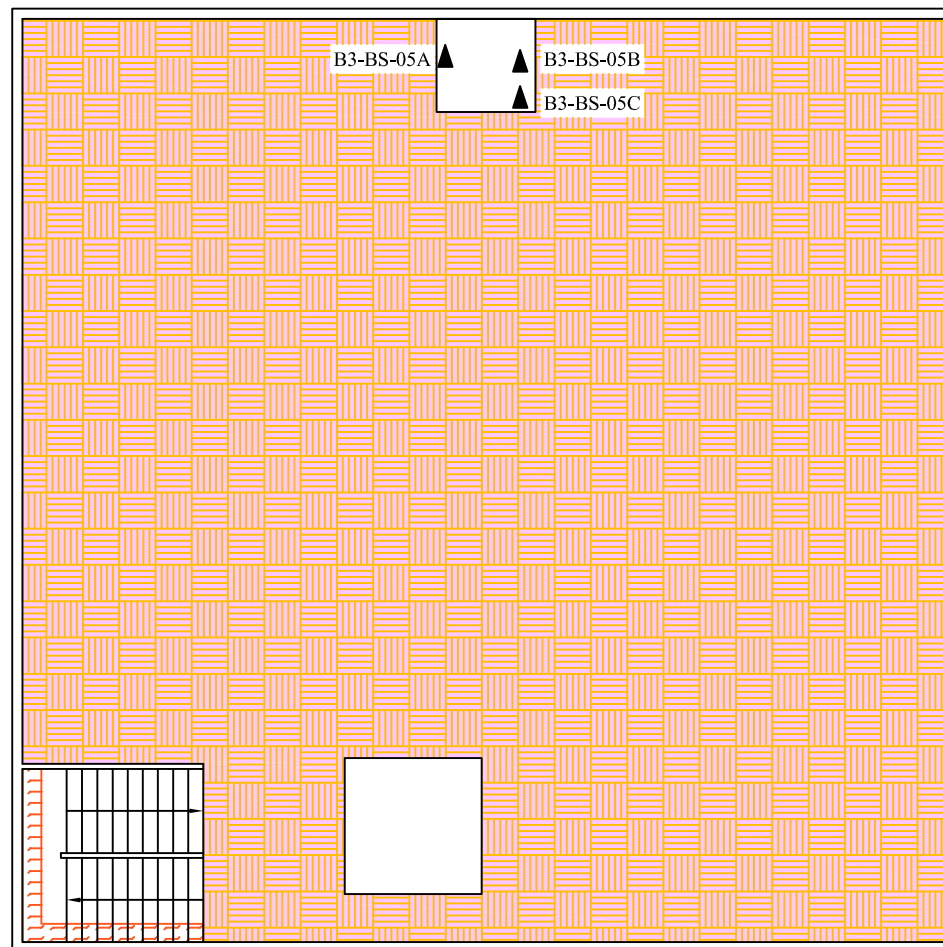
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Project No.: 163302647
Scale: N.T.S.
Date: 19/03/26
Dwn. By: CD <small>SL2019030452</small> CS/DM
App'd By: MM

Dwg. No.:





10





BUILDING 3 - SECOND FLOOR

LEGEND

-  BULK SAMPLE
-  ASBESTOS-CONTAINING VINYL FLOOR TILES
-  ASBESTOS-CONTAINING DRYWALL JOINT-FILL COMPOUND
-  ASBESTOS-CONTAINING THERMAL SYSTEM INSULATION

NOTES: 1. CAULKING MATERIALS ON CAST IRON DRAIN PIPES ARE PRESUMED TO BE ASBESTOS-CONTAINING.
 2. GASKET MATERIALS ON MECHANICAL PIPING IS 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.

FLOOR PLAN

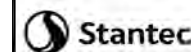
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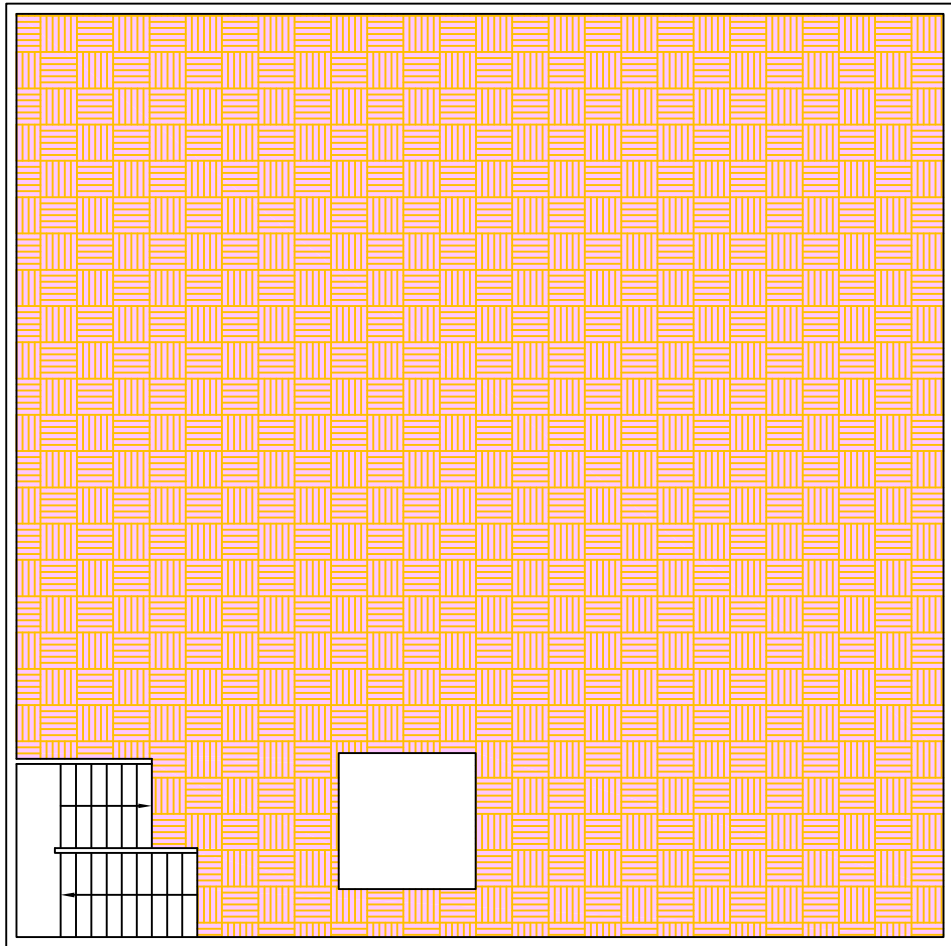
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Project No.: 163302647
Scale: N.T.S.
Date: 19/03/26
Dwn. By: CD <small>SL2019030453</small>
App'd By: MM

Dwg. No.:



11





BUILDING 3 - THIRD FLOOR

LEGEND

-  ASBESTOS-CONTAINING VINYL FLOOR TILES
-  ASBESTOS-CONTAINING THERMAL SYSTEM INSULATION

NOTES: 1. CAULKING MATERIALS ON CAST IRON DRAIN PIPES ARE PRESUMED TO BE ASBESTOS-CONTAINING.
 2. GASKET MATERIALS ON MECHANICAL PIPING IS 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.

FLOOR PLAN

BUILDING 3, MOOSONEE NATIONAL DEFENCE RADAR BASE, MOOSONEE, ONTARIO

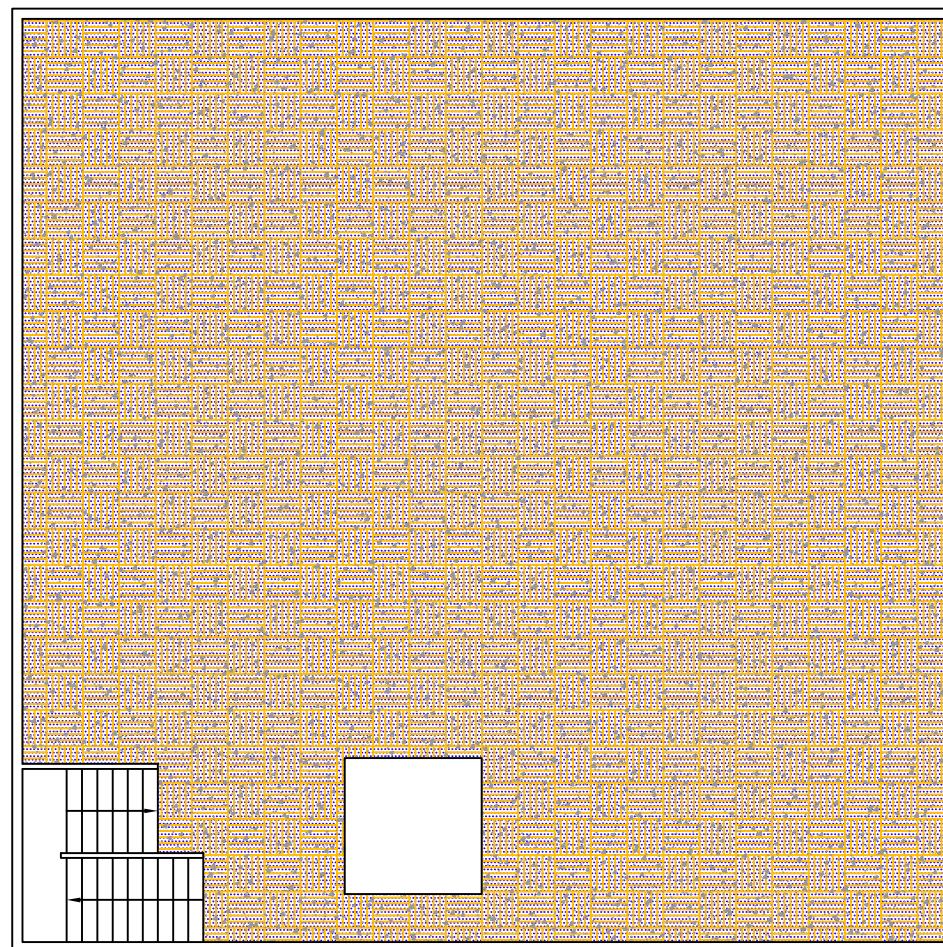
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Dwg. No.:




12





BUILDING 3 - FOURTH FLOOR

LEGEND

-  ASBESTOS-CONTAINING VINYL FLOOR TILES
-  ASBESTOS-CONTAINING SPRAYED FIREPROOFING
-  ASBESTOS-CONTAINING SPRAYED FIREPROOFING DEBRIS

NOTES: 1. CAULKING MATERIALS ON CAST IRON DRAIN PIPES ARE PRESUMED TO BE ASBESTOS-CONTAINING.
 2. GASKET MATERIALS ON MECHANICAL PIPING IS 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.

FLOOR PLAN

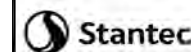
BUILDING 3, MOOSONEE NATIONAL DEFENCE RADAR BASE, MOOSONEE, ONTARIO

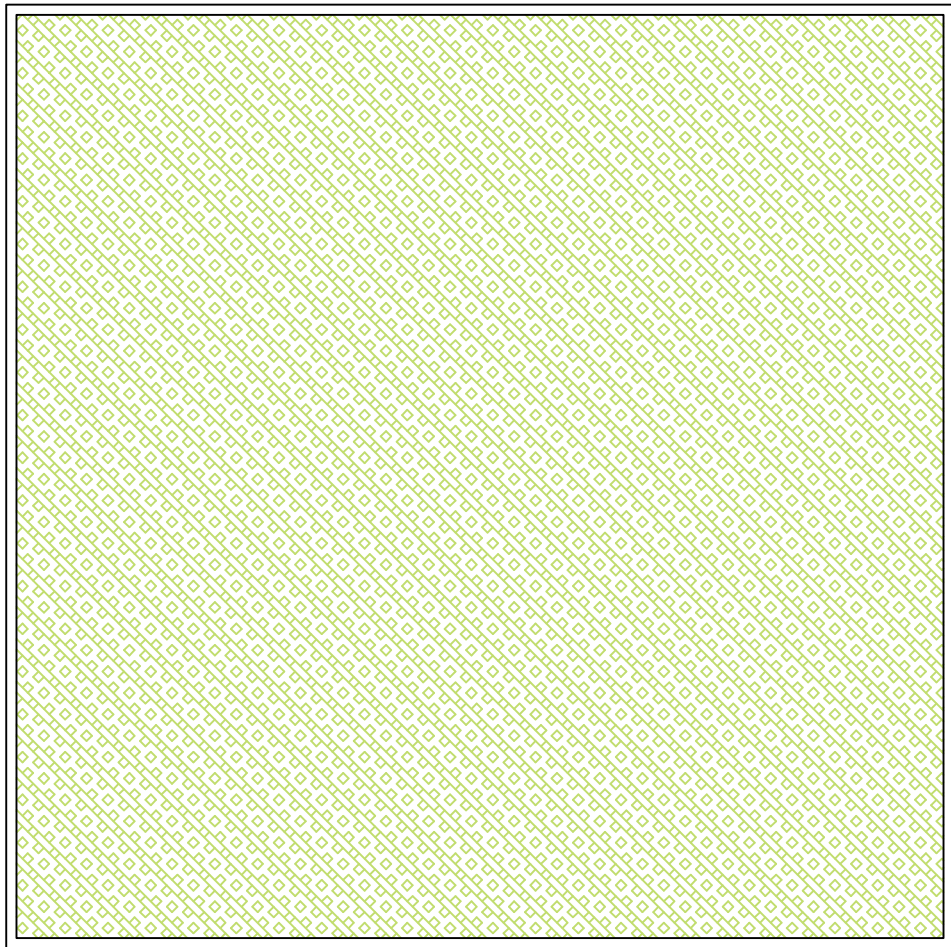
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Project No.: 163302647
Scale: N.T.S.
Date: 19/03/26
Dwn. By: CD <small>SL2019030455</small> CS/DM
App'd By: MM

Dwg. No.:


13





BUILDING 3 - ROOF

LEGEND

 PRESUMED ASBESTOS-CONTAINING ROOFING MATERIALS AND ROOF CAULKING

NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC CONSULTING LTD. REPORT AND MUST NOT BE USED FOR OTHER PURPOSES.

FLOOR PLAN

BUILDING 3, MOOSONEE NATIONAL DEFENCE RADAR BASE, MOOSONEE, ONTARIO

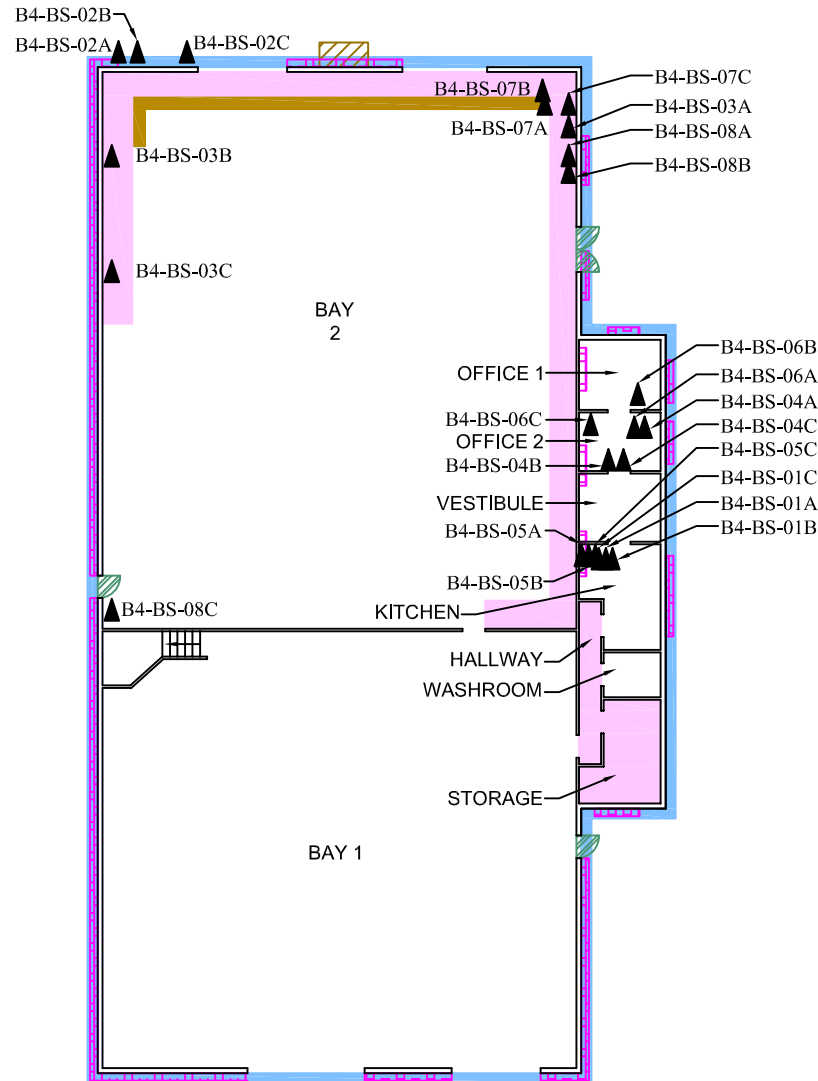
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Project No.: 163302647
Scale: N.T.S.
Date: 19/03/26
Dwn. By: CD <small>SL2019030456</small> CS/DM
App'd By: MM

Dwg. No.:

14





BUILDING 4 - MAIN FLOOR

LEGEND

- BULK SAMPLE
- ASBESTOS-CONTAINING CEMENT BOARD PANELS
- ASBESTOS-CONTAINING EXTERIOR CAULKING
- ASBESTOS-CONTAINING THERMAL SYSTEM INSULATION
- PRESUMED ASBESTOS-CONTAINING FIRE RATED DOORS
- PRESUMED ASBESTOS-CONTAINING CORRUGATED STRAIGHT PIPE INSULATION
- SUSPECT MOULD IMPACTED BUILDING MATERIALS

NOTES: 1. CAULKING MATERIALS ON CAST IRON DRAIN PIPES ARE PRESUMED TO BE ASBESTOS-CONTAINING.

2. THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC CONSULTING LTD. REPORT AND MUST NOT BE USED FOR OTHER PURPOSES.

FLOOR PLAN

BUILDING 4, MOOSONEE NATIONAL DEFENCE RADAR BASE, MOOSONEE, ONTARIO

Client: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

Project No.: 163302647

Scale: N.T.S.

Date: 19/03/27

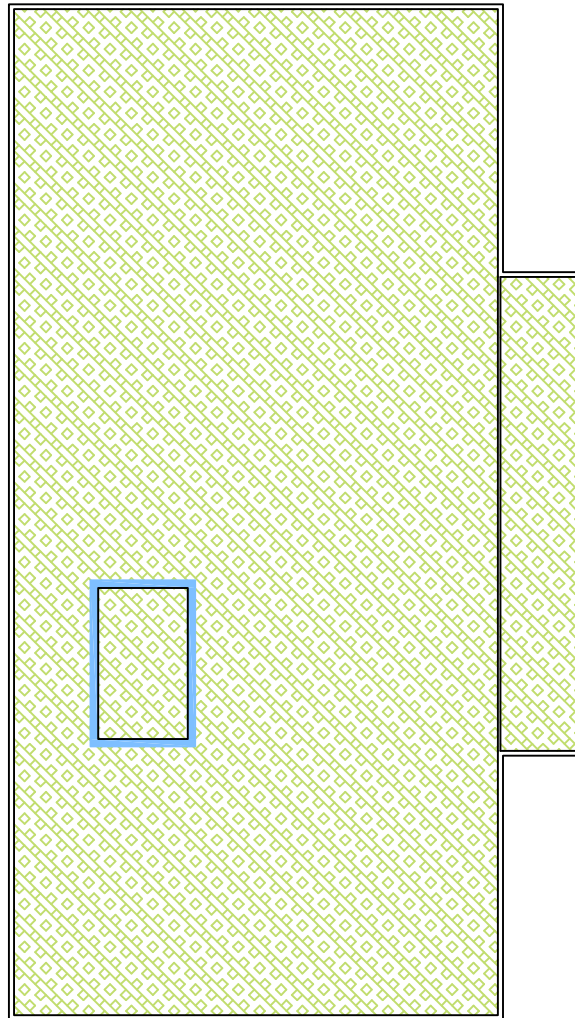
Dwn. By: CD SL2019030494
CS/DM

App'd By: MM

Dwg. No.:



15





BUILDING 4 - ROOF

LEGEND

-  ASBESTOS-CONTAINING CEMENT BOARD PANELS
-  PRESUMED ASBESTOS-CONTAINING ROOFING MATERIALS AND ROOF CAULKING

NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC CONSULTING LTD. REPORT AND MUST NOT BE USED FOR OTHER PURPOSES.

FLOOR PLAN

BUILDING 4, MOOSONEE NATIONAL DEFENCE RADAR BASE, MOOSONEE, ONTARIO

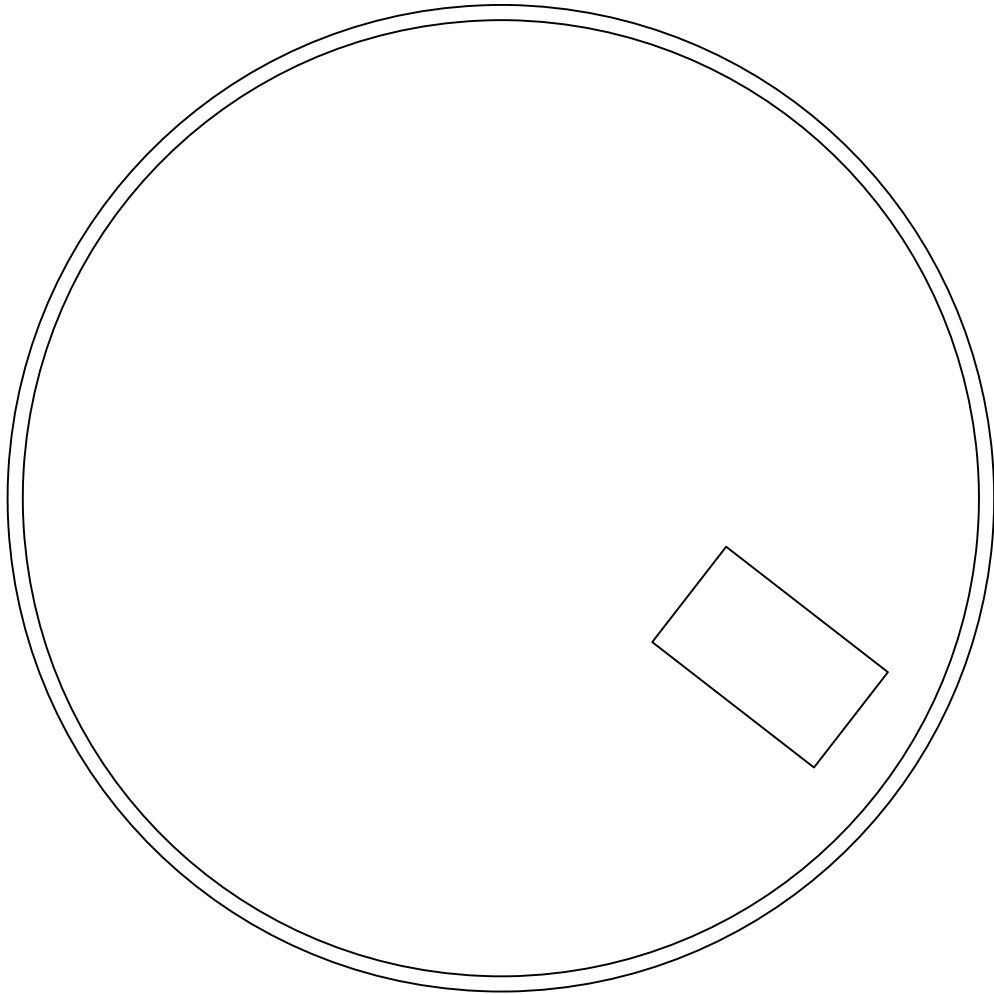
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App'd By: MM

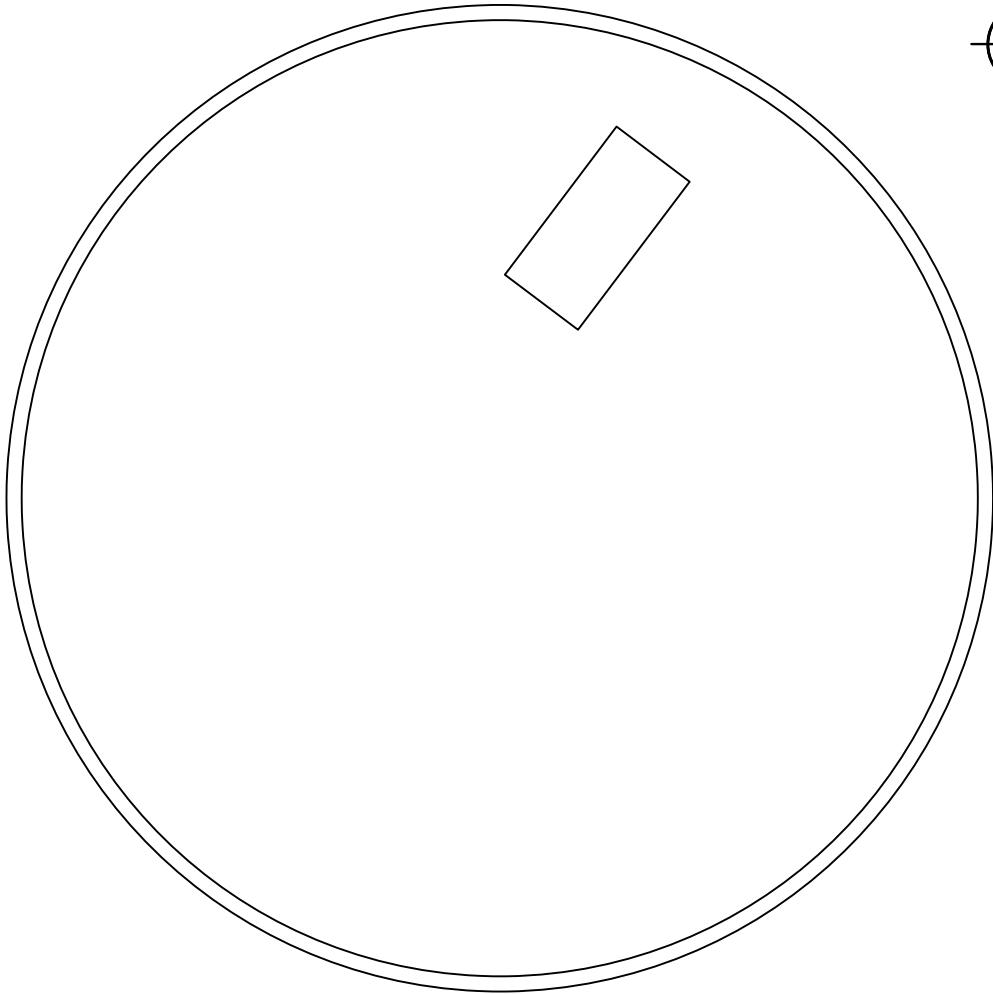
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16





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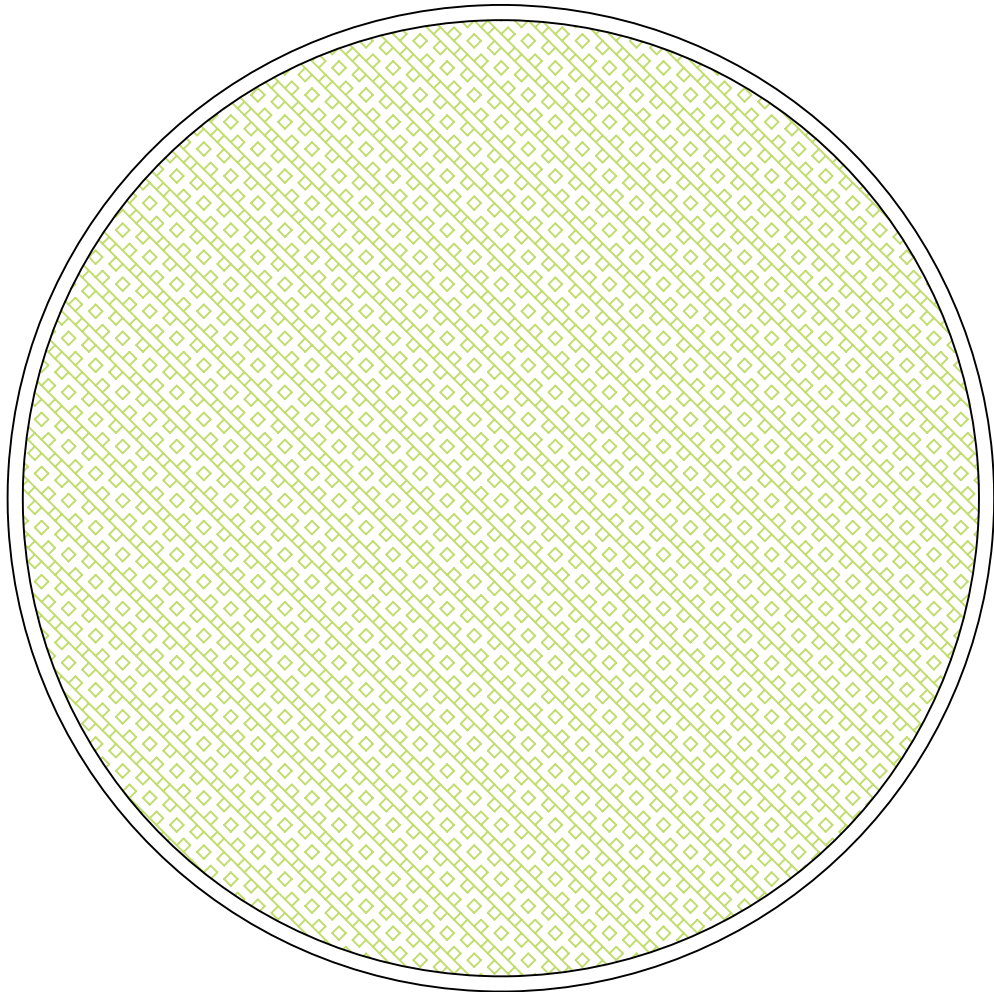


BUILDING 5A - CLARIFIER 2

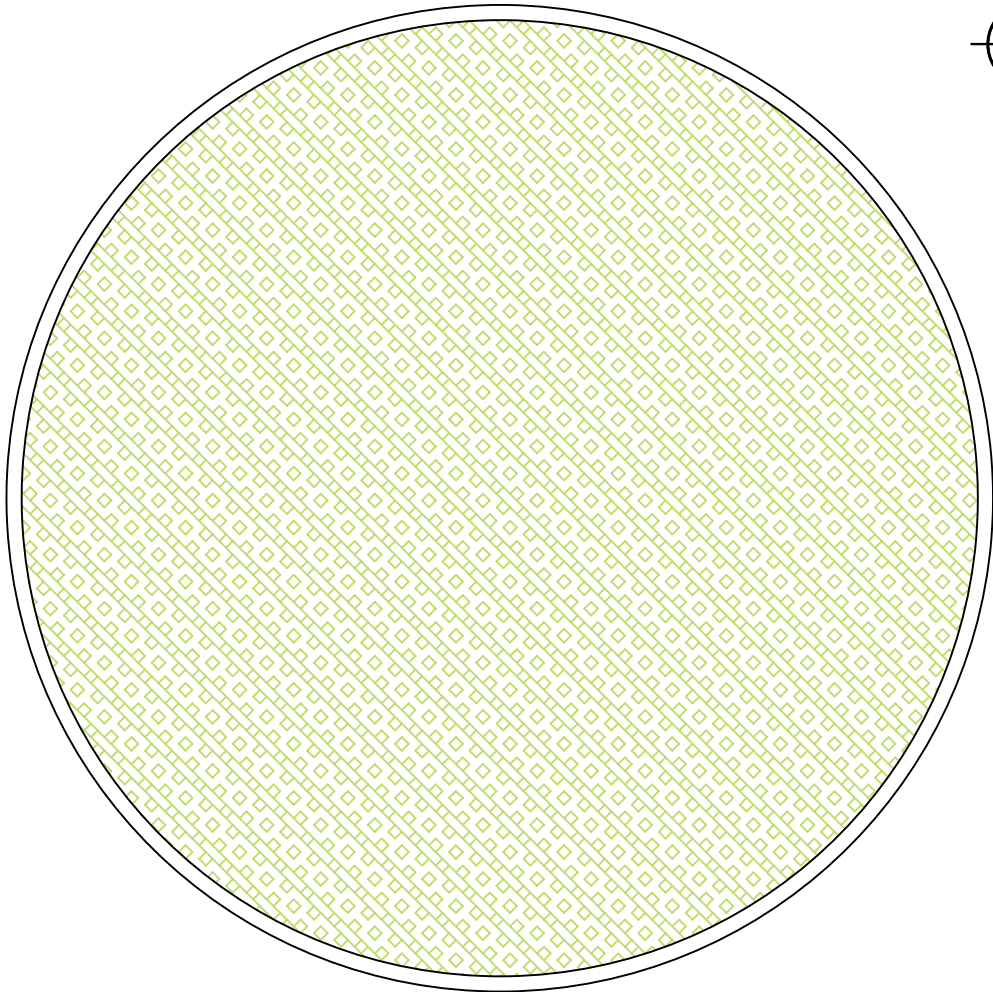


NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC CONSULTING LTD. REPORT AND MUST NOT BE USED FOR OTHER PURPOSES.

<div>FLOOR PLAN</div> <div>BUILDING 5 & 6, MOOSONEE NATIONAL DEFENCE RADAR BASE, MOOSONEE, ONTARIO</div>	Project No.: 163302647	Dwg. No.: 17	
	Scale: N.T.S.		
	Date: 19/03/26		
	Dwn. By: CD <small>SL2019030459 CS/DM</small>		
Client: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA	App'd By: MM		




BUILDING 5 - CLARIFIER 1 ROOF




BUILDING 5A - CLARIFIER 2 ROOF



LEGEND

 PRESUMED ASBESTOS-CONTAINING
ROOFING MATERIALS AND ROOF
CAULKING

NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC CONSULTING LTD. REPORT AND MUST NOT BE USED FOR OTHER PURPOSES.

<div>FLOOR PLAN</div> <div>BUILDING 5 & 6, MOOSONEE NATIONAL DEFENCE RADAR BASE, MOOSONEE, ONTARIO</div>	Project No.: 163302647	Dwg. No.: 18	
	Scale: N.T.S.		
	Date: 19/03/26		
	Dwn. By: CD <small>SL2019030460 CS/DM</small>		
Client: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA	App'd By: MM		

**DESIGNATED SUBSTANCES AND HAZARDOUS BUILDING MATERIALS SURVEY –
MOOSONEE NATIONAL DEFENCE RADAR BASE, MOOSONEE, ONTARIO**

Appendix D Summary of Occurrences of Asbestos-Containing Materials
September 3, 2019

**Appendix D SUMMARY OF OCCURRENCES OF ASBESTOS-
CONTAINING MATERIALS**



Summary of Occurrences of Asbestos-Containing Materials

Moosonee National Defence Radar Base, Moosonee, Ontario

Level	Building	Room	ACM Location	ACM Type	Estimated Quantity	Sample Number	Original Sample?	Asbestos Content	Friable? Visible?	Access.	ACM Condition	Comments/ Notes	
1	Building 1	Interior	Windows	Interior Window Glaze Compound - Grey	24 m (4 Windows)	Ref: 29911-1-01A	No	2% chrysotile	No	Yes	A	poor	DST REPORT (JULY 2017), OBSERVED TO BE IN POOR CONDITION (CRACKING)
2	Building 1	Interior	Windows	Interior Window Glaze Compound - Grey	18 m (3 Windows)	Ref: 29911-1-01A	No	2% chrysotile	No	Yes	A	good	DST REPORT (JULY 2017), OBSERVED TO BE IN POOR CONDITION (CRACKING)
E	Building 1	Exterior	Joint between metal siding and concrete foundation	Exterior Joint Caulking - Grey	54 m	Ref: 29911-1-03A	No	5% chrysotile	No	Yes	A	good	DST REPORT (JULY 2017), BETWEEN METAL SIDING AND CONCRETE FOUNDATION
R	Building 1	Roof	Roofing	Black Tar	175 sq. m	Ref: 29911-1-01A	No	2% chrysotile	No	Yes	B	good	DST REPORT (JULY 2017)
1	Building 1A	Interior	Flooring	9"x9" Vinyl Floor Tile - Beige	40 sq. m	Ref: 29911-1A-02A	No	1% chrysotile	No	Yes	A	poor	DST REPORT (JULY 2017), TILES OBSERVED TO BE IN POOR CONDITION (CRACKING AND LIFTING)

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

Summary of Occurrences of Asbestos-Containing Materials

Moosonee National Defence Radar Base, Moosonee, Ontario

Level	Building	Room	ACM Location	ACM Type	Estimated Quantity	Sample Number	Original Sample?	Asbestos Content	Friable? Visible?	Access.	ACM Condition	Comments/ Notes
1	Building 1A	Interior	Floor	Insulating Cement on Pipe Fitting	10 Fittings	Ref: 29911-1A-01A	No	65% chrysotile	Yes Yes	A	poor	DST REPORT (JULY 2017), 10 FITTINGS OBSERVED TO BE IN POOR CONDITION (EXPOSED ON FLOOR)
1	Building 1A	Interior	Mechanical	Insulating Cement on Pipe Fitting Debris	40 Fittings	Ref: 29911-1A-01A	No	65% chrysotile	Yes Yes	C	poor	DST REPORT (JULY 2017), 20 FITTINGS OBSERVED TO BE IN POOR CONDITION (EXPOSED)
1	Building 1A	Interior	Floor	Insulating Cement on Pipe Fitting Debris	60 sq. m	Ref: 29911-1A-01A	No	65% chrysotile	Yes Yes	A	poor	DST REPORT (JULY 2017), FITTING DEBRIS OBSERVED ON FLOOR
1	Building 1A	Interior	Windows	Interior Window Glaze Compound - Grey	30 m (4 Windows)	Ref: 29911-1A-03A	No	2% chrysotile	No Yes	A	poor	DST REPORT (JULY 2017), OBSERVED TO BE IN POOR CONDITION (CRACKING)
1/2	Building 1A	Stairwell	Mechanical	Pre-Formed Pipe Straight Insulation	5 m	Ref: 29911-1A-04A	No	30% chrysotile	Yes Yes	A	poor	DST REPORT (JULY 2017), 1 M OBSERVED TO BE IN POOR CONDITION (EXPOSED INSULATION)

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

Summary of Occurrences of Asbestos-Containing Materials

Moosonee National Defence Radar Base, Moosonee, Ontario

Level	Building	Room	ACM Location	ACM Type	Estimated Quantity	Sample Number	Original Sample?	Asbestos Content	Friable? Visible?	Access.	ACM Condition	Comments/ Notes	
2	Building 1A	Interior	Mechanical	Insulating Cement on Pipe Fitting	30 Fittings	Ref: 29911-1A-01A	No	65% chrysotile	Yes	Yes	C	poor	DST REPORT (JULY 2017), 9 FITTINGS OBSERVED TO BE IN POOR CONDITION (EXPOSED)
2	Building 1A	Interior	Window	Interior Joint Caulking - Grey	2 m (1 Window)	Ref: 29911-1A-05A	No	15% chrysotile	No	Yes	A	good	DST REPORT (JULY 2017), OBSERVED BETWEEN WOOD PANEL AND METAL WALL BY FAN UNIT
2	Building 1A	Interior	Windows	Interior Window Glaze Compound - Grey	18 m (3 Windows)	Ref: 29911-1A-03A	No	2% chrysotile	No	Yes	A	poor	DST REPORT (JULY 2017), OBSERVED TO BE IN POOR CONDITION (CRACKING)
R	Building 1A	Roof	Roofing	Roof Caulking	nq	ns	No	PACM	No	Yes	A	good (PACM)	PACM
R	Building 1A	Roof	Roofing	Roofing Materials	nq	ns	No	PACM	No	Yes	A	good (PACM)	PACM
1	Building 2	Room 1	Walls	Cement Board	60 sq. m	ns	No	PACM	No	Yes	A	good (PACM)	PACM
1	Building 2	Room 2	North Wall	Drywall Joint-Fill Compound	45 sq. m	Ref: B2-BS-03A	No	3% chrysotile	No	Yes	A	poor	DRYWALL WALLS OBSERVED TO BE WATER DAMAGED / DETERIORATING

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

Summary of Occurrences of Asbestos-Containing Materials

Moosonee National Defence Radar Base, Moosonee, Ontario

Level	Building	Room	ACM Location	ACM Type	Estimated Quantity	Sample Number	Original Sample?	Asbestos Content	Friable?	Access. Visible?	ACM Condition	Comments/ Notes	
1	Building 2	Room 2	South Wall	Drywall Joint-Fill Compound	45 sq. m	B2-BS-03A	Yes	3% chrysotile	No	Yes	A	poor	DRYWALL WALLS OBSERVED TO BE WATER DAMAGED / DETERIORATING
1	Building 2	Room 2	Ductwork	Duct Insulation - Black	45 sq. m	ns	No	PACM	Yes	Yes	C	poor	DUCT INSULATION OBSERVED TO BE IN POOR CONDITION (5 SQ. M TORN)
1	Building 2	Room 2	Beneath Floor	Mastic associated with 9"x9" Vinyl Floor Tile - Green	200 sq. m	B2-BS-04A-Mastic	Yes	1.2% chrysotile	No	Yes	A	poor	LOOSE TILES WITH EXPOSED MASTIC OBSERVED
1	Building 2	Room 3	Partition Wall	Drywall Joint-Fill Compound	10 sq. m	Ref: B2-BS-03A	No	3% chrysotile	No	Yes	A	poor	DRYWALL WALLS OBSERVED TO BE WATER DAMAGED / DETERIORATING
E	Building 2	Exterior	Vent (South Wall)	Exterior Caulking - Grey	2 m	Ref: B2-BS-01A	No	1.7% chrysotile	No	Yes	A	poor	CAULKING OBSERVED TO BE IN POOR CONDITION (CRACKING)
E	Building 2	Exterior	Door (West Wall)	Exterior Caulking - Grey	6 m	Ref: B2-BS-01A	No	1.7% chrysotile	No	Yes	A	poor	CAULKING OBSERVED TO BE IN POOR CONDITION (CRACKING)

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
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Notes:

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- RCA - recommend corrective action
- BS - bulk sample

Summary of Occurrences of Asbestos-Containing Materials

Moosonee National Defence Radar Base, Moosonee, Ontario

Level	Building	Room	ACM Location	ACM Type	Estimated Quantity	Sample Number	Original Sample?	Asbestos Content	Friable? Visible?	Access.	ACM Condition	Comments/ Notes
E	Building 2	Exterior	Vent (North Wall)	Exterior Caulking - Grey	4 m	B2-BS-01A	Yes	1.7% chrysotile	No Yes	A	poor	CAULKING OBSERVED TO BE IN POOR CONDITION (CRACKING)
E	Building 2	Exterior	Vent (West Wall)	Exterior Caulking - Grey	6 m	Ref: B2-BS-01A	No	1.7% chrysotile	No Yes	A	poor	CAULKING OBSERVED TO BE IN POOR CONDITION (CRACKING)
R	Building 2	Roof	Roofing	Roof Caulking	nq	ns	No	PACM	No Yes	C	poor (PACM)	ROOF OBSERVED TO BE IN POOR CONDITION (COLLAPSED) IN MULTIPLE LOCATIONS
R	Building 2	Roof	Roofing	Roof Insulation	nq	ns	No	PACM	No Yes	C	poor (PACM)	ROOF OBSERVED TO BE IN POOR CONDITION (COLLAPSED) IN MULTIPLE LOCATIONS
R	Building 2	Roof	Roofing	Roofing Materials	nq	ns	No	PACM	No Yes	C	poor (PACM)	ROOF OBSERVED TO BE IN POOR CONDITION (COLLAPSED) IN MULTIPLE LOCATIONS
1	Building 3	Communications	Cast Iron Drains	Caulking Materials	nq	ns	No	PACM	No No	C	good (PACM)	PACM
1	Building 3	Communications	Door	Fire Rated Door	1 Door	ns	No	PACM	No Yes	A	good (PACM)	PACM

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Moosonee National Defence Radar Base, Moosonee, Ontario

Level	Building	Room	ACM Location	ACM Type	Estimated Quantity	Sample Number	Original Sample?	Asbestos Content	Friable? Visible?	Access.	ACM Condition	Comments/ Notes
1	Building 3	Communications	Mechanical	Gasket Material	nq	ns	No	PACM	Yes No	D	good (PACM)	PACM
1	Building 3	Communications	Mechanical	Insulating Cement on Pipe Fitting	3 Fittings	Ref: 29911-3-03A	No	65% chrysotile	Yes Yes	C	good	DST REPORT (JULY 2017)
1	Building 3	Communications	Ceiling	Sprayed Fireproofing	160 sq. m	Ref: 29911-3-02A	No	10% chrysotile	Yes Yes	C	poor	DST REPORT (JULY 2017), FIREPROOFING OBSERVED TO BE IN POOR CONDITION (DETERIORATING)
1	Building 3	Storage	Cast Iron Drains	Caulking Materials	nq	ns	No	PACM	No No	C	good (PACM)	PACM
1	Building 3	Storage	Wall	Drywall Joint-Fill Compound	100 sq. m	Ref: 29911-3-04A	No	2% chrysotile	No Yes	A	poor	DST REPORT (JULY 2017), DRYWALL OBSERVED TO BE IN POOR CONDITION (BROKEN)
1	Building 3	Storage	Door	Fire Rated Door	1 Door	ns	No	PACM	No Yes	A	good (PACM)	PACM
1	Building 3	Storage	Mechanical	Gasket Material	nq	ns	No	PACM	Yes No	D	good (PACM)	PACM
1	Building 3	Storage	Mechanical	Insulating Cement on Pipe Fitting	60 Fittings	Ref: 29911-3-03A	No	65% chrysotile	Yes Yes	C	poor	DST REPORT (JULY 2017), 22 FITTINGS OBSERVED TO BE IN POOR CONDITION (EXPOSED)

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Summary of Occurrences of Asbestos-Containing Materials

Moosonee National Defence Radar Base, Moosonee, Ontario

Level	Building	Room	ACM Location	ACM Type	Estimated Quantity	Sample Number	Original Sample?	Asbestos Content	Friable? Visible?	Access.	ACM Condition	Comments/ Notes
1	Building 3	Storage	Mechanical	Pre-Formed (Tank/Body) Insulation	4 sq. m	B3-BS-04A	Yes	75% chrysotile	Yes Yes	A	poor	THERMAL SYSTEM INSULATION ON CONDENSATE RETURN TANK OBSERVED TO BE IN POOR CONDITION (1 SQ. M EXPOSED)
1	Building 3	Storage	Ceiling	Sprayed Fireproofing	200 sq. m	Ref: 29911-3-02A	No	10% chrysotile	Yes Yes	C	poor	DST REPORT (JULY 2017), FIREPROOFING OBSERVED TO BE IN POOR CONDITION (DETERIORATING)
1	Building 3	Storage	Floor	Sprayed Fireproofing Debris	200 sq. m	Ref: 29911-3-02A	No	10% chrysotile	Yes Yes	C	poor	DST REPORT (JULY 2017), FIREPROOFING DEBRIS OBSERVED ON FLOOR
1/2	Building 3	Stairwell	Wall	Drywall Joint-Fill Compound	30 sq. m	Ref: 29911-3-04A	No	2% chrysotile	No Yes	A	poor	DST REPORT (JULY 2017), DRYWALL OBSERVED TO BE IN POOR CONDITION (BROKEN)

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Summary of Occurrences of Asbestos-Containing Materials

Moosonee National Defence Radar Base, Moosonee, Ontario

Level	Building	Room	ACM Location	ACM Type	Estimated Quantity	Sample Number	Original Sample?	Asbestos Content	Friable?	Access. Visible?	ACM Condition	Comments/ Notes	
2	Building 3	Interior	Floor	9"x9" Vinyl Floor Tile - Grey	400 sq. m	Ref: 29911-3-01A	No	2% chrysotile	No	Yes	A	poor	DST REPORT (JULY 2017), TILES OBSERVED TO BE IN POOR CONDITION (CRACKED/LIFTING)
2	Building 3	Interior	Cast Iron Drains	Caulking Materials	nq	ns	No	PACM	No	No	C	good (PACM)	PACM
2	Building 3	Interior	Mechanical	Gasket Material	nq	ns	No	PACM	Yes	No	D	good (PACM)	PACM
2	Building 3	Interior	Mechanical	Insulating Cement on Pipe Fitting	40 Fittings	Ref: 29911-3-03A	No	65% chrysotile	Yes	Yes	C	poor	DST REPORT (JULY 2017), 4 FITTINGS OBSERVED TO BE IN POOR CONDITION (EXPOSED)
3	Building 3	Interior	Floor	9"x9" Vinyl Floor Tile - Grey	400 sq. m	Ref: 29911-3-01A	No	2% chrysotile	No	Yes	A	good	DST REPORT (JULY 2017), NOT ASSESSED BY STANTEC
3	Building 3	Interior	Cast Iron Drains	Caulking Materials	nq	ns	No	PACM	No	No	C	good (PACM)	PACM
3	Building 3	Interior	Mechanical	Gasket Material	nq	ns	No	PACM	Yes	No	D	good (PACM)	PACM
3	Building 3	Interior	Mechanical	Insulating Cement on Pipe Fitting	10 Fittings	Ref: 29911-3-03A	No	65% chrysotile	Yes	Yes	C	good	DST REPORT (JULY 2017), NOT ASSESSED BY STANTEC

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Summary of Occurrences of Asbestos-Containing Materials

Moosonee National Defence Radar Base, Moosonee, Ontario

Level	Building	Room	ACM Location	ACM Type	Estimated Quantity	Sample Number	Original Sample?	Asbestos Content	Friable? Visible?	Access.	ACM Condition	Comments/ Notes	
4	Building 3	Interior	Floor	9"x9" Vinyl Floor Tile - Grey	400 sq. m	Ref: 29911-3-01A	No	2% chrysotile	No	Yes	A	good	DST REPORT (JULY 2017), NOT ASSESSED BY STANTEC
4	Building 3	Interior	Cast Iron Drains	Caulking Materials	nq	ns	No	PACM	No	No	C	good (PACM)	PACM
4	Building 3	Interior	Mechanical	Gasket Material	nq	ns	No	PACM	Yes	No	D	good (PACM)	PACM
4	Building 3	Interior	Ceiling	Sprayed Fireproofing	400 sq. m	Ref: 29911-3-02A	No	10% chrysotile	Yes	Yes	C	poor	DST REPORT (JULY 2017), NOT ASSESSED BY STANTEC
4	Building 3	Interior	Floor	Sprayed Fireproofing Debris	400 sq. m	Ref: 29911-3-02A	No	10% chrysotile	Yes	Yes	A	poor	DST REPORT (JULY 2017), NOT ASSESSED BY STANTEC
Mez	Building 3	Entrance	Floor	9"x9" Vinyl Floor Tile - Grey	50 sq. m	Ref: 29911-3-01A	No	2% chrysotile	No	Yes	A	poor	DST REPORT (JULY 2017), TILES OBSERVED TO BE IN POOR CONDITION (CRACKED/LIFTING)
Mez	Building 3	Entrance	Cast Iron Drains	Caulking Materials	nq	ns	No	PACM	No	No	C	good (PACM)	PACM

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Moosonee National Defence Radar Base, Moosonee, Ontario

Level	Building	Room	ACM Location	ACM Type	Estimated Quantity	Sample Number	Original Sample?	Asbestos Content	Friable? Visible?	Access.	ACM Condition	Comments/ Notes	
Mez	Building 3	Entrance	Wall	Drywall Joint-Fill Compound	30 sq. m	Ref: 29911-3-04A	No	2% chrysotile	No	Yes	A	poor	DST REPORT (JULY 2017), DRYWALL OBSERVED TO BE IN POOR CONDITION (BROKEN)
Mez	Building 3	Entrance	Door	Fire Rated Door	4 Doors	ns	No	PACM	No	Yes	A	good (PACM)	PACM
Mez	Building 3	Entrance	Mechanical	Gasket Material	nq	ns	No	PACM	Yes	No	D	good (PACM)	PACM
Mez	Building 3	Entrance	Mechanical	Insulating Cement on Pipe Fitting	15 Fittings	Ref: 29911-3-03A	No	65% chrysotile	Yes	Yes	C	poor	DST REPORT (JULY 2017), 5 FITTINGS OBSERVED TO BE IN POOR CONDITION (EXPOSED)
Mez	Building 3	Entrance	Ceiling	Sprayed Fireproofing	50 sq. m	Ref: 29911-3-02A	No	10% chrysotile	Yes	Yes	C	poor	DST REPORT (JULY 2017), FIREPROOFING OBSERVED TO BE IN POOR CONDITION (DETERIORATING)
Mez	Building 3	Entrance	Floor	Sprayed Fireproofing Debris	50 sq. m	Ref: 29911-3-02A	No	10% chrysotile	Yes	Yes	A	poor	DST REPORT (JULY 2017), FIREPROOFING DEBRIS OBSERVED ON FLOOR
R	Building 3	Roof	Roofing	Roof Caulking	nq	ns	No	PACM	No	Yes	A	good (PACM)	PACM

10

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Moosonee National Defence Radar Base, Moosonee, Ontario

Level	Building	Room	ACM Location	ACM Type	Estimated Quantity	Sample Number	Original Sample?	Asbestos Content	Friable? Visible?	Access.	ACM Condition	Comments/ Notes	
R	Building 3	Roof	Roofing	Roofing Materials	200 sq. m	ns	No	PACM	No	Yes	A	good (PACM)	PACM
1	Building 4	Bay 1	Cast Iron Drains	Caulking Materials	nq	ns	No	PACM	No	No	C	good (PACM)	PACM
1	Building 4	Bay 1	Door	Fire Rated Door	1 Door	ns	No	PACM	No	Yes	A	good (PACM)	PACM
1	Building 4	Bay 2	Cast Iron Drains	Caulking Materials	nq	ns	No	PACM	No	No	C	good (PACM)	PACM
1	Building 4	Bay 2	Mechanical	Corrugated Paper-Like Straight Pipe Insulation	30 m	ns	No	PACM	Yes	Yes	C	poor (PACM)	APPROXIMATELY 3 METRES OF INSULATION WAS OBSERVED TO BE IN POOR CONDITION (EXPOSED)
1	Building 4	Bay 2	Door	Fire Rated Doors	3 Doors	ns	No	PACM	No	Yes	A	good (PACM)	PACM
1	Building 4	Bay 2	Mechanical	Insulating Cement on Pipe Fitting	29 Fittings	Ref: 353-04-MI-01	No	65% chrysotile	Yes	Yes	C	poor	DST REPORT (JULY 2017), 6 FITTINGS OBSERVED TO BE IN POOR CONDITION (EXPOSED)
1	Building 4	Hallway	Mechanical	Insulating Cement on Pipe Fitting	7 Fittings	Ref: 353-04-MI-01	No	65% chrysotile	Yes	Yes	C	good	DST REPORT (JULY 2017)

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1	Building 4	Storage	Mechanical	Insulating Cement on Pipe Fitting	8 Fittings	Ref: 353-04-MI-01	No	65% chrysotile	Yes	Yes	C	poor	DST REPORT (JULY 2017), 3 FITTINGS OBSERVED TO BE IN POOR CONDITION (EXPOSED)
E	Building 4	Exterior	Wall	Cement Board Panel	350 sq. m	Ref: 29911-4-01A	No	20% chrysotile	No	Yes	A	poor	DST REPORT (JULY 2017), APPROXIMATELY 21 SQ. M OF CEMENT BOARD PANELS WERE OBSERVED TO BE IN POOR CONDITION (CRACKED/BROKEN)
E	Building 4	Exterior	Wall	Exterior Caulking - Grey	235 m	Ref: 29911-4-04A	No	5% chrysotile	No	Yes	A	good	DST REPORT (JULY 2017)
E	Building 4	Exterior	Window	Exterior Caulking - Grey	265 m (52 Windows)	Ref: 29911-4-05A	No	2% chrysotile	No	Yes	A	good	DST REPORT (JULY 2017)
R	Building 4	Roof	Walls	Cement Board Panel	60 sq. m	Ref: 29911-4-01A	No	20% chrysotile	No	Yes	A	good	DST REPORT (JULY 2017)
R	Building 4	Roof	Roofing	Roof Caulking	nq	ns	No	PACM	No	Yes	B	good (PACM)	PACM
R	Building 4	Roof	Roofing	Roofing Materials	2000 sq. m	ns	No	PACM	No	Yes	B	good (PACM)	PACM
R	Building 5 Clarifier	Roof	Roofing	Roof Caulking	nq	ns	No	PACM	No	Yes	B	good (PACM)	PACM

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R	Building 5 Clarifier	Roof	Roofing	Roofing Materials	nq	ns	No	PACM	No	Yes	B	good (PACM) PACM
R	Building 5A Clarifier	Roof	Roofing	Roof Caulking	nq	ns	No	PACM	No	Yes	B	good (PACM) PACM
R	Building 5A Clarifier	Roof	Roofing	Roofing Materials	nq	ns	No	PACM	No	Yes	B	good (PACM) PACM

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**DESIGNATED SUBSTANCES AND HAZARDOUS BUILDING MATERIALS SURVEY –
MOOSONEE NATIONAL DEFENCE RADAR BASE, MOOSONEE, ONTARIO**

Appendix E Laboratory Analytical Report – Asbestos: Polarized Light Microscopy
September 3, 2019

**Appendix E LABORATORY ANALYTICAL REPORT – ASBESTOS:
POLARIZED LIGHT MICROSCOPY**





EMSL Canada Inc.

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EMSL Canada Order 671900611
 Customer ID: 55JACQ30P
 Customer PO:
 Project ID:

Attn: Tait van Wyk
 Stantec Consulting Ltd.
 1331 Clyde Avenue
 Suite 400
 Ottawa, ON K2C 3G4
Proj: 163302647

Phone: (613) 722-4420
Fax: (613) 722-2799
Collected:
Received: 3/11/2019
Analyzed: 3/13/2019

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

Client Sample ID: B1A-BS-01A			Lab Sample ID: 671900611-0001			
Sample Description: Building 1A - First Floor - Northwest Corner/Mastic associated with 9"x9" vinyl floor tile - grey						
TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
TEM Grav. Reduction	3/13/2019	Black	Fibrous 0.0%	Non-Fibrous 100.0%	None Detected	
Client Sample ID: B1A-BS-01B			Lab Sample ID: 671900611-0002			
Sample Description: Building 1A - First Floor - Northwest Corner/Mastic associated with 9"x9" vinyl floor tile - grey						
TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
TEM Grav. Reduction	3/13/2019	Black	Fibrous 0.0%	Non-Fibrous 100.0%	None Detected	
Client Sample ID: B1A-BS-01C			Lab Sample ID: 671900611-0003			
Sample Description: Building 1A - First Floor - Northwest Corner/Mastic associated with 9"x9" vinyl floor tile - grey						
TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
TEM Grav. Reduction	3/13/2019	Black	Fibrous 0.0%	Non-Fibrous 100.0%	None Detected	
Client Sample ID: B1-BS-01A			Lab Sample ID: 671900611-0004			
Sample Description: Building 1 - Second Floor - Fan Unit (Plywood)/Interior caulking - grey						
TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
TEM Grav. Reduction	3/13/2019	Gray/White	Fibrous 0.0%	Non-Fibrous 100.0%	None Detected	
Client Sample ID: B1-BS-01B			Lab Sample ID: 671900611-0005			
Sample Description: Building 1 - Second Floor - Fan Unit (Plywood)/Interior caulking - grey						
TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
TEM Grav. Reduction	3/13/2019	Gray/White	Fibrous 0.0%	Non-Fibrous 100.0%	None Detected	
Client Sample ID: B1-BS-01C			Lab Sample ID: 671900611-0006			
Sample Description: Building 1 - Second Floor - Fan Unit (Plywood)/Interior caulking - grey						
TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
TEM Grav. Reduction	3/13/2019	Gray/White	Fibrous 0.0%	Non-Fibrous 100.0%	None Detected	
Client Sample ID: B2-BS-01A			Lab Sample ID: 671900611-0007			
Sample Description: Building 2 - Exterior - Vent/Exterior caulking - grey						
TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
TEM Grav. Reduction	3/13/2019	Gray	Fibrous 0.0%	Non-Fibrous 98.3%	1.7% Chrysotile	



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Client Sample ID: B2-BS-01B **Lab Sample ID:** 671900611-0008

Sample Description: Building 2 - Exterior - Vent/Exterior caulking - grey

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
TEM Grav. Reduction	3/13/2019					Positive Stop (Not Analyzed)

Client Sample ID: B2-BS-01C **Lab Sample ID:** 671900611-0009

Sample Description: Building 2 - Exterior - Vent/Exterior caulking - grey

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
TEM Grav. Reduction	3/13/2019					Positive Stop (Not Analyzed)

Client Sample ID: B2-BS-02A **Lab Sample ID:** 671900611-0010

Sample Description: Building 2 - Exterior - East Wall/Exterior caulking - white

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
TEM Grav. Reduction	3/13/2019	White	0.0%	100.0%	<0.1% Chrysotile	

Client Sample ID: B2-BS-02B **Lab Sample ID:** 671900611-0011

Sample Description: Building 2 - Exterior - East Wall/Exterior caulking - white

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
TEM Grav. Reduction	3/13/2019	White	0.0%	100.0%	<0.1% Chrysotile	

Client Sample ID: B2-BS-02C **Lab Sample ID:** 671900611-0012

Sample Description: Building 2 - Exterior - East Wall/Exterior caulking - white

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
TEM Grav. Reduction	3/13/2019	White	0.0%	100.0%	<0.1% Chrysotile	

Client Sample ID: B2-BS-03A **Lab Sample ID:** 671900611-0013

Sample Description: Building 2 - Main Floor - Room 2 - Wall/Drywall joint-fill compound

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/12/2019	Beige	0.0%	97.0%	3% Chrysotile	

Client Sample ID: B2-BS-03B **Lab Sample ID:** 671900611-0014

Sample Description: Building 2 - Main Floor - Room 2 - Wall/Drywall joint-fill compound

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/12/2019					Positive Stop (Not Analyzed)

Client Sample ID: B2-BS-03C **Lab Sample ID:** 671900611-0015

Sample Description: Building 2 - Main Floor - Room 2 - Wall/Drywall joint-fill compound

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/12/2019					Positive Stop (Not Analyzed)



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Client Sample ID: B2-BS-03D **Lab Sample ID:** 671900611-0016

Sample Description: Building 2 - Main Floor - Room 2 - Wall/Drywall joint-fill compound

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/12/2019					Positive Stop (Not Analyzed)

Client Sample ID: B2-BS-03E **Lab Sample ID:** 671900611-0017

Sample Description: Building 2 - Main Floor - Room 2 - Wall/Drywall joint-fill compound

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/12/2019					Positive Stop (Not Analyzed)

Client Sample ID: B2-BS-04A-Floor Tile **Lab Sample ID:** 671900611-0018

Sample Description: Building 2 - Main Floor - Room 2/9"x9" vinyl floor tile - green

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	3/13/2019	Green	0.0%	100%	<0.25% Chrysotile	

Client Sample ID: B2-BS-04A-Mastic **Lab Sample ID:** 671900611-0018A

Sample Description: Building 2 - Main Floor - Room 2/9"x9" vinyl floor tile - green

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	3/13/2019	Black	0.0%	98.8%	1.2% Chrysotile	

Client Sample ID: B2-BS-04B-Floor Tile **Lab Sample ID:** 671900611-0019

Sample Description: Building 2 - Main Floor - Room 2/9"x9" vinyl floor tile - green

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	3/13/2019	Green	0.0%	100%	<0.25% Chrysotile	

Client Sample ID: B2-BS-04B-Mastic **Lab Sample ID:** 671900611-0019A

Sample Description: Building 2 - Main Floor - Room 2/9"x9" vinyl floor tile - green

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	3/13/2019					Positive Stop (Not Analyzed)

Client Sample ID: B2-BS-04C-Floor Tile **Lab Sample ID:** 671900611-0020

Sample Description: Building 2 - Main Floor - Room 2/9"x9" vinyl floor tile - green

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	3/13/2019	Green	0.0%	100%	<0.25% Chrysotile	

Client Sample ID: B2-BS-04C-Mastic **Lab Sample ID:** 671900611-0020A

Sample Description: Building 2 - Main Floor - Room 2/9"x9" vinyl floor tile - green

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	3/13/2019					Positive Stop (Not Analyzed)



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Client Sample ID: B2-BS-05A **Lab Sample ID:** 671900611-0021

Sample Description: Building 2 - Exterior - East Wall Cavity/Vermiculite insulation

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/12/2019	Brown/Tan/Gold	0.0%	100.0%	None Detected	

Client Sample ID: B2-BS-05B **Lab Sample ID:** 671900611-0022

Sample Description: Building 2 - Exterior - East Wall Cavity/Vermiculite insulation

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/12/2019	Brown/Tan/Gold	0.0%	100.0%	None Detected	

Client Sample ID: B2-BS-05C **Lab Sample ID:** 671900611-0023

Sample Description: Building 2 - Exterior - East Wall Cavity/Vermiculite insulation

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/12/2019	Gray/Tan	0.0%	100.0%	None Detected	

Client Sample ID: B3-BS-01A-Skim Coat **Lab Sample ID:** 671900611-0024

Sample Description: Building 3 - First Floor - Communications, Wall/Plaster

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/12/2019	White	0.0%	100.0%	None Detected	

Client Sample ID: B3-BS-01A-Base Coat **Lab Sample ID:** 671900611-0024A

Sample Description: Building 3 - First Floor - Communications, Wall/Plaster

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/12/2019	Gray	0.0%	100.0%	None Detected	

Client Sample ID: B3-BS-01B-Skim Coat **Lab Sample ID:** 671900611-0025

Sample Description: Building 3 - First Floor - Communications, Wall/Plaster

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/12/2019	White	0.0%	100.0%	None Detected	

Client Sample ID: B3-BS-01B-Base Coat **Lab Sample ID:** 671900611-0025A

Sample Description: Building 3 - First Floor - Communications, Wall/Plaster

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/12/2019	Gray	0.0%	100.0%	None Detected	

Client Sample ID: B3-BS-01C-Skim Coat **Lab Sample ID:** 671900611-0026

Sample Description: Building 3 - First Floor - Communications, Wall/Plaster

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/12/2019	White	0.0%	100.0%	None Detected	



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Client Sample ID: B3-BS-01C-Base Coat

Lab Sample ID: 671900611-0026A

Sample Description: Building 3 - First Floor - Communications, Wall/Plaster

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/12/2019	Gray	0.0%	100.0%	None Detected	

Client Sample ID: B3-BS-01D-Skim Coat

Lab Sample ID: 671900611-0027

Sample Description: Building 3 - First Floor - Communications, Wall/Plaster

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/12/2019	White	0.0%	100.0%	None Detected	

Client Sample ID: B3-BS-01D-Base Coat

Lab Sample ID: 671900611-0027A

Sample Description: Building 3 - First Floor - Communications, Wall/Plaster

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/12/2019	Gray	0.0%	100.0%	None Detected	

Client Sample ID: B3-BS-01E-Skim Coat

Lab Sample ID: 671900611-0028

Sample Description: Building 3 - First Floor - Communications, Wall/Plaster

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/12/2019	White	0.0%	100.0%	None Detected	

Client Sample ID: B3-BS-01E-Base Coat

Lab Sample ID: 671900611-0028A

Sample Description: Building 3 - First Floor - Communications, Wall/Plaster

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/12/2019	White	0.0%	100.0%	None Detected	

Client Sample ID: B3-BS-01E-Base Coat

Lab Sample ID: 671900611-0028A

Sample Description: Building 3 - First Floor - Communications, Wall/Plaster

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/12/2019	Gray	0.0%	100.0%	None Detected	

Client Sample ID: B3-BS-02A

Lab Sample ID: 671900611-0029

Sample Description: Building 3 - Mezzanine - Entrance/Mastic associated with 9"x9" vinyl floor tile - grey

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/12/2019	Gray	0.0%	100.0%	None Detected	

Client Sample ID: B3-BS-02A

Lab Sample ID: 671900611-0029

Sample Description: Building 3 - Mezzanine - Entrance/Mastic associated with 9"x9" vinyl floor tile - grey

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	3/13/2019	Black	0.0%	100%	None Detected	

Client Sample ID: B3-BS-02B

Lab Sample ID: 671900611-0030

Sample Description: Building 3 - Mezzanine - Entrance/Mastic associated with 9"x9" vinyl floor tile - grey

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	3/13/2019	Black	0.0%	100%	None Detected	

Client Sample ID: B3-BS-02B

Lab Sample ID: 671900611-0030

Sample Description: Building 3 - Mezzanine - Entrance/Mastic associated with 9"x9" vinyl floor tile - grey

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	3/13/2019	Black	0.0%	100%	None Detected	

Client Sample ID: B3-BS-02C

Lab Sample ID: 671900611-0031

Sample Description: Building 3 - Mezzanine - Entrance/Mastic associated with 9"x9" vinyl floor tile - grey

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	3/13/2019	Black	0.0%	100%	None Detected	

Client Sample ID: B3-BS-02C

Lab Sample ID: 671900611-0031

Sample Description: Building 3 - Mezzanine - Entrance/Mastic associated with 9"x9" vinyl floor tile - grey

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	3/13/2019	Black	0.0%	100%	None Detected	



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Client Sample ID: B3-BS-03A-Vinyl Sheet Flooring		Lab Sample ID: 671900611-0032				
Sample Description: Building 3 - First Floor - Communications/Vinyl sheet flooring - grey						
TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/12/2019	Gray/Tan	10.0%	90.0%	None Detected	
Client Sample ID: B3-BS-03A-Backing		Lab Sample ID: 671900611-0032A				
Sample Description: Building 3 - First Floor - Communications/Vinyl sheet flooring - grey						
TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/12/2019	Brown	85.0%	15.0%	None Detected	
Client Sample ID: B3-BS-03B-Vinyl Sheet Flooring		Lab Sample ID: 671900611-0033				
Sample Description: Building 3 - First Floor - Communications/Vinyl sheet flooring - grey						
TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/12/2019	Gray/Tan	10.0%	90.0%	None Detected	
Client Sample ID: B3-BS-03B-Backing		Lab Sample ID: 671900611-0033A				
Sample Description: Building 3 - First Floor - Communications/Vinyl sheet flooring - grey						
TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/12/2019	Brown	85.0%	15.0%	None Detected	
Client Sample ID: B3-BS-03C-Vinyl Sheet Flooring		Lab Sample ID: 671900611-0034				
Sample Description: Building 3 - First Floor - Communications/Vinyl sheet flooring - grey						
TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/12/2019	Brown	15.0%	85.0%	None Detected	
Client Sample ID: B3-BS-03C-Backing		Lab Sample ID: 671900611-0034A				
Sample Description: Building 3 - First Floor - Communications/Vinyl sheet flooring - grey						
TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/12/2019	Brown	85.0%	15.0%	None Detected	
Client Sample ID: B3-BS-04A		Lab Sample ID: 671900611-0035				
Sample Description: Building 3 - First Floor - Storage, Condensate Return Tank/Mag block						
TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/12/2019	Gray	10.0%	15.0%	75% Chrysotile	
Client Sample ID: B3-BS-04B		Lab Sample ID: 671900611-0036				
Sample Description: Building 3 - First Floor - Storage, Condensate Return Tank/Mag block						
TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/12/2019				Positive Stop (Not Analyzed)	



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Client Sample ID: B3-BS-04C		Lab Sample ID: 671900611-0037				
Sample Description: Building 3 - First Floor - Storage, Condensate Return Tank/Mag block						
TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/12/2019					Positive Stop (Not Analyzed)
Client Sample ID: B3-BS-05A-Insulation 1		Lab Sample ID: 671900611-0038				
Sample Description: Building 3 - Second Floor - HVAC Unit/Duct insulation						
TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/12/2019	Gray	90.0%	10.0%	None Detected	
Client Sample ID: B3-BS-05A-Insulation 2		Lab Sample ID: 671900611-0038A				
Sample Description: Building 3 - Second Floor - HVAC Unit/Duct insulation						
TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/12/2019	Black	85.0%	15.0%	None Detected	
Client Sample ID: B3-BS-05B-Insulation 1		Lab Sample ID: 671900611-0039				
Sample Description: Building 3 - Second Floor - HVAC Unit/Duct insulation						
TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/12/2019	Gray	85.0%	15.0%	None Detected	
Client Sample ID: B3-BS-05B-Insulation 2		Lab Sample ID: 671900611-0039A				
Sample Description: Building 3 - Second Floor - HVAC Unit/Duct insulation						
TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/12/2019	Black	85.0%	15.0%	None Detected	
Client Sample ID: B3-BS-05C-Insulation 1		Lab Sample ID: 671900611-0040				
Sample Description: Building 3 - Second Floor - HVAC Unit/Duct insulation						
TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/12/2019	Gray	85.0%	15.0%	None Detected	
Client Sample ID: B3-BS-05C-Insulation 2		Lab Sample ID: 671900611-0040A				
Sample Description: Building 3 - Second Floor - HVAC Unit/Duct insulation						
TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/12/2019	Brown/Black	85.0%	15.0%	None Detected	
Client Sample ID: B4-BS-01A		Lab Sample ID: 671900611-0041				
Sample Description: Building 4 - Main Floor - Kitchen, Wall/Ceramic tile grout						
TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/12/2019	White	0.0%	100.0%	None Detected	



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Client Sample ID: B4-BS-01B **Lab Sample ID:** 671900611-0042

Sample Description: Building 4 - Main Floor - Kitchen, Wall/Ceramic tile grout

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/12/2019	White	0.0%	100.0%	None Detected	

Client Sample ID: B4-BS-01C **Lab Sample ID:** 671900611-0043

Sample Description: Building 4 - Main Floor - Kitchen, Wall/Ceramic tile grout

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/12/2019	White	0.0%	100.0%	None Detected	

Client Sample ID: B4-BS-02A **Lab Sample ID:** 671900611-0044

Sample Description: Building 4 - Exterior - North Wall/Parging

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/12/2019	Gray/Beige	0.0%	100.0%	None Detected	

Client Sample ID: B4-BS-02B **Lab Sample ID:** 671900611-0045

Sample Description: Building 4 - Exterior - North Wall/Parging

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/12/2019	Gray/Beige	0.0%	100.0%	None Detected	

Client Sample ID: B4-BS-02C **Lab Sample ID:** 671900611-0046

Sample Description: Building 4 - Exterior - North Wall/Parging

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/12/2019	Gray/Beige	0.0%	100.0%	None Detected	

Client Sample ID: B4-BS-03A **Lab Sample ID:** 671900611-0047

Sample Description: Building 4 - Main Floor - Bay 2, East Wall/Block Mortar

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/12/2019	Gray	0.0%	100.0%	None Detected	

Client Sample ID: B4-BS-03B **Lab Sample ID:** 671900611-0048

Sample Description: Building 4 - Main Floor - Bay 2, East Wall/Block Mortar

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/12/2019	Gray	0.0%	100.0%	None Detected	

Client Sample ID: B4-BS-03C **Lab Sample ID:** 671900611-0049

Sample Description: Building 4 - Main Floor - Bay 2, East Wall/Block Mortar

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/12/2019	Gray	0.0%	100.0%	None Detected	



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Client Sample ID: B4-BS-04A-Floor Tile

Lab Sample ID: 671900611-0050

Sample Description: Building 4 - Main Floor - Office 2/12"x12" vinyl floor tile - white with grey specks

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	3/13/2019	Tan	0.0%	100%	None Detected	

Client Sample ID: B4-BS-04A-Mastic

Lab Sample ID: 671900611-0050A

Sample Description: Building 4 - Main Floor - Office 2/12"x12" vinyl floor tile - white with grey specks

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	3/13/2019	Black	0.0%	100%	None Detected	

Client Sample ID: B4-BS-04B-Floor Tile

Lab Sample ID: 671900611-0051

Sample Description: Building 4 - Main Floor - Office 2/12"x12" vinyl floor tile - white with grey specks

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	3/13/2019	Tan	0.0%	100%	None Detected	

Client Sample ID: B4-BS-04B-Mastic

Lab Sample ID: 671900611-0051A

Sample Description: Building 4 - Main Floor - Office 2/12"x12" vinyl floor tile - white with grey specks

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	3/13/2019	Black	0.0%	100%	None Detected	

Client Sample ID: B4-BS-04C-Floor Tile

Lab Sample ID: 671900611-0052

Sample Description: Building 4 - Main Floor - Office 2/12"x12" vinyl floor tile - white with grey specks

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	3/13/2019	Tan	0.0%	100%	None Detected	

Client Sample ID: B4-BS-04C-Mastic

Lab Sample ID: 671900611-0052A

Sample Description: Building 4 - Main Floor - Office 2/12"x12" vinyl floor tile - white with grey specks

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	3/13/2019	Black	0.0%	100%	None Detected	

Client Sample ID: B4-BS-05A-Ceramic Tile

Lab Sample ID: 671900611-0053

Sample Description: Building 4 - Main Floor - Kitchen, Wall/Ceramic tile mortar/adhesive

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/12/2019	White/Green	0.0%	100.0%	None Detected	

Client Sample ID: B4-BS-05A-Mortar

Lab Sample ID: 671900611-0053A

Sample Description: Building 4 - Main Floor - Kitchen, Wall/Ceramic tile mortar/adhesive

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/12/2019	Gray	0.0%	100.0%	None Detected	



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EMSL Canada Order 671900611
 Customer ID: 55JACQ30P
 Customer PO:
 Project ID:

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

Client Sample ID: B4-BS-05A-Adhesive

Lab Sample ID: 671900611-0053B

Sample Description: Building 4 - Main Floor - Kitchen, Wall/Ceramic tile mortar/adhesive

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/12/2019	Tan	<1%	100.0%	None Detected	

Client Sample ID: B4-BS-05B-Ceramic Tile

Lab Sample ID: 671900611-0054

Sample Description: Building 4 - Main Floor - Kitchen, Wall/Ceramic tile mortar/adhesive

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/12/2019	White/Green	0.0%	100.0%	None Detected	

Client Sample ID: B4-BS-05B-Mortar

Lab Sample ID: 671900611-0054A

Sample Description: Building 4 - Main Floor - Kitchen, Wall/Ceramic tile mortar/adhesive

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/12/2019	Gray	0.0%	100.0%	None Detected	

Client Sample ID: B4-BS-05B-Adhesive

Lab Sample ID: 671900611-0054B

Sample Description: Building 4 - Main Floor - Kitchen, Wall/Ceramic tile mortar/adhesive

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/12/2019	Tan	<1%	100.0%	None Detected	

Client Sample ID: B4-BS-05C-Ceramic Tile

Lab Sample ID: 671900611-0055

Sample Description: Building 4 - Main Floor - Kitchen, Wall/Ceramic tile mortar/adhesive

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/12/2019	White/Green	0.0%	100.0%	None Detected	

Client Sample ID: B4-BS-05C-Mortar

Lab Sample ID: 671900611-0055A

Sample Description: Building 4 - Main Floor - Kitchen, Wall/Ceramic tile mortar/adhesive

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/12/2019	Gray	0.0%	100.0%	None Detected	

Client Sample ID: B4-BS-05C-Adhesive

Lab Sample ID: 671900611-0055B

Sample Description: Building 4 - Main Floor - Kitchen, Wall/Ceramic tile mortar/adhesive

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/12/2019	White	0.0%	100.0%	None Detected	

Client Sample ID: B4-BS-06A

Lab Sample ID: 671900611-0056

Sample Description: Building 4 - Main Floor - Office 2, Wall/Drywall joint-fill compound

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/12/2019	White	<1%	100.0%	None Detected	



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EMSL Canada Order 671900611
Customer ID: 55JACQ30P
Customer PO:
Project ID:

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

Client Sample ID: B4-BS-06B **Lab Sample ID:** 671900611-0057

Sample Description: Building 4 - Main Floor - Office 1, Wall/Drywall joint-fill compound

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/12/2019	White	<1%	100.0%	None Detected	

Client Sample ID: B4-BS-06C **Lab Sample ID:** 671900611-0058

Sample Description: Building 4 - Main Floor - Office 2, Wall/Drywall joint-fill compound

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/12/2019	White	0.0%	100.0%	None Detected	

Client Sample ID: B4-BS-07A-Air Cell 1 **Lab Sample ID:** 671900611-0059

Sample Description: Building 4 - Main Floor - Bay 2/Air cell

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/12/2019	Brown	85.0%	15.0%	None Detected	

Client Sample ID: B4-BS-07A-Air Cell 2 **Lab Sample ID:** 671900611-0059A

Sample Description: Building 4 - Main Floor - Bay 2/Air cell

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/12/2019	Black	75.0%	25.0%	None Detected	

Client Sample ID: B4-BS-07B-Air Cell 1 **Lab Sample ID:** 671900611-0060

Sample Description: Building 4 - Main Floor - Bay 2/Air cell

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/12/2019	Brown	85.0%	15.0%	None Detected	

Client Sample ID: B4-BS-07B-Air Cell 2 **Lab Sample ID:** 671900611-0060A

Sample Description: Building 4 - Main Floor - Bay 2/Air cell

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/12/2019	Black	75.0%	25.0%	None Detected	

Client Sample ID: B4-BS-07C-Air Cell 1 **Lab Sample ID:** 671900611-0061

Sample Description: Building 4 - Main Floor - Bay 2/Air cell

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/12/2019	Brown/Gray	85.0%	15.0%	None Detected	

Client Sample ID: B4-BS-07C-Air Cell 2 **Lab Sample ID:** 671900611-0061A

Sample Description: Building 4 - Main Floor - Bay 2/Air cell

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	3/12/2019	Brown/Black	70.0%	30.0%	None Detected	



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EMSL Canada Order 671900611
 Customer ID: 55JACQ30P
 Customer PO:
 Project ID:

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

Client Sample ID: B4-BS-08A **Lab Sample ID:** 671900611-0062

Sample Description: Building 4 - Main Floor - Bay 2, East Window/Window glaze compound - white

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
TEM Grav. Reduction	3/13/2019	Gray/White	0.0%	100.0%	<0.1% Chrysotile	

Client Sample ID: B4-BS-08B **Lab Sample ID:** 671900611-0063

Sample Description: Building 4 - Main Floor - Bay 2, East Window/Window glaze compound - white

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
TEM Grav. Reduction	3/13/2019	Gray/White	0.0%	100.0%	<0.1% Chrysotile	

Client Sample ID: B4-BS-08C **Lab Sample ID:** 671900611-0064

Sample Description: Building 4 - Main Floor - Bay 2, West Window/Window glaze compound - white

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
TEM Grav. Reduction	3/13/2019	Gray/White	0.0%	100.0%	<0.1% Chrysotile	

Analyst(s):

Billy Barnes PLM Grav. Reduction (3)
 Joshua Moorman PLM (27)
 PLM Grav. Reduction (9)
 TEM Grav. Reduction (6)
 Kelly Gallisdorfer PLM (4)
 PLM Grav. Reduction (1)
 Roxsee Stover PLM (23)
 TEM Grav. Reduction (7)

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 of the U.S. Government.

Samples analyzed by EMSL Analytical, Inc. Morrisville, NC NVLAP Lab Code 200671-0, VA 3333 000278, WVA LT000296

Report amended: 03/26/2019 09:46:33 Replaces initial report from: 03/13/2019 15:36:33 Reason Code: Client-Change to Location

**DESIGNATED SUBSTANCES AND HAZARDOUS BUILDING MATERIALS SURVEY –
MOOSONEE NATIONAL DEFENCE RADAR BASE, MOOSONEE, ONTARIO**

Appendix F Laboratory Analytical Report – Lead: Paint Chip Analysis
September 3, 2019

**Appendix F LABORATORY ANALYTICAL REPORT – LEAD:
PAINT CHIP ANALYSIS**



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Suite 400
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Phone: (613) 722-4420
Fax: (613) 722-2799
Received: 03/12/19 10:07 AM
Collected: 3/8/2019

Project: **163302647****Test Report: Lead in Paint Chips by Flame AAS (SW 846 3050B/7000B)***

<i>Client Sample</i>	<i>Description</i>	<i>Collected</i>	<i>Analyzed</i>	<i>Weight</i>	<i>RDL</i>	<i>Lead Concentration</i>
B1A-PS-01 551902816-0001	3/8/2019 3/13/2019 Site: Building 1A - First Floor - Framing Desc: Grey Coloured Paint			0.2471 g	81 ppm	340 ppm
B2-PS-01 551902816-0002	3/8/2019 3/13/2019 Site: Building 2 - Exterior - Wall Desc: Pink Coloured Paint			0.2442 g	82 ppm	<82 ppm
B2-PS-02 551902816-0003	3/8/2019 3/13/2019 Site: Building 2 - Main Floor - Room 2, Wall Desc: Cream Coloured Paint			0.2413 g	83 ppm	1200 ppm
B3-PS-02 551902816-0004	3/8/2019 3/13/2019 Site: Building 3 - First Floor - Storage, Wall Desc: Red Coloured Paint			0.2418 g	170 ppm	4800 ppm
B3-PS-01 551902816-0005	3/8/2019 3/13/2019 Site: Building 3 - First Floor - Storage, Wall Desc: Green Coloured Paint			0.2467 g	81 ppm	2100 ppm

Rowena Fanto, Lead Supervisor
or other approved signatory

*Analysis following Lead in Paint by EMSL SOP/Determination of Environmental Lead by FLAA. Reporting limit is 0.010 % wt based on the minimum sample weight per our SOP. Unless noted, results in this report are not blank corrected. 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. Samples received in good condition unless otherwise noted. "<" (less than) result signifies that the analyte was not detected at or above the reporting limit. Measurement of uncertainty is available upon request. The QC data associated with the sample results included in this report meet the recovery and precision requirements unless specifically indicated otherwise. Definitions of modifications are available upon request.

Samples analyzed by EMSL Canada Inc. Mississauga, ON A2LA Accredited Cert #2845.08; AIHA-LAP, LLC - ELLAP #196142

Report Amended: 03/26/2019 09:17:08 Replaces the Initial Report 03/14/2019 08:48:42. Reason Code: Client-Change to Sample ID

Appendix G EVALUATION CRITERIA FOR ASSESSING ASBESTOS-CONTAINING MATERIALS

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 is based on the Public Works and Government Services Canada (PWGSC) document entitled *Asbestos 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.

The evaluation of ACM spray applied as fireproofing, non-mechanical thermal insulation, or texture, decorative or acoustic finishes which are present above ceilings, may be limited by the number of observations made, and by building components such as ducts or full height walls that obstruct the above ceiling observations. Persons entering the ceiling area are advised to be watchful for ACM DEBRIS prior to accessing or working above ceilings in areas of building with ACM, regardless of the reported condition.



DESIGNATED SUBSTANCES AND HAZARDOUS BUILDING MATERIALS SURVEY – MOOSONEE NATIONAL DEFENCE RADAR BASE, MOOSONEE, ONTARIO

Appendix G Evaluation Criteria for Assessing Asbestos-Containing Materials
September 3, 2019

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 building components such as ducts or full height walls 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.

