Public Works and Government Services Canada

Requisition No. EZ899-211939/A

DRAWINGS & SPECIFICATIONS
for

Fort Nelson 12 Residences Building Envelope Upgrade
Fort Nelson, BC

Project No.: R.109055.001

Real Property Services Branch, Professional and Technical Services, Pacific Region
Room 219 - 800 Burrard Street, Vancouver, B.C. V6Z 0B9

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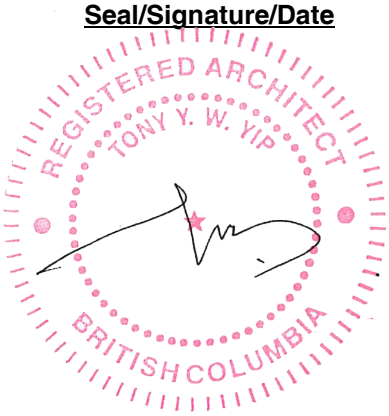
END OF SECTION 00 00 10

CONSULTANTS – SEAL & SIGNATURE

Discipline	**Seal/Signature/Date**
Architectural Chernoff Thompson Architects	 May 15, 2020

END OF SECTION 00 01 07

1.0 GENERAL

1.1 CODES

.1 Perform work in accordance with National Building Code for Canada 2015, BCBC 2018, Worksafe BC, and any other code of provincial or local application provided that in any case of conflict or discrepancy, the more stringent requirements shall apply.

.2 Meet or exceed requirements of specified standards, codes and referenced documents.

1.2 DESCRIPTION OF WORK

.1 Works of this Contract for the building upgrade for 12 houses in Fort Nelson, BC, which generally includes:

.1 Exterior work that comprises cladding replacement, window replacement, Door replacement, ventilation louvre replacement, insulation upgrade, lighting fixture replacement and rain water leader replacement associated with the cladding replacement. New painting for the wood deck, wood deck replacement exterior stair and wood structure.

.2 Interior works includes removal and replacement of the trims and casing around window and door openings.

1.4 TIME OF COMPLETION

.1 Commence work immediately and complete the scope of project within twenty-three (23) weeks upon official notification of acceptance of offer.

1.5 HOURS OF WORK

.1 The hours of work are restricted to between 8am to 5pm, Monday to Friday throughout the contract period. Approval is required for weekend/holiday work schedule.

1.6 WORK SCHEDULE

.1 Carry out work as follows:

.1 Within 10 working days after Contract award, submit Bar (GANTT) chart as per specification sections 01 32 16.07 Construction Progress Schedule Bar (GANTT) chart. Indicate the following:

.1 Submission of shop drawings, product data, MSDS sheets and samples.

.2 Commencement and completion of work of each section of the specifications or trades for each phase as outlined.

.3 Final completion date within the time period required by the Contract documents.

.2 Do not change approved Schedule without notifying Departmental Representative.

.3 Interim reviews of work progress based on work schedule will be conducted as decided by Departmental Representative and schedule updated by Contractor in conjunction with and to approval of Departmental Representative.

1.7 DIVISION OF SPECIFICATIONS

.1 The specifications are subdivided in accordance with the current 6-digit National Master Specifications System.

.2 A division may consist of the work of more than 1 subcontractor. Responsibility for determining which subcontractor provides the labour, material, equipment and services required to complete the work rests solely with the Contractor.

.3 In the event of discrepancies or conflicts when interpreting the drawings and specifications, the specifications govern.

1.8 DOCUMENTS REQUIRED

.1 Maintain one copy each of the following at the job site:
- .1 Contract drawings.
- .2 Contract specifications.
- .3 Addenda to Contract documents.
- .4 Copy of work schedule.
- .5 Reviewed shop drawings.
- .6 Change orders.
- .7 Other modifications to Contract.
- .8 Field test reports.
- .9 Reviewed samples.
- .10 Manufacturer's installation and application instructions.
- .11 One set of record drawings and specifications for "as-built" purposes.
- .12 National Building Code of Canada 2015.
- .13 Current construction standards of workmanship listed in technical Sections.
- .14 Building Safety Plan.
- .15 Building Permit
- .16 Request for Information (RFI)
- .17 Contemplated Change Notices
- .18 WHMIS Documents
- .19 Site Instructions
- .20 Contractor's Health and Safety Plan, including map to nearest hospital.

1.9 REGULATORY REQUIREMENTS

.1 There is no need for a Building Permit. The Contractor shall obtain and pay for all other trades permits and licenses required for the Work.

.2 The Contractor shall conform to the codes, ordinances, regulations and orders of all authorities having jurisdiction over the performance of the Work. Should conflicts arise, the Contractor shall forthwith request clarification from the Departmental Representatives.

1.10 CONTRACTOR'S USE OF SITE

.1 Use of site:
- .1 for execution and completion of Work.
- .2 Assume responsibility for assigned area on the premises for performance of this work.
- .3 Be responsible for coordination of all work activities on site, including the work of other contractors engaged by the Departmental Representative.
- .4 Provide safety and security of Contractor's work site and all Contractors and Subcontractor's equipment and material. Secure Contractor's work site at the end of each work day.
- .5 Perform work in accordance with the Contract documents. Ensure work is carried out in accordance with indicated phasing.
- .6 Any area which access is restricted by sign is a secured or restricted area and shall not be entered.
- .7 Do not obstruct access to property outside of the Contractor's work site. Maintain overhead clearances, keep roadways and walkways clear, and maintain routes for emergency response vehicles.

.2 Perform work in accordance with Contract documents. Ensure work is carried out in accordance with approved schedules.

.3 Do not unreasonably encumber site with material or equipment.

.4 Coordinate with Departmental Representative for material storage on site which belongs to the project but waiting to be installed.

1.11 EXAMINATION

.1 Examine site and be familiar and conversant with existing conditions likely to affect work.

1.12 EXISTING SERVICES

.1 Where Work involves breaking into or connecting to existing services, schedule any required shut down with Departmental Representative prior to proceeding.

.2 Record locations of maintained, re-routed and abandoned service lines.

.3 Construct barriers in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

1.13 LOCATION OF EQUIPMENT AND FIXTURES

.1 Location of equipment, fixtures and outlets indicated or specified are to be considered as approximate.

.2 Locate equipment, fixtures and distribution systems to provide minimum interference and maximum usable space, and in accordance with manufacturer's recommendations for safety, access and maintenance.

.3 Inform Departmental Representative at least 48 hours prior to impending installation and obtain approval for actual location.

.4 Submit field drawings or shop drawings to indicate the relative position of various services and equipment when required by the Departmental Representative and/or as specified.

1.14 CUTTING AND PATCHING

.1 Cut existing surfaces as required to accommodate new work.

.2 Remove items as shown or specified.

.3 Do not cut, bore, or sleeve load-bearing members.

.4 Make cuts with clean, true, smooth edges. Make patches inconspicuous in final assembly.

.5 Fit work airtight to pipes, sleeves, ducts and conduits.

.6 Conceal pipes, ducts and wiring in raised floors, wall and ceiling construction of finished areas except where indicated otherwise.

.7 Patch and make good surfaces cut, damaged or disturbed, to Departmental Representative's approval. Match existing material, colour, finish and texture.

.8 Making good is defined as matching construction and finishing materials and the adjacent surfaces such that there is no visible difference between existing and new surfaces when viewed from 1.5 metres in ambient light, and includes painting the whole surface to the next change in plane.

1.15 SETTING OUT OF WORK

.1 Assume full responsibility for and execute complete layout of work to locations, lines and

elevations indicated.

.2 Provide devices needed to lay out and construct work.

.3 Supply such devices as templates required to facilitate Departmental Representative's inspection of work.

1.16 QUALITY OF WORK

.1 Ensure that quality workmanship is performed through use of skilled tradesmen, under supervision of qualified journeyman.

.2 The workmanship, erection methods and procedures to meet minimum standards set out in the National Building Code of Canada 2015 and Construction Standards as specified herein.

.3 In cases of dispute, decisions as to standard or quality of work rest solely with the Departmental Representative, whose decision is final.

1.17 WORKS COORDINATION

.1 Coordinate work of sub-trades:
- .1 Designate one person to be responsible for review of contract documents and shop drawings and managing coordination of Work.

.2 Convene meetings between subcontractors whose work interfaces and ensure awareness of areas and extent of interface required.
- .1 Provide each subcontractor with complete plans and specifications for Contract, to assist them in planning and carrying out their respective work.
- .2 Develop coordination drawings when required, illustrating potential interference between work of various trades and distribute to affected parties.
  - .1 Pay particularly close attention to overhead work above ceilings and within or near to building structural elements.
  - .2 Identify on coordination drawings, building elements, services lines, rough-in points and indicate location services entrance to site.
- .3 Facilitate meeting and review coordination drawings. Ensure subcontractors agree and sign off on drawings.
- .4 Publish minutes of each meeting.
- .5 Plan and coordinate work in such a way to minimize quantity of service line offsets.
- .6 Submit copy of coordination drawings and meeting minutes to Departmental Representative for information purposes.

.3 Submit shop drawings and order of prefabricated equipment or rebuilt components only after coordination meeting for such items has taken place.

.4 Work cooperation:
- .1 Ensure cooperation between trades in order to facilitate general progress of Work and avoid situations of spatial interference.
- .2 Ensure that each trade provides all other trades reasonable opportunity for completion of Work and in such a way as to prevent unnecessary delays, cutting, patching and removal or replacement of completed work.
- .3 Ensure disputes between subcontractors are resolved.
- .4 Departmental Representative is not responsible for, or accountable for extra costs incurred as a result of Contractor's failure to coordinate Work.
- .5 Maintain efficient and continuous supervision.

1.18 APPROVAL OF SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

.1 In accordance with Section 01 33 00, submit the requested shop drawings, product data, MSDS sheets and samples indicated in each of the technical Sections.

.2 Allow sufficient time for the following:
- .1 Review of product data.
- .2 Review of shop drawings.
- .3 Review of re-submission.
- .4 Ordering of approved material and/or products. Refer to individual technical section of specification.

1.19 TESTING AND INSPECTION

.1 Particular requirements for inspection and testing to be carried out by testing service or laboratory approved by the Departmental Representative are specified in Sections 01 45 00.

.2 The Contractor will appoint and pay for the services of testing agency or testing laboratory as specified, and where required for the following:
- .1 Inspection and testing required by laws, ordinances, rules, regulations or orders of public authorities.
- .2 Inspection and testing performed exclusively for Contractor's convenience.
- .3 Tests specified in the contract documents to be carried out by Contractor which may be under the Departmental Representative's supervision.

.3 Within 15 working days after Contract award provide a list of proposed testing services or testing laboratories for Departmental Representative’s approval.

.4 The Departmental Representative may require, and pay for, additional inspection and testing services not included in paragraph 1.19.2.

.5 Where tests or inspections by designated testing laboratory reveal work is not in accordance with the Contract requirements, Contractor shall pay costs for additional tests or inspections as the Departmental Representative may require to verify acceptability of corrected work.

.6 Contractor shall furnish labour and facilities to carry out specified testing and notify Departmental Representative in advance of planned testing.

.7 Where materials are specified to be tested, deliver representative samples in required quantity to testing laboratory.

.8 Pay costs for uncovering and making good work that is covered before required inspection or testing is completed and approved by Departmental Representative.

.9 Provide Departmental Representative with 2 copies of test reports as soon as they are available.

1.20 AS-BUILT DOCUMENTS

.1 The Departmental Representative will only provide electronic format of drawings and specification in PDF format. Contractor to provide as-built drawings by hardcopy or in pdf.

.2 Keep one set of current white prints of all contract drawings and all addenda, revisions, clarifications, change orders, and reviewed shop drawings in the site office; and have them available at all times for inspection by the Departmental Representative.

.3 As the work progresses, maintain accurate records to show all deviations from the Contract documents. Note on as-built specifications, drawings and shop drawings as changes occur.

.4 Provide accurate as-built drawings by a qualified professional surveyor identifying the various elements shown on the drawings in the requested format.

.5 At completion of the Work, transfer all deviations, including those called up by addenda, revisions, clarifications, shop drawings and change order, to a set of Issued for Construction drawings. Submit the 'red-marked' as-built set to the Departmental Representative in hard copy with contractor's review stamp and date confirming that the set submitted are a true record of "as-built" information. Submit full set of Mechanical and Electrical as-builts in CAD and PDF in addition to the above.

.6 Refer to Section 01 78 00 – Close-out Submittals.

1.21 CLEANING

.1 Refer to Section 01 74 11 - Cleaning.

1.22 DUST CONTROL

.1 Provide temporary dust tight screens or partitions to localize dust generating activities, and for protection of workers, finished areas of work and public.

.2 Maintain and relocate protection until such work is complete.

1.23 ENVIRONMENTAL PROTECTION

.1 Prevent extraneous materials from contaminating air beyond construction area, by providing temporary enclosures during work.

.2 Do not dispose of waste or volatile materials into water courses, storm or sanitary sewers.

.3 Ensure proper disposal procedures in accordance with all applicable territorial regulations.

1.24 MAINTENANCE MATERIALS, SPECIAL TOOLS AND SPARE PARTS

.1 Specific requirements for maintenance materials, tools and spare parts are specified in individual technical sections of specifications.

1.25 ADDITIONAL DRAWINGS

.1 The Departmental Representative may furnish additional drawings for clarification. These additional drawings have the same meaning and intent as if they were included with drawings referred to in the Contract Documents.

1.26 BUILDING SMOKING ENVIRONMENT

.1 Smoking within the property of each building is not permitted.

1.27 SYSTEM OF MEASUREMENT

.1 The metric system of measurement (SI) will be employed on this Contract.

1.28 COST BREAKDOWN

.1 Before submitting the first progress claim, submit a breakdown of the Contract price in detail as directed by the Departmental Representative and aggregating Contract price. After approval, the cost breakdown will form the basis of progress payments.

.2 Within 2 weeks after award of contract, provide a monthly cash flow projection for the whole contract period in detail as directed by Departmental Representative. Contractor should provide a monthly update of the cash flow projection according to the actual work schedule.

1.29 TREE PROTECTION

.1 Contractor should provide sufficient tree protection measures such as hoarding and screening to the satisfaction of the Departmental Representative to protect all the trees in the vicinity of the project work area which will likely be affected by the construction work or any temporary work, such as but not limited to scaffolding, hoarding, on site storage, and all temporary facilities and storage provided by the contractor.

.2 Remove all temporary fencing or tree protection after completion of work.

1.30 BUSINESS LICENSES FOR CONSTRUCTION PROJECTS

.1 The Prime Contractor and all sub-contractors are required to obtain and pay for the Business License across the contract period to carry out works in the Authority having Jurisdiction's area. Aware of the processing time for each license.

1.31 HAZARDOUS MATERIAL

.1 Refer to Appendices A1-1 to A1-12 for hazmat reports. Refer hazmat abatement requirements in specification section 02 81 01 Hazardous Materials Use and Abatement.

END OF SECTION 01 11 55

1.0 GENERAL

1.1 CONSTRUCTION ETIQUETTE

.1 All construction staff shall be respectful of the occupants of the residence. The residence will be occupied throughout the contract period.

.1 All construction parking must be outside the property.

.2 The following are considered as misbehaviors and there will be zero-tolerance:

.1 Appear to be under the influence of alcohol, drugs or narcotics.

.2 Behave in an unusual or disorderly manner.

.3 In possession of contraband.

.2 Cooperate with and coordinate construction/demolition activities with Departmental Representatives.

1.2 ACCESS AND EGRESS

.1 All construction laydown area, construction material and disposal bin, and all construction activities must not block access to the carpark and front entry of the residence.

.2 Provide hoarding, and scaffolding plan to Departmental Representative for review five (5) business days prior to installation.

1.3 USE OF SITE

.1 Execute work with least possible interference or disturbance to normal use of premises. Make arrangements with Departmental Representative to facilitate work as stated.

.2 Maintain existing services to building and provide for personnel and vehicle access.

.3 Where security is reduced by work, provide temporary means to maintain security as per Departmental Representatives direction.

.4 Closures: protect work temporarily until permanent enclosures are completed.

.5 Coordinate with Departmental Representative in scheduling operations to minimize conflict and to facilitate use of space.

1.4 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING

.1 Execute work with least possible interference or disturbance to the neighbors and the occupants and normal use of premises. Arrange with Departmental Representative to facilitate execution of work.

1.5 EXISTING SERVICES SHUT DOWNS

.1 No work within the Contract should require any services shut down of the residence. Should any shut down of services be required to facilitate work, notify Departmental Representative of any intended interruption of services five (5) days in advance.

1.6 BUILDING SMOKING ENVIRONMENT

.1 Comply with smoking restrictions. Smoking is not permitted within the property area.

1.7 NOISE CONTROL

.1 Comply with applicable provincial by-law for noise control.

1.8 EXISTING BUILDING CONDITIONS

.1 Protect all existing building elements (exterior and interior) which do not form part of the specified work, but may be affected by the construction work in their vicinity. Contact Departmental Representative prior to start of construction work to confirm acceptability of the protective measures. Correct protective measures as instructed by Departmental Representative.

.2 Provide appropriate protection to existing building components not forming part of the scope from damage by construction activities.

1.9 CONSTRUCTION SEQUENCE AND PROTECTION

.1 All construction work should be carried out outside the building except addition of new window trim and door casing and measurements of windows and door rough openings.

.2 Contractor to sequent construction work to minimize exposure of unprotected exterior sheathing, windows and door openings. Removal of existing windows and construction of new windows should be carried out at the same time. Caulking and replacement of window casing on the inside should be completed in one (1) day.

.3 Contractor to provide appropriate weather protection to exposed exterior sheathing after removal of existing cladding to the satisfaction of Departmental Representative.

.4 Prior to any work occurring inside the residence, Contractor will provide a minimum of three (3) days advance notification to the Departmental Representative.

.5 Contractor to confirm sequencing of houses with Departmental Representative prior to the start of construction.

END OF SECTION 01 14 00

1.0 GENERAL

1.1 ADMINISTRATIVE

.1 Schedule and administer site meetings throughout the progress of the work on a regular basis or at the call of Departmental Representative.

.2 Prepare and distribute agenda at least three (3) days prior to the meetings.

.3 Distribute written notice of each meeting seven (7) days in advance of meeting date to Departmental Representative.

.4 Provide physical space and make arrangements for meetings.

.5 Preside at meetings.

.6 Record the meeting minutes. Include significant proceedings and decisions. Identify actions by parties.

.7 Reproduce and distribute copies of minutes within five (5) days after meetings and transmit to meeting participants and affected parties not in attendance, Departmental Representative

.8 Representative of Contractor, Subcontractor and suppliers attending meetings will be qualified and authorized to act on behalf of party each represents.

1.2 PRE-CONSTRUCTION MEETING

.1 Within 15 days after award of Contract: Departmental Representative will request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.

.2 Attendance will include, but is not limited to, the Departmental Representative and the client representative.

.3 Departmental Representative to establish time and location of pre-construction meeting, Contractor to notify parties concerned a minimum of 4 working days before meeting.

.4 Departmental Representative will chair the meeting, record minutes and issue minutes.

.5 Agenda to include:

- .1 Introduction of official representative of participants in the Work.
- .2 Start date on site.
- .3 Communication Protocol for submission of shop drawings, samples, colour chips. Submit submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .4 Requirements for temporary facilities, site sign, offices, storage sheds, utilities, fences in accordance with Section 01 51 00 - Temporary Utilities.
- .5 Site safety in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.
- .6 Communication Protocol for proposed changes, change orders, procedures, approvals required.
- .7 Owner’s Work.
- .8 Record drawings in accordance with Section 01 78 00 - Closeout Submittals.
- .9 Maintenance manuals in accordance with Section 01 78 00 - Closeout Submittals.
- .10 Take-over procedures, acceptance, warranties in accordance with Section 01 78 00 - Closeout Submittals.
- .11 Monthly progress claims, administrative procedures, photographs, hold backs.
- .12 Appointment of inspection and testing agencies or firms.

1.3 PROGRESS MEETINGS

.1 During course of Work and two weeks prior to Project Completion, Contractor to schedule progress meetings bi-weekly.

.2 Attendance to include but is not limited to Departmental Representative, client representatives, Contractor, and major subcontractors.

.3 Contractor is responsible to record minutes of meetings and circulate to attending parties and affected parties not in attendance within five (5) days after meeting.

.4 Record next meeting dates in the meeting minutes or notify parties minimum of seven (7) days in advance for other ad-hoc meetings.

.5 Agenda to include, at a minimum, the following:

.1 Review, approval of minutes of previous meeting.
.2 Review of Health and Safety including any incidents, near misses, and WorkSafe BC visits.
.3 Review of Work progress since previous meeting.
.4 Coordination discussions with Departmental Representatives.
.5 Construction schedule review.
.6 Review of off-site fabrication delivery schedules.
.7 Corrective measures and procedures to regain projected schedule.
.8 Request for Information (RFI) log review.
.9 Engineering Disciplines Reviews.
.10 Change order log review.
.11 Review submittal schedule.
.12 Review updated as built.
.13 Review and resolve site issues.
.14 New business.

END OF SECTION 01 31 19

1.0 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, Interim Certificate and Final Certificate as defined times of completion are of essence of this contract.

.5 Clearly show sequence and interdependence of construction activities and indicate:

1 Start and completion of all items of Work, their major components and interim milestones completion dates.

.2 Activities for procurement, delivery, installation and completion of each major piece of equipment, materials and other supplies, including:

.1 Time for submittals, re-submittal and review.

.2 Time for fabrication and delivery of manufactured products for Work.

.3 Interdependence of procurement and construction activities.

.3 Include sufficient detail for project activities to assure adequate planning and execution of work. Activities should generally range in duration from 3 to 15 days each.

.4 Provide level of detail for project activities such that sequence and interdependency of Contract tasks are demonstrated to allow coordination and control of project activities. Show continuous flow from left to right.

.5 Ensure activities with no float are calculated and clearly indicated on logical CPM construction network system as being whenever possible, continuous series of activities throughout length of project to form critical path.

1.3 SUBMITTALS

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

.2 Submit to Departmental Representative within fourteen (14) working days after Award of Contract Project schedule in form of Bar (GANTT) Chart for planning, monitoring and reporting of project progress.

1.4 REVIEW OF THE SCHEDULE

.1 Allow 10 working days for Departmental Representative to review proposed schedule. Make necessary changes to proposed schedule within 5 days.

.2 Submit letter ensuring the schedule has been prepared in coordination with major subcontractors and suppliers.

.3 Promptly provide additional information to validate practicability of schedule as required by Departmental Representative.

.4 Submittal of Schedule indicates that it meets Contract Requirements and will be executed generally in sequence.

1.5 COMPLIANCE WITH SCHEDULE

.1 Comply with reviewed schedule.

.2 Proceed with significant changes and deviations from schedule sequence of activities which cause delay only after review by Departmental Representative.

.3 Identify activities that are behind schedule and causing delay. Provide measures to regain slippage.

.1 Corrective measures may include:

.1 An increase of personnel on the site for effective activities or work packages.

.2 An increase in materials and equipment.

.3 Additional work shifts, longer hours.

1.6 PROJECT SCHEDULE

.1 Develop detailed Project Schedule derived from Master Plan.

.2 Ensure detailed Project Schedule that shows milestone and activity types and expand from the following items:

.1 Award.

.2 Shop Drawings, Samples and Approvals.

.3 Permits.

.4 Mobilization.

.5 Mock-ups and Approvals.

.6 Procurement.

.7 Construction.
.8 Installation.
.9 Site Works.

1.7 PROJECT SCHEDULE REPORTING

.1 On an ongoing basis, schedule on job site must show “progress to date”. Arrange participation on and off site of subcontractor and suppliers, as and when necessary, for purpose of network planning, scheduling, updating and progress monitoring. Inspect Work with Departmental Representative at least once monthly to establish progress on each current activity shown on applicable networks.

.2 Maintain a daily log of progress of the work:
.1 Submit daily force report to Departmental Representative daily prior to noon the following day indicating:
.1 Total number of personnel on site.
.2 Major subcontractors on site listed by trade.
.3 Major equipment on site, i.e. excavators, cranes, drills.
.4 Concrete volumes.
.5 Visitors to site.
.6 Weather
.7 Documents required from Departmental Representative to Contractor to maintain.

.3 Perform schedule update monthly dated on last working day of the month. Update to reflect activities completed to date, activities in progress, logic and duration changes.

.4 Do not automatically update actual start and finish dates by using default mechanisms found in project management software.

.5 Requirements for monthly progress monitoring and reporting are basis for progress payment request.

.6 Submit monthly schedule updates with the progress payment request.

.7 Submit monthly written reports based on schedule, showing Work to Date performed, comparing work progress planned and presenting current forecasts. Report must summarize progress, defining problem areas and anticipated delays with respect to Work Schedule, and critical paths. Explain alternatives for possible schedule recovery to mitigate any potential delay. Include in report:
.1 Description of progress made.
.2 Pending items and status of: Permits, shop drawings, samples, mockups, deliveries, change orders, possible time extension.
.3 Status of Contract Completion Date and Milestones.
.4 Current and Anticipated problem areas, potential delays and corrective measures.

.8 Submit weekly 3 weeks look ahead schedule to Departmental Representative on each Friday of the Week indicating the planned tasks of the next three week period.

1.8 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.

END OF SECTION 01 32 16.07

1.0 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.

.11 Do not proceed with work until relevant submissions are reviewed by Departmental Representative.

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 When specified in the Contract document, submit drawings stamped and signed by professional engineer registered or licensed in Province of British Columbia of 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 10 days for Departmental Representative's review of each submission, unless noted otherwise.

.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, in duplicate, 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 manufacturer’s 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 Material Safety Data Sheets concerning impedances, hazards and safety precautions.

.15 Submit 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 Departmental Representative is for sole purpose of ascertaining conformance with general concept.
.1 This review shall not mean that Departmental Representative 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.

.22 Shop drawings format larger than 11” x17” (275mm x 430mm) must be submitted with hardcopies together with electronic format. Submit sufficient copies such that Departmental Representative will keep 5 copies plus contractor’s distribution and maintenance manual.

.23 Electronic submissions will only be reviewed and returned electronically. No hardcopies will be returned to contractor.

.24 All electronic submissions to be uploaded to Document Control System FTP site hosted by Departmental Representative.

1.3 SAMPLES

.1 Submit for review samples in duplicate as required in respective specification Sections. Label samples with origin and intended use.

.2 Deliver samples prepaid to Departmental Representative's business address.

.3 Notify Departmental Representative in writing, at time of submission of deviations in samples from requirements of Contract Documents.

.4 Where colour, pattern or texture is criterion, submit full range of samples.

.5 Adjustments made on samples 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 samples which Departmental Representative may require, consistent with Contract Documents.

.7 Reviewed and accepted samples will be kept on site and will become standard of workmanship and material against which installed Work will be verified.

1.4 MOCK-UPS

.1 Erect mock-ups in accordance with 01 45 00 - Quality Control.

1.5 PHOTOGRAPHIC DOCUMENTATION

.1 Submit electronic copy of colour digital photography in jpg format, standard resolution monthly with progress statement and as directed by Departmental Representative.

.2 Project identification: name and number of project and date of exposure indicated.

.3 Viewpoints and their locations as reasonably determined by Departmental Representative.

.4 Provide photographic documentation of adjacent existing conditions prior to commencement of construction for determining and accidental damage as a result of contractor’s work.

.5 Frequency of photographic documentation: monthly as directed by Departmental Representative.

.1 Upon completion of: demolition, framing and services before concealment of Work, and as directed by Departmental Representative.

1.6 CERTIFICATES AND TRANSCRIPTS

.1 Submit electronic copies of test results and inspection reports required as noted in each section of specifications.

END OF SECTION 01 33 00

1.0 GENERAL

PWGSC Update on Asbestos Use

Effective April 1, 2016, all Public Works and Government Services of Canada (PWGSC) contracts for new construction and major rehabilitation will prohibit use of asbestos-containing materials.

COVID 19

All contractors shall follow Canadian Construction Association COVID-19 - Standardized Protocols for All Canadian Construction Sites.

1.1 REFERENCES

.1 Government of Canada.
- .1 Canada Labour Code - Part II (as amended)
- .2 Canada Occupational Health and Safety Regulations. (as amended)

.2 National Building Code of Canada (NBC): (as amended)
- .1 Part 8, Safety Measures at Construction and Demolition Sites.

.3 The Canadian Electrical Code (as amended)

.4 Canadian Standards Association (CSA) as amended:
- .1 CSA Z797-2018 Code of Practice for Access Scaffold.
- .2 CSA S269.1-2016 Falsework for Construction Purposes.
- .3 CSA S350-M1980 (R2003) Code of Practice for Safety in Demolition of Structures.
- .4 CSA Z1006-10 Management of Work in Confined Spaces.
- .5 CSA Z462-18 Workplace Electrical Safety Standard

.5 National Fire Code of Canada 2015 (as amended)
- .1 Part 5 – Hazardous Processes and Operations and Division B as applicable and required.

.6 American National Standards Institute (ANSI): (as amended)
- .1 ANSI/ASSP A10.3-2013, Operations – Safety Requirements for Powder-Actuated Fastening Systems.

.7 Province of British Columbia:
- .1 Workers Compensation Act Part 3-Occupational Health and Safety. (as amended)
- .2 Occupational Health and Safety Regulation (as amended)

.8 Refer Appendix A of the specification for hazmat reports of all the buildings.

1.2 RELATED SECTIONS

.1 Refer to the following current NMS sections as required:

.1	Section 01 01 50	General Instructions
.2	Section 01 32 16.0	Construction Progress Schedule-Bar (GANTT) Chart:
.3	Section 01 33 00	Submittal Procedures:
.4	Section 01 51 00	Temporary utilities:
.5	Section 01 52 00	Construction facilities:

.6	Section 01 56 00	Temporary barriers and enclosures
.7	Section 02 41 99	Demolition for Minor Works
.8	Section 02 82 00.02	Asbestos Abatement Intermediate Precautions
.9	Section 02 83 11	Lead BasePaint (Abatement Intermediate Precautions)

1.3 WORKERS' COMPENSATION BOARD COVERAGE

.1 Comply fully with the Workers' Compensation Act, regulations and orders made pursuant thereto, and any amendments up to the completion of the work.

.2 Maintain Workers' Compensation Board coverage during the term of the Contract, until and including the date that the Certificate of Final Completion is issued.

1.4 COMPLIANCE WITH REGULATIONS

.1 PWGSC may terminate the Contract without liability to PWGSC where the Contractor, in the opinion of PWGSC, refuses to comply with a requirement of the Workers' Compensation Act or the Occupational Health and Safety Regulations.

.2 It is the Contractor's responsibility to ensure that all workers are qualified, competent and certified to perform the work as required by the Workers' Compensation Act or the Occupational Health and Safety Regulations.

1.5 SUBMITTALS

.1 Submit to Departmental Representative submittals listed for review in accordance with Section 01 01 50.

.2 Work affected by submittal shall not proceed until review is complete.

.3 Submit the following:

- .1 Organizations Health and Safety Plan.
- .2 Site Specific Safety Plan or Health and Safety Plan (SSSP or HASP)
- .2 Copies of reports or directions issued by Federal and Provincial health and safety inspectors.
- .3 Copies of incident and accident reports.
- .4 Complete set of Material Safety Data Sheets (SDS), and all other documentation required by Workplace Hazardous Materials Information System (WHMIS) requirements.
- .5 Emergency Response Procedures.

.4 The Departmental Representative will review the Contractor's Site Specific Safety Plan or Health and Safety Plan (SSSP/HASP) and emergency response procedures, and provide comments to the Contractor within 5 days after receipt of the plan. Revise the plan as appropriate and resubmit to Departmental Representative.

.5 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.

.6 Submission of the Site Specific Safety Plan or Health and Safety Plan, and any revised version, to the Departmental Representative is for information and reference purposes only. It shall not:
- .1 Be construed to imply approval by the Departmental Representative.
- .2 Be interpreted as a warranty of being complete, accurate and legislatively compliant.
- .3 Relieve the Contractor of his legal obligations for the provision of health and safety on the project.

1.6 RESPONSIBILITY

.1 Assume responsibility as the Prime Contractor for work under this contract.

.2 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.

.3 Comply with and enforce compliance by employees with safety requirements of Contract documents, applicable Federal, Provincial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

1.7 HEALTH AND SAFETY COORDINATOR

.1 Assign a competent and qualified Health and Safety Coordinator who shall:
- .1 Be responsible for completing all health and safety training, and ensuring that personnel that do not successfully complete the required training are not permitted to enter the site to perform work.
- .2 Be responsible for implementing, daily enforcing, and monitoring the Site Specific Safety Plan (SSSP) or Health and Safety Plan (HASP)
- .3 Be on site during execution of work.
- .4 Have minimum two (2) years' site-related working experience
- .5 Have working knowledge of the applicable occupational safety and health regulations.

1.8 GENERAL CONDITIONS

.1 Provide safety barricades and lights around work site as required to provide a safe working environment for workers and protection for pedestrian and vehicular traffic.

.2 Ensure that non-authorized persons are not allowed to circulate in designated construction areas of the work site.
- .1 Provide appropriate means by use of barricades, fences, warning signs, traffic control personnel, and temporary lighting as required.
- .2 Secure site at night time or provide security guard as deemed necessary to protect site against entry.

1.9 PROJECT/SITE CONDITIONS

.1 Work at site will involve contact with:
- .1 Multi-employer work site.
- .2 Federal employees and general public.
- .3 Energized electrical services.
- .4 Working from heights.
- .5 Persons incarcerated in the federal institutional system.
- .6 Hazards - PSPC Preliminary Hazard Assessment included as an Appendix to Specifications

1.10 UTILITY CLEARANCES

.1 The Contractor is solely responsible for all utility detection and clearances prior to starting the work.

.2 The Contractor will not rely solely upon the Reference Drawings or other information provided for Utility locations.

1.11 REGULATORY REQUIREMENTS

.1 Comply with specified codes, acts, bylaws, standards and regulations to ensure safe operations at site.

.2 In event of conflict between any provision of the above authorities, the most stringent provision will apply. Should a dispute arise in determining the most stringent requirement, the Departmental Representative will advise on the course of action to be followed.

1.12 WORK PERMITS

.1 Obtain specialty permit(s) related to project before start of work.

1.13 FILING OF NOTICE

.1 The General Contractor is to file Notice of Project with Provincial authorities prior to commencement of work. (All construction projects require a Notice of Work)

.2 Provide copies of all notices to the Departmental Representative.

1.14 SITE SPECIFIC HEALTH AND SAFETY PLAN

.1 Conduct a site-specific hazard assessment based on review of Contract documents, required work, and project site. Identify any known and potential health risks and safety hazards.

.2 Prepare and comply with the Site-Specific Safety Plan (SSSP) or Health and Safety Plan (HASP) based on the required hazard assessment, including, but not limited to, the following:

.1 Primary requirements:

.1 Contractor's safety policy.
.2 Identification of applicable compliance obligations.
.3 Definition of responsibilities for project safety/organization chart for project.
.4 General safety rules for project.
.5 Job-specific safe work, procedures.
.6 Inspection policy and procedures.
.7 Incident reporting and investigation policy and procedures.
.8 Occupational Health and Safety Committee/Representative procedures.
.9 Occupational Health and Safety meetings.
.10 Occupational Health and Safety communications and record keeping procedures.
.11 COVID 19 Protocols and Procedures

.2 Summary of health risks and safety hazards resulting from analysis of hazard assessment, with respect to site tasks and operations which must be performed as part of the work.

.3 List hazardous materials to be brought on site as required by work. SDS required for all products.

.4 Indicate Engineering and administrative control measures to be implemented at the site for managing identified risks and hazards.

.5 Identify personal protective equipment (PPE) to be used by workers.
.6 Identify personnel and alternates responsible for site safety and health.
.7 Identify personnel training requirements and training plan, including site orientation for new workers.

.3 Develop the plan in collaboration with all subcontractors. Ensure that work/activities of subcontractors are included in the hazard assessment and are reflected in the plan.

.4 Revise and update Site Specifc Safety Plan (SSSP) and/or Health and Safety Plan (HASP) as required, and re-submit to the Departmental Representative.

.5 Departmental Representative's review: the review of Site Specific Safety Plan and/or Health and Safety Plan by Public Works and Government Services Canada (PWGSC) shall not relieve the Contractor of responsibility for errors or omissions in final Site Specific Safety Plan and/or Health and Safety Plan of responsibility for meeting all requirements of construction and Contract documents and legislated requirements.

1.15 EMERGENCY PROCEDURES

.1 List standard operating procedures and measures to be taken in emergency situations. Include an emergency response and emergency evacuation plan and emergency contacts (i.e. names/telephone numbers) of:
.1 Designated personnel from own company.
.2 Regulatory agencies applicable to work and as per legislated regulations.
.3 Local emergency resources.
.4 Departmental Representative.
.5 A route map with written directions to the nearest hospital or medical clinic.

.2 Include the following provisions in the emergency procedures:
.1 Notify workers and the first-aid attendant, of the nature and location of the emergency.
.2 Evacuate all workers safely.
.3 Check and confirm the safe evacuation of all workers.
.4 Notify the fire department or other emergency responders.
.5 Notify adjacent workplaces or residences which may be affected if the risk extends beyond the workplace.
.6 Notify Departmental Representative.

.3 Provide written rescue/evacuation procedures as required for, but not limited to:
.1 Work at high angles.
.2 Work in confined spaces or where there is a risk of entrapment.
.3 Work with hazardous substances.
.4 Underground work.
.5 Work on, over, under and adjacent to water.
.6 Workplaces where there are persons who require physical assistance to be moved.

.4 Design and mark emergency exit routes to provide quick and unimpeded exit.

.5 Revise and update emergency procedures as required, and re-submit to the Departmental Representative.

.6 Contractors must not rely solely upon 911 for emergency rescue in a confined space, working at heights, etc.

1.16 HAZARDOUS PRODUCTS

.1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS 2015) regarding use, handling, storage and disposal of hazardous materials, and regarding labelling and provision of Safety Data Sheets (SDS) acceptable to the Departmental Representative and in accordance with the Canada Labour Code.

.2 Where use of hazardous and toxic products cannot be avoided:

.1 Advise Departmental Representative beforehand of the product(s) intended for use. Submit applicable SDS and WHMIS 2015 documents as per Section 01 01 50.

.2 In conjunction with Departmental Representative schedule to carry out work during "off hours" when tenants have left the building.

.3 Provide adequate means of ventilation in accordance with Section 01 51 00.

.4 The contractor shall ensure that the product is applied as per manufacturers recommendations.

.5 The contractor shall ensure that only pre-approved products are bought onto the work site in an adequate quantity to complete the work.

1.17 ASBESTOS HAZARD

.1 Carry out any activities involving asbestos in accordance with current applicable Federal and Provincial Regulations.

.2 Removal and handling of asbestos will be in accordance with current applicable Provincial / Federal Regulations.

1.18 PCB REMOVALS

.1 Mercury-containing fluorescent tubes and ballasts which contain polychlorinated biphenyls (PCBs) are classified as hazardous waste.

.2 Remove, handle, transport and dispose of as indicated in Division 2 specifications.

1.19 REMOVAL OF LEAD-CONTAINING PAINT

.1 All paint containing TCLP lead concentrations above 5 ppm are classified as hazardous.

.2 Carry out demolition and/or remediation activities involving lead-containing paints in accordance with current applicable Provincial / Territorial Regulations.

.3 Work with lead-containing paint shall be completed as per Provincial and Federal regulations.

.4 Dry Scraping/Sanding of any materials containing lead is strictly prohibited.

.5 The use of Methylene Chloride based paint removal products is strictly prohibited.

1.20 ELECTRICAL SAFETY REQUIREMENTS

(Reference: Worksafe BC OHS Reguation Part 19 – Electrical Safety)

.1 Comply with authorities and ensure that, when installing new facilities or modifying existing facilities, all electrical personnel are completely familiar with existing and new electrical circuits and equipment and their operation.

.1 Before undertaking any work, coordinate arc flash protection, required energizing and de-energizing of new and existing circuits with Departmental Representative.

.2 Maintain electrical safety procedures and take necessary precautions to ensure safety of all personnel working under this Contract, as well as

safety of other personnel on site.

1.21 ELECTRICAL LOCKOUT

.1 Develop, implement and enforce use of established procedures to provide electrical lockout and to ensure the health and safety of workers for every event where work must be done on any electrical circuit or facility.

.2 Prepare the lockout procedures in writing, listing step-by-step processes to be followed by workers, including how to prepare and issue the request/authorization form. Have procedures available for review upon request by the Departmental Representative.

.3 Keep the documents and lockout tags at the site and list in a log book for the full duration of the Contract. Upon request, make such data available for viewing by Departmental Representative or by any authorized safety representative.

1.22 OVERLOADING

.1 Ensure no part of work is subjected to a load which will endanger its safety or will cause permanent deformation.

1.23 FALSEWORK

.1 Design and construct falsework in accordance with CSA S269.1-1975 (R2003) (as amended)

1.24 SCAFFOLDING

.1 Design, construct and maintain scaffolding in a rigid, secure and safe manner, in accordance with CSA Z797-2009 (as amended) and B.C. Occupational Health and Safety Regulations. (as amended)

1.25 CONFINED SPACES

.1 Carry out work in compliance with current Provincial / Territorial regulations.

1.26 POWDER-ACTUATED DEVICES

.1 Use powder-actuated devices in accordance with ANSI A10.3 (as amended) only after receipt of written permission from the Departmental Representative.

1.27 FIRE SAFETY AND HOT WORK

.1 Obtain Departmental Representative's authorization before any welding, cutting or any other hot work operations can be carried out on site.

.2 Hot work includes cutting/melting with use of torch, flame heating roofing kettles, or other open flame devices and grinding with equipment which produces sparks.

.3 Hot Work permits are a mandatory requirement for any hot work activities.

1.28 FIRE SAFETY REQUIREMENTS

.1 Store oily/paint-soaked rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site on a daily basis.

.2 Handle, store, use and dispose of flammable and combustible materials in accordance with the National Fire Code of Canada. (as amended)

.3 Portable gas and diesel fuel tanks are not permitted on most federal work sites. Approval from the Departmental Representative is required prior to any gas or diesel tank being brought onto the work site.

1.29 FIRE PROTECTION AND ALARM SYSTEM

.1 Fire protection and alarm systems shall not be:
- .1 Obstructed.
- .2 Shut off.
- .3 Left inactive at the end of a working day or shift.

.2 Do not use fire hydrants, standpipes and hose systems for purposes other than firefighting.

.3 Be responsible/liable for costs incurred from the fire department, the building owner and the tenants, resulting from false alarms.

1.30 UNFORESEEN HAZARDS

.1 Should any unforeseen or peculiar safety-related factor, hazard or condition become evident during performance of the work, immediately stop work and immediately advise the Departmental Representative verbally and in writing.

1.31 POSTED DOCUMENTS

.1 Post legible versions of the following documents on site:
- .1 Site Specific Safety Plan (SSSP) or Health and Safety Plan (HASP)
- .2 Sequence of work.
- .3 Emergency procedures.
- .4 Site drawing showing project layout, locations of the first-aid station, evacuation route and marshalling station, and the emergency transportation provisions.
- .5 Notice of Project.
- .6 Floor plans or site plans. Must be posted in a non-inmate access area and locked up when not being used.
- .7 Notice as to where a copy of the Workers' Compensation Act and Regulations are available on the work site for review by employees and workers.
- .8 Workplace Hazardous Materials Information System (WHMIS 2015) documents.
- .9 Material Safety Data Sheets (SDS).
- .10 List of names of Joint Health and Safety Committee members, or Health and Safety Representative, as applicable.
- .11 All Hazardous Material and Substance Reports including Lab Analysis

.2 Post all Material Safety Data Sheets (MSDS) on site, in a common area, visible to all workers and in locations accessible to tenants when work of this Contract includes construction activities adjacent to occupied areas.

.3 Postings should be protected from the weather, and visible from the street or the exterior of the principal construction site shelter provided for workers and equipment, or as approved by the Departmental Representative.

1.32 MEETINGS

.1 Attend health and safety pre-construction meeting and all subsequent meetings called by the Departmental Representative.

1.33 CORRECTION OF NON-COMPLIANCE

.1 Immediately address health and safety non-compliance issues identified by the Departmental Representative.

.2 Provide Departmental Representative with written report of action taken to correct non-compliance with health and safety issues identified.

.3 The Departmental Representative may issue a "stop work order" if noncompliance of health and safety regulations is not corrected immediately or within posted time. The General Contractor/subcontractors will be responsible for any costs arising from such a "stop work order".

2.0 PRODUCTS

.1 Not used.

3.0 EXECUTION

.1 Not used.

END OF SECTION 01 35 33

1.0 GENERAL

1.1 RELATED SECTIONS

.1 General Instructions Section 01 11 55

1.2 REFERENCES AND CODES

.1 Perform Work in accordance with National Building Code of Canada (NBC) 2015 and B.C. Building Code 2018 including amendments up to tender closing date and other codes of provincial or local application provided that in case of conflict or discrepancy, more stringent requirements apply.

.2 Meet or exceed requirements of:

.1 Contract Documents.

.2 Specified standards, codes and referenced documents.

1.3 BUILDING SMOKING ENVIRONMENT

.1 No smoking is allowed within the property.

END OF SECTION 01 41 00

1.0 GENERAL

1.1 INSPECTION

.1 Allow Departmental Representative access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.

.2 Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Departmental Representative instructions, or law of Place of Work

.3 If Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.

.4 Departmental Representative will order part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction. If such Work is found in accordance with Contract Documents, Departmental Representative shall pay cost of examination and replacement.

1.2 INDEPENDENT INSPECTION AGENCIES

.1 Independent Inspection/Testing Agencies will be engaged by Contractor for purpose of inspecting and/or testing portions of Work. Cost of such services will be borne by Contractor.

.2 Provide equipment required for executing inspection and testing by appointed agencies.

.3 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.

.4 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Departmental Representative at no cost to Departmental Representative. Pay costs for retesting and re-inspection.

1.3 ACCESS TO WORK

.1 Allow inspection/testing agencies access to Work, off site manufacturing and fabrication plants.

.2 Co-operate to provide reasonable facilities for such access.

1.4 PROCEDURES

.1 Notify appropriate agency and Departmental Representative in advance of requirement for tests, in order that attendance arrangements can be made.

.2 Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in orderly sequence to not cause delays in Work.

.3 Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.

1.5 REJECTED WORK

.1 Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by Departmental Representative as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.

.2 Make good other Contractor's work damaged by such removals or replacements promptly.

.3 If in opinion of Departmental Representative it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Owner will deduct from Contract Price difference in value between Work performed and that called for by Contract Documents, amount of which will be determined by Departmental Representative.

1.6 REPORTS

.1 Submit electronic copy of inspection and test reports to Departmental Representative. Testing and Inspection companies engaged by the Contractor will furnish paper copies of reports on site to allow for work to proceed in a timely manner.

.2 Provide copies to subcontractor of work being, inspected or tested or manufacturer or fabricator of material being inspected or tested.

1.7 MOCK-UPS

.1 Prepare mock-ups for Work specifically requested in specifications. Include for Work of Sections required to provide mock-ups.

.2 Construct in locations acceptable to Departmental Representative as specified in specific Section. Each required sample mock up as noted in specification is to be constructed and placed against the existing for comparison.

.3 Prepare mock-ups for Departmental Representative review with reasonable promptness and in orderly sequence, to not cause delays in Work. Contractor to provide mock up in a prompt manner and schedule a mock up review by Departmental Representative who may invite other stakeholders. This mock up is to be provided at the beginning of the project prior to demolition of any existing materials.

.4 Failure to prepare mock-ups 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.

.5 Specification section identifies whether mock-up may remain as part of Work or if it is to be removed.

END OF SECTION 01 45 00

1.0 GENERAL

1.1 REFERENCES

.1 U.S. Environmental Protection Agency (EPA) / Office of Water

.1 EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.2 ACTION AND INFORMATION SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 – Submittal Procedures.

1.3 INSTALLATION AND REMOVAL

.1 Provide temporary utilities controls in order to execute work expeditiously.

.2 Remove from site all such work after use.

1.4 WATER SUPPLY

.1 Water supply is available from hose bibb outside each residence for construction use.

.2 There is no guarantee that there will be uninterrupted water supply and that the supply will be sufficient for construction purpose. Contractor to supplement with their own supply as deemed necessary to complete work.

1.5 TEMPORARY POWER

.1 Permanent power is available from each residence for construction use as long as the Contractor will not overload the circuits.

.2 If required for Construction use, Contractor to arrange for connection with appropriate utility company. Pay costs for installation, maintenance and removal.

.3 There is no guarantee that there will be uninterrupted power supply and capacity for construction use. Contractor to supplement with their own construction power supply as needed to complete and execute the work.

1.6 FIRE PROTECTION

.1 Provide and maintain temporary fire protection equipment during performance of Work required by governing codes, regulations and bylaws.

.2 Burning rubbish and construction waste materials is not permitted on site.

1.7 TEMPORARY CLEANING STATION

.1 Provide and maintain temporary cleaning station for hand and tool cleaning for hygiene control.

2.0 PRODUCTS

2.1 NOT USED

END OF SECTION 01 51 00

1.0 GENERAL

1.1 RELATED REQUIREMENTS

1.2 REFERENCES

.1 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB 1. 189-00, Exterior Alkyd Primer for Wood.
- .2 CGSB 1.59-97, Alkyd Exterior Gloss Enamel.

.2 Canadian Standards Association (CSA International)
- .1 CSA-A23.1/A23.2-04, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
- .2 CSA-0121-M1978 (R2003), Douglas Fir Plywood.
- .3 CAN/CSA-S269.2 – M1987 (R2001), Access Scaffolding for Construction Purpose.
- .4 CAN/CSA-Z321-96 (R2001), Signs and Symbols for the Occupational Environment.

.3 U.S. Environmental Protection Agency (EPA) / Office of Water
- .1 EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 – Submittal Procedures.

1.4 INSTALLATION AND REMOVAL

.1 Prepare site plan indicating proposed location and dimensions of area to be fenced and used by Contractor, number of trailers to be used, avenues of ingress/egress to fenced area and details of fence installation.

.2 Identify areas which have to be gravelled to prevent tracking of mud.

.3 Indicate use of supplemental or other staging area.

.4 Provide construction facilities in order to execute work expeditiously.

.5 Remove from site all such work after use.

1.5 SCAFFOLDING

.1 Scaffolding in accordance with CAN/CSA-S269.2.

1.6 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.

1.7 CONSTRUCTION PARKING

.1 Parking will not be permitted within the property.

.2 Provide and maintain adequate access to project site.

.3 Do not block off access by the occupants to the carpark and entry door.

1.8 SECURITY

.1 Provide and pay for responsible security personnel to guard site and contents of site after working hours and during holidays.

1.9 EQUIPMENT, TOOL AND MATERIALS STORAGE

.1 Provide and maintain, in clean and orderly condition, lockable weatherproof sheds for storage of tools, equipment and materials.

.2 Locate materials not required to be stored in weatherproof sheds on site in manner to cause least interference with work activities and occupants.

1.10 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.

.3 Contractor is not allowed to use the washroom inside the residence.

1.11 CONSTRUCTION SIGNAGE

.1 No other signs or advertisements, other than warning signs, are permitted on site.

.2 Maintain approved signs and notices in good condition for duration of project, and dispose of off-site on completion of project or earlier if directed by Departmental Representative.

1.12 PROTECTION AND MAINTENANCE OF TRAFFIC

.1 Provide access and temporary relocated roads as necessary to maintain traffic.

.2 Maintain and protect traffic on affected roads during construction period except as otherwise specifically directed by Departmental Representative.

.3 Provide measures for protection and diversion of traffic, including provision of watch-persons and flag-persons, erection of barricades, placing of lights around and in front of equipment and work, and erection and maintenance of adequate warning, danger and direction signs.

.4 Protect travelling public from damage to person and property.

.5 Contractor’s traffic on roads selected for hauling material to and from site to interfere as little as possible with public traffic.

.6 Verify adequacy of existing roads and allowable load limit on these roads. Contractor: responsible for repair of damage to roads caused by construction operations.

.7 Construct access and haul roads necessary.

.8 Haul roads: constructed with suitable grades and widths; sharp curves, blind corners, and dangerous cross traffic shall be avoided.

.9 Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic.

.10 Dust control: adequate to ensure safe operations at all times.

.11 Location, grade, width, and alignment of construction and hauling roads: subject to approval by Departmental Representative.

.12 Lighting: to assure full and clear visibility for full width of haul road and work areas during night work operations.

.13 Provide snow removal during period of Work.

.14 Remove, upon completion of work, haul roads designated by Departmental Representative.

1.13 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.

.3 Store materials resulting from demolition activities that are salvageable.

.4 Stack stored new or salvaged material not in construction facilities.

2.0 PRODUCTS

2.1 NOT USED

.1 Not used.

END OF SECTION 01 52 00

1.0 GENERAL

1.1 REFERENCES

.1 Canadian General Standards Board (CGSB)
- .1 CGSB 1.59-97, Alkyd Exterior Gloss Enamel.
- .2 CAN/CGSB 1.189-00, Exterior Alkyd Primer for Wood.

.2 Canadian Standards Association (CSA International)
- .1 CSA-O121-M1978(R2003, Douglas Fir Plywood.

1.2 INSTALLATION AND REMOVAL

.1 Provide temporary controls in order to execute Work expeditiously.

.2 Remove from site all such work after use.

1.3 HOARDING

.1 Erect temporary site enclosure using new minimum 1.83 m high module lock fence with visual barrier.

.2 Provide barriers around trees and plants. Protect from damage by equipment and constriction procedures.

1.4 GUARD RAILS AND BARRICADES

.1 Provide secure, rigid guard rails and barricades around deep excavations, open shafts, open stair wells, and open edges of floors and roofs,

.2 Provide as required by governing authorities.

1.5 WEATHER ENCLOSURES

.1 Provide weather tight closures to unfinished openings in walls.

.2 Provide protection to all existing interior during removal of windows and walls.

.3 Design enclosures to withstand wind pressure.

1.6 DUST TIGHT SCREENS

.1 Provide dust tight screens or partitions to localize dust generating activities, and for protection of workers, finished areas of Work and public.

.2 Provide dust tight protection to all interior items affected by construction or demolition of exterior and interior walls

.3 Maintain and relocate protection until such work is complete.

1.7 ACCESS TO SITE

.1 Provide and maintain access roads, sidewalk crossings, ramps and construction runways as may be required for access to Work.

1.8 PUBLIC TRAFFIC FLOW

.1 Provide and maintain competent signal flag operators, traffic signals, barricades and flares, lights, or lanterns as required to perform Work and protect public.

1.9 FIRE ROUTES

.1 Maintain access to property including overhead clearances for use by emergency response vehicles.

.2 Maintain clearance for all egress routes.

1.10 PROTECTION OFF-SITE AND PUBLIC PROPERTY

.1 Protect surrounding private and public property from damage during performance of Work.

.2 Be responsible for damage incurred.

1.11 PROTECTION OF EXISTING PROPERTY

.1 Provide protection for finished and partially finished property and equipment during performance of Work.

.2 Provide necessary screens, covers, and hoardings.

.3 Confirm with Departmental Representative locations and installation schedule 3 days prior to installation.

.4 Be responsible for damage incurred due to lack of or improper protection.

1.12 PROTECTION OF BUILDING FINISHES

.1 Provide protection for finished and partially finished building finishes and equipment during performance of Work.

.2 Provide necessary screens, covers, and hoardings.

.3 Confirm with Departmental Representative locations and installation schedule 3 days prior to installation.

.4 Be responsible for damage incurred due to lack of or improper protection.

.5 Be responsible for cleaning of existing exhibits due to lack of or improper dust protection.

1.13 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for recycling in accordance with Section 01 74 19 - Waste Management And Disposal.

END OF SECTION 01 56 00

1.0 GENERAL

1.1 PRODUCTS/MATERIAL AND EQUIPMENT

.1 Use NEW products/material and equipment unless otherwise specified. The term "products" is referred to throughout the specifications.

.2 Use products of 1 manufacturer for material and equipment of the same type or classification unless otherwise specified.

.3 Unless otherwise specified, comply with manufacturer's latest printed instructions for materials and installation methods.

.4 Notify Departmental Representative in writing of any conflict between these specifications and manufacturer's instructions. Departmental Representative will designate which document is to be followed.

.5 Provide metal fastenings and accessories in the same texture, colour and finish as base metal in which they occur.

- .1 Prevent electrolytic action between dissimilar metals.
- .2 Use non-corrosive fasteners, anchors and spacers for securing exterior work.
- .3 Fastenings which cause spalling or cracking are not acceptable.
- .4 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.
- .5 Use heavy hexagon heads, semi-finished unless otherwise specified.
- .6 Bolts may not project more than 1 diameter beyond nuts.
- .7 Types of washers as follows:
  - .1 Plain type washers: use on equipment and sheet metal.
  - .2 Soft gasket lock type washers: use where vibrations occur.
  - .3 Resilient washers: use with stainless steel.
- .8 Deliver, store and maintain packaged material and equipment with manufacturer's seals and labels intact.
- .9 Prevent damage, adulteration and soiling of products during delivery, handling and storage. Immediately remove rejected products from site.
- .10 Store products in accordance with suppliers' instructions.
- .11 Touch up damaged factory finished surfaces to Departmental Representative's satisfaction.
  - .1 Use primer or enamel to match original.
  - .2 Do not paint over nameplates.

1.2 QUALITY OF PRODUCTS

.1 Products, materials and equipment (referred to as products) incorporated into work shall be new, not damaged or defective, and of the best quality (compatible with the specifications) for the purpose intended. If requested, furnish evidence as to type, source and quality of the products provided.

.2 Defective products will be rejected regardless of previous inspections.

- .1 Inspection does not relieve responsibility, but is precaution against oversight or error.
- .2 Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.
- .3 Retain purchase orders, invoices and other documents to prove that all products utilized in this Contract meet the requirements of the specifications. Produce documents when requested by the Departmental Representative.

.3 Should any dispute arise as to quality or fitness of products, the decision rests strictly with the Departmental Representative based upon the requirements of the Contract documents.

.4 Unless otherwise indicated in the specifications, maintain uniformity of manufacture for any particular or like item throughout the building.

.5 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

1.3 AVAILABILITY OF PRODUCTS

.1 Immediately upon signing the Contract, review product delivery requirements and anticipate foreseeable supply delays for any items.

.2 If delays in supply of products are foreseeable, notify Departmental Representative of such in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of the work.

.3 In event of failure to notify Departmental Representative at the start of work and should it subsequently appear that the work may be delayed for such reason, the Departmental Representative reserves the right to substitute more readily available products of similar character, at no increase in either the Contract price or the Contract time.

1.4 MANUFACTURER'S INSTRUCTIONS

.1 Unless otherwise indicated in the specifications, install or erect products in accordance with the manufacturer's instructions.
.1 Do not rely on labels or enclosures provided with products.
.2 Obtain written instructions directly from the manufacturer.

.2 Notify Departmental Representative in writing of conflicts between the specifications and the manufacturer's instructions so that the Departmental Representative may establish the course of action.

.3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes the Departmental Representative to require removal and reinstallation at no increase in either the Contract price or the Contract time.

1.5 CONTRACTOR'S OPTIONS FOR SELECTION OF PRODUCTS FOR TENDERING

.1 Products are specified by "Prescriptive" specifications: select any product meeting or exceeding specifications.

.2 Products specified under "Acceptable Products": select any one of the indicated manufacturers, or any other manufacturer meeting or exceeding the Prescriptive specifications and indicated Products.

.3 Products specified by performance and referenced standard: select any product meeting or exceeding the referenced standard.

.4 Products specified to meet particular design requirements or to match existing materials: use only material specified Approved Product. Alternative products may be considered provided full technical data is received in writing by Departmental Representative in accordance with "Special Instructions to Tenderers".

.5 When products are specified by a referenced standard or by or Performance specifications, upon request of Departmental Representative obtain from manufacturer an independent laboratory report showing that the product meets or exceeds the specified requirements.

1.6 SUBSTITUTION AFTER CONTRACT AWARD

.1 No substitutions are permitted without prior written approval of the Departmental Representative.

.2 Proposals for substitution may only be submitted after Contract award. Such request must include statements of respective costs of items originally specified and the proposed substitution.

.3 Proposals will be considered by the Departmental Representative if:

.1 Products selected by tenderer from those specified are not available;

.2 Delivery date of products selected from those specified would unduly delay completion of Contract, or

.3 Alternative product to that specified, which is brought to the attention of and considered by Departmental Representative as equivalent to the product specified, and will result in a credit to the Contract amount.

.4 Should the proposed substitution be accepted either in part or in whole, assume full responsibility and costs when substitution affects other work on the project. Pay for design or drawing changes required as result of substitution.

.5 Amounts of all credits arising from approval of the substitutions will be determined by the Departmental Representative and the Contract price will be reduced accordingly.

END OF SECTION 01 61 00

1.0 GENERAL

1.1 LOCATION OF EQUIPMENT AND FIXTURES

.1 Location of equipment, fixtures and outlets indicated or specified are to be considered as approximate.

.2 Locate equipment, fixtures and distribution systems to provide minimum interference and maximum usable space and in accordance with manufacturer's recommendations for safety, access and maintenance.

.3 Inform Departmental Representative of impending installation and obtain approval for actual location.

.4 Submit field drawings to indicate relative position of various services and equipment when required by Departmental Representative.

END OF SECTION 01 71 00

1.0 GENERAL

1.1 SUBMITTALS

.1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.

.2 Submit written request in advance of cutting or alteration which affects:
- .1 Structural integrity of elements of project.
- .2 Integrity of weather-exposed or moisture-resistant elements.
- .3 Efficiency, maintenance, or safety of operational elements.
- .4 Visual qualities of sight-exposed elements.
- .5 Work of Owner or separate contractor.

.3 Include in request:
- .1 Identification of project.
- .2 Location and description of affected Work.
- .3 Statement on necessity for cutting or alteration.
- .4 Description of proposed Work, and products to be used.
- .5 Alternatives to cutting and patching.
- .6 Effect on Work of Owner or separate contractor.
- .7 Written permission of affected separate contractor.
- .8 Date and time work will be executed.

1.2 MATERIALS

.1 Required for original installation.

.2 Change in Materials: Submit request for substitution in accordance with Section 01 33 00 - Submittal Procedures.

1.3 PREPARATION

.1 Inspect existing conditions, including elements subject to damage or movement during cutting and patching.

.2 After uncovering, inspect conditions affecting performance of Work.

.3 Beginning of cutting or patching means acceptance of existing conditions.

.4 Provide supports to assure structural integrity of surroundings; provide devices and methods to protect other portions of project from damage.

.5 Provide protection from elements for areas which are to be exposed by uncovering work; maintain excavations free of water.

1.4 EXECUTION

.1 Execute cutting, fitting, and patching including excavation and fill, to complete Work.

.2 Fit several parts together, to integrate with other Work.

.3 Uncover Work to install ill-timed Work.

.4 Remove and replace defective and non-conforming Work.

.5 Provide openings in non-structural elements of Work for penetrations of mechanical and electrical Work.

.6 Execute Work by methods to avoid damage to other Work, and which will provide proper surfaces to receive patching and finishing.

.7 Employ original installer to perform cutting and patching for weather-exposed and moisture-resistant elements, and sight-exposed surfaces.

.8 Cut rigid materials using masonry saw or core drill. Pneumatic or impact tools not allowed on masonry work without prior approval.

.9 Restore work with new products in accordance with requirements of Contract Documents.

.10 Fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

.11 Refinish surfaces to match adjacent finishes: Refinish continuous surfaces to nearest intersection. Refinish assemblies by refinishing entire unit.

.12 Conceal pipes, ducts and wiring in floor, wall and ceiling construction of finished areas except where indicated otherwise.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for recycling in accordance with Section 01 74 19 - Waste Management And Disposal.

END OF SECTION 01 73 00

1.0 GENERAL

1.1 PROJECT CLEANLINESS

.1 Maintain Work in tidy condition, free from accumulation of waste products and debris, including that caused by Owner or other Contractors.

.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 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

.4 Provide on-site containers for collection of waste materials and debris.

.5 Provide and use marked separate bins for recycling. Refer to Section 01 74 19 - Waste Management and Disposal.

.6 Dispose of waste materials and debris off site.

.7 Clean areas prior to start of finishing work, and maintain areas free of dust and other contaminants during finishing operations.

.8 Store volatile waste in covered metal containers, and remove from premises at end of each working day.

.9 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.

.10 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.

.11 Schedule cleaning operations so that resulting dust, debris and other contaminants will not remain on newly finished surfaces.

.12 Use only approved and/or safe cleaning agents only.

1.2 FINAL CLEANING

.1 When Work is Substantially Performed remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.

.2 Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy.

.3 Prior to final review remove surplus products, tools, construction machinery and equipment.

.4 Remove waste products and debris including that caused by Owner or other Contractors.

.5 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.

.6 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

.7 Clean and polish glass and all other finished work. Replace broken, scratched or disfigured glass.

.8 Remove stains, spots, marks and dirt on new or existing surfaces resulting from construction work.

.9 Clean lighting reflectors, lenses, and other lighting surfaces.

.10 Vacuum clean and dust building interiors, behind grilles, louvres and screens.

.11 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.

.12 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.

.13 Remove dirt and other disfiguration from exterior surfaces.

.14 Clean and sweep debris from gutters resulting from construction work.

.15 Sweep and wash clean paved areas resulting from construction work.

.16 Clean fixtures to sanitary condition.

.17 Remove debris and surplus materials from site.

1.3 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for recycling in accordance with Section 01 74 19 - Waste Management and Disposal.

END OF SECTION 01 74 11

1.0 GENERAL

1.1 SUMMARY

.1 This Section includes requirements for management of construction waste and disposal, which forms the Contractor's commitment to reduce and divert waste materials from landfill and includes the following:

.1 Preparation of a Draft Construction Waste Management Plan that will be used to track the success of the Construction Waste Management Plan against actual waste diversion from landfill.

.2 Preparation of a Construction Waste Management Plan that provides guidance on a logical progression of tasks and procedures to be followed in a pollution prevention program to reduce or eliminate the generation of waste, the loss of natural resources, and process emissions through source reduction, reuse, recycling, and reclamation.

.3 Preparation of monthly progress reports indicating cumulative totals representing progress towards achieving diversion and reduction goals of waste materials away from landfill and identifying any special programs, landfill options or alternatives to landfill used during construction.

.4 Preparation of a Construction Waste Management Report containing detailed information indicating total waste produced by the project, types of waste material and quantity of each material, and total waste diverted and diversion rates indicated as a percentage of the total waste produced.

.2 Departmental Representative has established that this project shall generate the least amount of waste possible and that processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors be employed by the Contractor.

1.2 RELATED REQUIREMENTS

.1 Section 01 51 00– Temporary Utilities

.2 Section 01 52 00– Construction Facilities

1.3 REFERENCE STANDARDS

.1 American Society for Testing and Materials (ASTM):

.1 ASTM E1609 01, Standard Guide for Development and Implementation of a Pollution Prevention Program

.2 Canada Green Building Council (CaGBC)

.1 LEED® Reference Guide for Building Design and Construction, Version 4

.3 Recycling Certification Institute (RCI):

.1 RCI Certification Construction and Demolition Materials Recycling

1.4 DEFINITIONS

.1 Clean Waste: Untreated and unpainted; not contaminated with oils, solvents, sealants or similar materials.

.2 Construction and Demolition Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction, repair and demolition.

.3 Hazardous: Exhibiting the characteristics of hazardous substances including properties such as ignitability, corrosiveness, toxicity or reactivity.

.4 Non hazardous: Exhibiting none of the characteristics of hazardous substances, including properties such as ignitability, corrosiveness, toxicity, or reactivity.

.5 Non toxic: Not poisonous to humans either immediately or after a long period of exposure.

.6 Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.

.7 Recycle: To remove a waste material from the project site to another site for remanufacture into a new product for reuse by others.

.8 Recycling: The process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for the purpose of using the altered form; recycling does not include burning, incinerating, or thermally destroying waste.

.9 Return: To give back reusable items or unused products to vendors for credit.

.10 Reuse: To reuse a construction waste material in some manner on the project site.

.11 Salvage: To remove a waste material from the project site to another site for resale or reuse by others.

.12 Sediment: Soil and other debris that has been eroded and transported by storm or well production run off water.

.13 Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste.

.14 Toxic: Poisonous to humans either immediately or after a long period of exposure.

.15 Trash: Any product or material unable to be reused, returned, recycled, or salvaged.

.16 Volatile Organic Compounds (VOC's): Chemical compounds common in and emitted by many building products over time through outgassing:

.1 Solvents in paints and other coatings;
.2 Wood preservatives; strippers and household cleaners;
.3 Adhesives in particleboard, fiberboard, and some plywood; and foam insulation.
.4 When released, VOC's can contribute to the formation of smog and can cause respiratory tract problems, headaches, eye irritations, nausea, damage to the liver, kidneys, and central nervous system, and possibly cancer.

.17 Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.

.18 Construction Waste Management Plan: A project related plan for the collection, transportation, and disposal of the waste generated at the construction site; the

purpose of the plan is to ultimately reduce the amount of material being landfilled.

1.5 ADMINISTRATIVE REQUIREMENTS

.1 Coordination: Coordinate waste management requirements with all Divisions of the Work for the project, and ensure that requirements of the Construction Waste Management Plan are followed.

.2 Preconstruction Meeting: Arrange a pre-construction meeting in accordance with Section 01 31 19 – Project Meetings before starting any Work of the Contract attended by the Departmental Representative, Contractor and Consultants to discuss the Contractor's Construction Waste Management Plan and to develop mutual understanding of the requirements for a consistent policy towards waste reduction and recycling.

1.6 SUBMITTALS

.1 Provide required information in accordance with Section 01 33 00 – Submittal Procedures.

.2 Action Submittals: Provide the following submittals before starting any work of this Section:

.1 Draft Construction Waste Management Plan (Draft CWM Plan): Submit to Departmental Representative a preliminary analysis of anticipated site generated waste by listing a minimum of five (5) construction or demolition waste streams that have potential to generate the most volume of material indicating methods that will be used to divert construction waste from landfill and source reduction strategies; Departmental Representative will provide commentary before development of Contractor's Construction Waste Management Plan.

.2 Construction Waste Management Plan (CWM Plan): Submit a CWM Plan for this project prior to any waste removal from site and that includes the following information:

.1 Material Streams: Analysis of the proposed jobsite waste being generated, including material types and quantities forming a part of identified material streams in the Draft CWM Plan; materials removed from site destined for alternative daily cover at landfill sites and land clearing debris cannot be considered as contributing to waste diversion and will be included as a component of the total waste generated for the site.

.2 Recycling Haulers and Markets: Investigate local haulers and markets for recyclable materials, and incorporate into CWM Plan.

.3 Alternative Waste Disposal: Prepare a listing of each material proposed to be salvaged, reused, recycled or composted during the course of the project, and the proposed local market for each material.

.4 Landfill Options: The name of the landfill where trash will be disposed of; landfill materials will form a part of the total waste generated by the project.

.5 Materials Handling Procedures: A description of the means by which any recycled waste materials will be protected from contamination, and a description of the means to be employed in recycling the above materials consistent with requirements for acceptance by designated facilities.

.6 Transportation: A description of the means of transportation of the recyclable materials, whether materials will be site separated and self

hauled to designated centers, or whether mixed materials will be collected by a waste hauler and removed from the site, and destination of materials.

1.7 PROJECT CLOSEOUT SUBMISSIONS

.1 Record Documentation: Submit as constructed information in accordance with Section 01 78 00– Closeout Submittals as follows:

.1 Construction Waste Management Report (CWM Report): Submit a CWM Report for this project according to the samples provided.

.1 Accounting: Submit information indicating total waste produced by the project.

.2 Composition: Submit information indicating types of waste material and quantity of each material.

.3 Diversion Rate: Submit information indicating total waste diverted from landfill as a percentage of the total waste produced by the project.

.4 Diversion Documentation: Submit copies of transportation documents or shipping manifests indicating weights of materials, and other evidence of disposal indicating final location of waste diverted from landfill and waste sent to landfill.

.5 Alternative Daily Cover (ADC): Submit quantities of material that were used as ADC at landfill sites, and that form a part of the total waste generated by the project.

.6 Multiple Waste Hauling: Compile all information into a single CWM Report where multiple waste hauling and diversion strategies were used for the project.

.7 Photographs: Submit photographs of waste diversion facilities documenting location and signage describing usage of waste separation containers.

1.8 QUALITY ASSURANCE

.1 Resources for Development of Construction Waste Management Report (CWM Report): The following sources may be useful in developing the Draft Construction Waste Management Plan:

.1 Recycling Haulers and Markets: Investigate local haulers and markets for recyclable materials, and incorporate into CWM Plan.

.2 Waste-to-Energy Systems: Investigate local waste-to-energy incentives where systems for diverting materials from landfill for reuse or recycling are not available.

1.9 DELIVERY, STORAGE AND HANDLING

.1 Storage Requirements: Implement a recycling/reuse program that includes separate collection of waste materials as appropriate to the project waste and the available recycling and reuse programs in the project area.

.2 Handling Requirements: Clean materials that are contaminated before placing in collection containers and ensure that waste destined for landfill does not get mixed in with recycled materials:

.1 Deliver materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to recycling process.

.2 Arrange for collection by or delivery to the appropriate recycling or reuse facility.

.3 Hazardous Waste and Hazardous Materials: Handle in accordance with applicable regulations.

2.0 PRODUCTS

2.1 NOT USED

.1 Not used.

3.0 EXECUTION

3.1 (CWM PLAN) IMPLEMENTATION

.1 Manager: Contractor is responsible for designating an on-site party or parties responsible for instructing workers and overseeing and documenting results of the CWM Plan for the project.

.2 Distribution: Distribute copies of the CWM Plan to the job site foreman, each Subcontractor, the Departmental Representative and other site personnel as required to maintain CWM Plan.

.3 Instruction: Provide on site instruction of appropriate separation, handling, and recycling, salvage, reuse, composting and return methods being used for the project to Subcontractor's at appropriate stages of the project.

.4 Separation Facilities: Lay out and label a specific area to facilitate separation of materials for potential recycling, salvage, reuse, composting and return:

.1 Recycling and waste bin areas are to be kept neat and clean and clearly marked in order to avoid contamination of materials.

.2 Hazardous wastes shall be separated, stored, and disposed of in accordance with local regulations.

.5 Progressive Documentation: Submit a monthly summary of waste generated by the project to ensure that waste diversion goals are on track with project requirements:

.1 Submission of waste summary can coincide with application for progress payment, or similar milestone event as agreed upon between the Contractor and Departmental Representative.

.2 Monthly waste summary shall contain the following information:

.1 The amount in tonnes or m3and location of material landfilled,

.2 The amount in tonnes or m3and location of materials diverted from landfill, and

.3 Indication of progress based on total waste generated by the project with materials diverted from landfill as a percentage.

3.2 SUBCONTRACTOR'S RESPONSIBILITY

.1 Subcontractor's shall cooperate fully with the Contractor to implement the CWM Plan.

.2 Failure to cooperate may result in the Departmental Representative not achieving their environmental goals, and may result in penalties being assessed by the Contractor to the responsible Subcontractor's.

3.3 SAMPLE CONSTRUCTION WASTE MANAGEMENT FORMS

.1 Sample waste tracking form below can be used by the Contractor to establish their own forms for recording management of construction waste:

.2 SAMPLE WASTE MANAGEMENT FORM

Material Stream	Diverted Waste by Report Date	Total	Units				
Sept	Oct	Nov	Dec				
Material Streams Contributing to Credit	Plastic	1.25	2.5	10	5	18.75	m^3
Carpet	2.5	2.5	2.5	0	7.5	m^3	
Paper/Cardboard	5	2.5	2.5	5	15	m^3	
Clean Wood	0	25	0	1.25	26.25	m^3	
Metal	1.25	2.5	5.5	7	16.25	m^3	
Gypsum Board	2.5	2.5	4	5	14	m^3	
Brick/Concrete	10.5	2.5	5.5	8.75	27.25	m^3	
Asphalt Shingles	10	0	0	0	10	m^3	
Total Diverted Waste	135	m^3					
Material Streams not Contributing to Credit	Landfill	10.75	7.5	15	10	43.25	m^3
Screen Fines (ADC)	5	1.25	0	2.5	8.75	m^3	
150 mm Minus (ADC	1.25	1.25	5	5.5	13	m^3	
Total Landfill/ADC Waste	65			m^3			
Total Waste	200	m^3					
Percent Diverted	67.5	%					

END OF SECTION 01 74 19

1.0 GENERAL

1.1 SECTION INCLUDES

.1 Administrative procedures preceding preliminary and final inspections of Work.

1.2 RELATED SECTIONS

.1 Section 01 78 00 - Closeout Submittals.

1.3 INSPECTION AND DECLARATION

.1 Contractor's Inspection: Contractor and all Subcontractors shall conduct an inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.

.1 Notify Departmental Representative in writing of satisfactory completion of Contractor's Inspection and that corrections have been made.

.2 Request Departmental Representative's Inspection.

.3 Departmental Representative's Review: Departmental Representative and Contractor will perform review of Work to identify obvious defects or deficiencies. Contractor shall correct Work accordingly.

.4 Completion: submit written certificate that following have been performed:

.1 Work has been completed and inspected for compliance with Contract Documents.

.2 Defects have been corrected and deficiencies have been completed.

.3 Work is complete and ready for Final Inspection.

END OF SECTION 01 77 00

1.0 GENERAL

1.1 RELATED SECTIONS

.1 Section 01 45 00 - Quality Control.

.2 Section 01 71 00 – Examination & Preparation.

.3 Section 01 77 00 – Closeout Procedures.

1.2 SUBMISSION

.1 Prepare instructions and data using personnel experienced in maintenance and operation of described products.

.2 Copy will be returned after final inspection, with Departmental Representative's comments.

.3 Revise content of documents as required prior to final submittal.

.4 Two weeks prior to Interim Completion of the Work, submit to the Departmental Representative, four final copies of operating and maintenance manuals in English.

.5 An electronic copy Interactive Operating and Maintenance Manual System is required as specified under clause 1.3. Provide 4 sets of the Electronic Interactive Operating and Maintenance Manual System to the Departmental Representative.

.6 Hard copies of the Operating and Maintenance Manual System is required as specified under clause 1.4. Provide 4 sets of the Hard Copy Interactive Operating and Maintenance Manual System to the Departmental Representative.

.7 Ensure spare parts, maintenance materials and special tools provided are new, undamaged or defective, and of same quality and manufacture as products provided in Work.

.8 If requested, furnish evidence as to type, source and quality of products provided.

.9 Defective products will be rejected, regardless of previous inspections. Replace products at own expense.

.10 Pay costs of transportation.

1.3 INTERACTIVE OPERATING AND MAINTENANCE MANUAL SYSTEM

.1 In addition to the printed copies, submit provide an Interactive Operating and Maintenance Manual System as specified herein.

.2 System Description and Requirements

.1 All as constructed drawings and operation and maintenance (O&M) manuals listed under the Scope of Work shall be converted, where necessary, into Portable Data File (PDF) format for viewing using the Adobe Acrobat Reader.

.2 Documentation storage and retrieval system shall be structured based on a database framework with direct links to the appropriate PDF files. Documents retrieval and viewing shall be executed through a menu driven approach.

.3 Program shall be capable of storing separately and independently data of multiple buildings and shall be expandable for addition of new buildings and systems.

.4 Data of each building shall be accessible by the input of either the building name or building number as defined by the Departmental Representative.

.5 O&M data and as constructed drawings shall be classified by their corresponding disciplines, including:
- .1 Architectural
- .2 Electrical
- .3 Under each discipline, data shall be grouped into the following four major categories:
  - .1 Basic Documents
    - .1 'Basic Documents' shall, according to the type of services or disciplines, include the full contents of each hard copy of the O&M manuals with the addition of Miscellaneous Maintenance Reports and Records, or as defined by the user. In general, the following shall be included unless specifically excluded by the Departmental Representative:
      - .1 Introduction
      - .2 Consultant/Contractor/Suppliers List
      - .3 System Description
      - .4 Maintenance and Lubrication Schedules
      - .5 Testing and Commissioning (T&C) Reports
      - .6 Misc. Reports
      - .7 Specifications
      - .8 Equipment and/or point schedules as identified in the hard copy documents
      - .9 Others as stipulated by the Departmental Representative
    - .2 All Basic Documents PDF files shall be enhanced with appropriate bookmarks to facilitate searching of information within the document or linking to other relevant documents for references.
  - .2 'As-Constructed' Drawings
    - .1 'As-Constructed' drawings shall be converted from the original electronic files, such as CAD, into PDF format. If only the hard copies of the 'as constructed' drawings are available, they shall be scanned and saved in PDF format. PDF files of the 'As-Constructed' drawings shall be enhanced with the following bookmarks to zoom into legible views on the computer screen as a minimum:
      - .1 Drawing Number and Title
      - .2 Drawing Notes
      - .3 Major Equipment Locations
      - .4 Cross-links to other related drawings
      - .5 Revisions
  - .3 Equipment Data
    - .1 Equipment data shall be classified into the following categories:
      - .1 Equipment submittals
      - .2 T&C Report
      - .3 Maintenance Data
      - .4 Maintenance Records
      - .5 Photo
    - .2 Provide a summary screen to list all equipment classified under a specific system. On the summary screen, provide direct links to the corresponding equipment data under each category with addition links to the relevant 'As Constructed' drawings.
- .4 The Contractor shall provide a demonstration of the building system to the Departmental Representative to provide verification that the requirements if the specification are fulfilled.

1.4 FORMAT HARD COPY MANUALS

.1 Organize data in the form of an instructional manual.

.2 Binders: vinyl, hard covered, 3 'D' ring, loose leaf 219 x 279 mm with spine and face pockets.

.3 When multiple binders are used, correlate data into related consistent groupings. Identify contents of each binder on spine.

.4 Cover: Identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.

.5 Arrange content by Section numbers and sequence of Table of Contents.

.6 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.

.7 Text: Manufacturer's printed data, or typewritten data.

.8 Drawings: provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

.9 Provide 1:1 scaled CAD files in .dwg format on CD.

1.5 CONTENTS - EACH VOLUME

.1 Table of Contents: provide title of project;
- .1 date of submission;
- .2 names, addresses, and telephone and fax numbers of Contractor, Subcontractors, Suppliers with name of responsible parties;
- .3 schedule of products and systems, indexed to content of volume.
- .4 copy of hardware schedule and paint schedules, complete with the actual manufacturer, supplier and identification names and numbers.
- .5 all extended guarantees, warranties, maintenance bonds, certificates, letters of guarantees, registration cards, as called for in the various sections of the specification.
- .6 complete set of all final reviewed shop drawings.
- .7 certificates of inspection by authorities having jurisdiction.
- .8 test reports and certificates as applicable.
- .9 complete set of as constructed drawings.

.2 For each product or system:
- .1 List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.

.3 Product Data: mark each sheet to clearly identify specific products and component parts, and data applicable to installation; delete inapplicable information.

.4 Drawings: supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.

.5 Typewritten Text: as required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01 45 00 - Quality Control.

.6 Training: Refer to Section 01 91 41 - Demonstration and Training.

1.6 'AS CONSTRUCTED' DRAWINGS AND SAMPLES

.1 In addition to requirements in General Conditions, maintain at the site one record copy of:
- .1 Contract Drawings.
- .2 Specifications.
- .3 Addenda.
- .4 Change Orders and other modifications to the Contract.

.5 Reviewed shop drawings, product data, and samples.
.6 Field test records.
.7 Inspection certificates.
.8 Manufacturer's certificates.

.2 Store record documents and samples in field office apart from documents used for construction. Provide files, racks, and secure storage.

.3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual. Label each document "PROJECT RECORD" in neat, large, printed letters.

.4 Maintain record documents in clean, dry and legible condition. Do not use record documents for construction purposes.

.5 Keep record documents and samples available for inspection by Departmental Representative.

.6 Provide an electronic copy of as constructed drawings.

1.7 RECORDING ACTUAL SITE CONDITIONS

.1 Record information on set of black line opaque drawings, provided by Departmental Representative.

.2 Provide felt tip marking pens, maintaining separate colours for each major system, for recording information.

.3 Record information concurrently with construction progress. Do not conceal Work until required information is recorded.

.

.4 Contract Drawings and shop drawings: legibly mark each item to record actual construction, including:
.1 Measured depths of elements of foundation in relation to finish first floor datum.
.2 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
.3 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.
.4 Field changes of dimension and detail.
.5 Changes made by change orders.
.6 Details not on original Contract Drawings.
.7 References to related shop drawings and modifications.

.5 Specifications: legibly mark each item to record actual construction, including:
.1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.
.2 Changes made by Addenda and change orders.

.6 Other Documents: maintain manufacturer's certifications, inspection certifications, field test records, required by individual specifications sections.

1.8 MATERIALS AND FINISHES

.1 Building Products, Applied Materials, and Finishes: include product data, with catalogue number, size, composition, and colour and texture designations. Provide information for re-ordering custom manufactured products.

.2 Instructions for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

.3 Moisture-protection and Weather-exposed Products: include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

.4 Additional Requirements: as specified in individual specifications sections.

1.9 SPARE PARTS

.1 Provide spare parts, in quantities specified in individual specification sections.

.2 Provide items of same manufacture and quality as items in Work.

.3 Deliver to location as directed; place and store.

.4 Receive and catalogue all items. Submit inventory listing to Departmental Representative. Include approved listings in Maintenance Manual.

.5 Obtain receipt for delivered products and submit prior to final payment.

1.10 MAINTENANCE MATERIALS

.1 Provide maintenance and extra materials, in quantities specified in individual specification sections.

.2 Provide items of same manufacture and quality as items in Work.

.3 Deliver to location as directed; place and store.

.4 Receive and catalogue all items. Submit inventory listing to Departmental Representative. Include approved listings in the Operating and Maintenance Manuals.

.5 Obtain receipt for delivered products and submit prior to final payment.

1.11 SPECIAL TOOLS

.1 Provide special tools, in quantities specified in individual specification section.

.2 Provide items with tags identifying their associated function and equipment.

.3 Deliver to location as directed; place and store.

.4 Receive and catalogue all items. Submit inventory listing to Departmental Representative. Include approved listings in Maintenance Manual.

1.12 STORAGE, HANDLING AND PROTECTION

.1 Store spare parts, maintenance materials, and special tools in manner to prevent damage or deterioration.

.2 Store in original and undamaged condition with manufacturer's seal and labels intact.

.3 Store components subject to damage from weather in weatherproof enclosures.

.4 Store paints and freezable materials in a heated and ventilated room.

.5 Remove and replace damaged products at own expense and to satisfaction of Departmental Representative.

1.13 WARRANTIES AND BONDS

.1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.

.2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

.3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers within ten days after completion of the applicable item of work.

.4 Except for items put into use with Owner's permission, leave date of beginning of time of warranty until the Date of Substantial Performance is determined.

.5 Verify that documents are in proper form, contain full information, and are notarized.

.6 Co-execute submittals when required.

.7 Retain warranties and bonds until time specified for submittal.

END OF SECTION 01 78 00

1.0 GENERAL

1.1 REFERENCES

.1 CSA International

.1 CSA S350-M1980 (R2003), Code of Practice for Safety in Demolition of Structures.

1.2 ACTION & INFORMATIONS SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures and 01 74 19 - Waste Management Disposal.

.2 Submit hoarding and scaffolding layout plan for approval by Departmental Representative at each stage of work.

1.3 SITE CONDITIONS

.1 If material resembling spray or trowel-applied asbestos or other designated substance listed as hazardous is encountered, stop work, take preventative measures, and notify Departmental Representative immediately.

.1 Proceed only after receipt of written instructions have been received from Departmental Representative.

.2 Notify Departmental Representative before disrupting building access or services.

.3 Extent of Demolition - refer to drawing.

2.0 PRODUCT

.1 Not used.

3.0 EXECUTION

3.1 EXAMINATION

.1 Inspect building 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, cap, plug or divert, as required, existing utilities within the building where they interfere with the execution of the work, in conformity with the requirements of the authorities having jurisdiction. Mark the location of these and previously capped or plugged services on the site and indicate location (horizontal and vertical) on the record drawings. Support, shore up and maintain pipes and conduits encountered.

.1 Immediately notify Departmental Representative and the Owner concerned in case of damage to any utility or service designated to remain in place.

.2 Immediately notify the Departmental Representative should uncharted utility or service be encountered, and await instruction in writing regarding remedial action.

3.2 PREPARATION

.1 Protection of In-Place Conditions:

.1 Prevent movement, settlement, or damage to adjacent structures, and utilities.

.2 Keep noise, dust, and inconvenience to occupants to minimum.

.3 Protect building systems, services and equipment.

.4 Provide temporary dust screens, covers, railings, supports and other protection as required.

.5 Do Work in accordance with Section 01 35 33 - Health and Safety Requirements.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

.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 - Cleaning.

.3 Waste Management: separate waste materials for recycling in accordance with Section 01 74 19 - Waste Management and Disposal.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION 02 41 99

1.0 GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 11 55 – General Instructions.

.2 Section 01 33 00 – Submittal Procedures.

.3 Section 01 35 33 – Health and Safety Requirements

1.2 REFERENCES

.1 Reports:

Refer to the Assessment Reports:

.1 Hazardous Building Material Assessment Building E0137, House 10, British Columbia, prepared for Public Services and Procurement Canada on behalf of the Government of Canada, dated October 21, 2020. The report was prepared by Arcadis Canada Inc.

.2 Hazardous Building Material Assessment Building E0154, House 07, British Columbia, prepared for Public Services and Procurement Canada on behalf of the Government of Canada, dated October 22, 2020. The report was prepared by Arcadis Canada Inc.

.3 Hazardous Building Material Assessment Building E0159, House 05, British Columbia, prepared for Public Services and Procurement Canada on behalf of the Government of Canada, dated October 23, 2020. The report was prepared by Arcadis Canada Inc.

.4 Hazardous Building Material Assessment Building E0163, House 02, British Columbia, prepared for Public Services and Procurement Canada on behalf of the Government of Canada, dated October 23, 2020. The report was prepared by Arcadis Canada Inc.

.5 Hazardous Building Material Assessment Building E0164, House 03, British Columbia, prepared for Public Services and Procurement Canada on behalf of the Government of Canada, dated October 23, 2020. The report was prepared by Arcadis Canada Inc.

.6 Hazardous Building Material Assessment Building E0174, House 04, British Columbia, prepared for Public Services and Procurement Canada on behalf of the Government of Canada, dated October 23, 2020. The report was prepared by Arcadis Canada Inc.

.7 Hazardous Building Material Assessment Building E0178, House 06, British Columbia, prepared for Public Services and Procurement Canada on behalf of the Government of Canada, dated October 23, 2020. The report was prepared by Arcadis Canada Inc.

.8 Hazardous Building Material Assessment Building E0179, House 08, British Columbia, prepared for Public Services and Procurement Canada on behalf of the Government of Canada, dated October 23, 2020. The report was prepared by Arcadis Canada Inc.

.9 Hazardous Building Material Assessment Building E0183, House 09, British Columbia, prepared for Public Services and Procurement Canada on behalf of the Government of Canada, dated October 26, 2020. The report was prepared by Arcadis Canada Inc.

.10 Hazardous Building Material Assessment Building E0187, House 11, British Columbia, prepared for Public Services and Procurement Canada on behalf of

the Government of Canada, dated October 23, 2020. The report was prepared by Arcadis Canada Inc.

.11 Hazardous Building Material Assessment Building E0189, House 12, British Columbia, prepared for Public Services and Procurement Canada on behalf of the Government of Canada, dated October 23, 2020. The report was prepared by Arcadis Canada Inc.

.12 Hazardous Building Material Assessment Building E0192, House 01, British Columbia, prepared for Public Services and Procurement Canada on behalf of the Government of Canada, dated October 23, 2020. The report was prepared by Arcadis Canada Inc.

.2 Definitions:

.1 Dangerous Goods: product, substance, or organism specifically listed or meets hazard criteria established in Transportation of Dangerous Goods Regulations.

.2 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.

.3 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 the environment.

.4 Hazardous Waste: hazardous material no longer used for its original purpose and that is intended for recycling, treatment or disposal.

.3 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 SOR/2018-196 Prohibition of Asbestos and Products Containing Asbestos Regulations.

.2 Department of Justice Canada

.1 Transportation of Dangerous Goods Act, 1992 (TDG Act) [1992], (c. 34).

.2 Transportation of Dangerous Goods Regulations (T-19.01-SOR/2019-101).

.3 Health Canada / Workplace Hazardous Materials Information System (WHMIS)

.1 Safety Data Sheets (SDS).

.4 National Research Council Canada Institute for Research in Construction (NRC-IRC)

.1 National Fire Code of Canada (2015).

.5 WorkSafe BC

.1 British Columbia’s Occupational Health and Safety Regulation (BC Reg. 296/97, including amendments to date of work)

.2 “Safe Work Practices for Handling Asbestos” (2017)

.3 “Lead-Containing Paints and Coatings; Preventing Exposure in the Construction Industry” (2017)

.4 “Safe Work Practices for Handling Lead” (2017)

.5 "Developing a Silica Exposure Control Plan" (2014)
.6 British Columbia Hazardous Waste Regulation (BC Reg. 63/88)
.7 The Federal PCB Regulations (SOR/2008-273).
.8 The British Columbia Waste Management Act - Ozone Depleting Substances and Other Halocarbons Regulation (BC Reg. 317/2012).
.9 The Federal Halocarbons Regulation (July 2003).
.10 The Canada Labour Code, Part II, Canada Occupational Health and Safety Regulations (COHSR)
.11 Canadian Construction Association
.1 Standard Construction Document CCA 82 "Mould Guidelines for the Canadian Construction Industry" (2018)

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 Submittal Procedures.

.2 Product Data to be used by the Contractor to complete the Work:
.1 Submit manufacturer's instructions, printed product literature and data sheets, and include product characteristics, performance criteria, physical size, finish and limitations.
.2 Submit two copies of Workplace Hazardous Materials Information System (WHMIS) Safety Data Sheets (SDS) in accordance with Section 01 35 33 - Health and Safety Requirements to Departmental Representative for each hazardous material required prior to bringing hazardous material on site.
.3 Submit Exposure Control Plan (ECP) to Departmental Representative that identifies hazardous materials, usage, location, personal protective equipment requirements, and disposal arrangements.
.4 Construction/Demolition Waste Management:
.1 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating percentage of construction/demolition wastes were recycled or salvaged
.5 Low-Emitting Materials: submit listing of adhesives and sealants used in building, comply with VOC and chemical component limits or restrictions requirements.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Deliver, store and handle hazardous materials to be used by the Contractor to complete the Work in accordance with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver hazardous materials to be used by the Contractor 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.

.4 Storage and Handling Requirements:
.1 Co-ordinate storage of hazardous materials to be used by the Contractor to complete the Work 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 requirements.

.4 Keep no more than 45 litres of flammable and combustible liquids such as gasoline, kerosene and naphtha for ready use.

.1 Store flammable and combustible liquids in approved safety cans bearing the Underwriters' Laboratory of Canada or Factory Mutual seal of approval.

.2 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 must be 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.

.12 Ensure personnel have been trained in accordance with WHMIS requirements.
.13 Report spills or accidents immediately to Departmental Representative. Submit a written spill report to Departmental Representative within 24 hours of incident.

2.0 PRODUCTS

2.1 MATERIALS

.1 Description:
.1 Bring on site only quantities hazardous material required to perform Work.
.2 Maintain SDS in proximity to where materials are being used. Communicate this location to personnel who may have contact with hazardous materials.

3.0 EXECUTION

3.1 HAZARDOUS MATERIALS ABATEMENT

.1 Scope of Abatement Activities.
.1 Abatement shall be conducted to handle, alter, remove and/or dispose of hazardous building materials as identified in the Assessment Report in accordance with applicable regulations, guidelines, standards and/or best practices for such work, where 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 materials that will be impacted by the Work of this contract, 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, along with their associated removal and disposal regulations, guidelines and/or standards.
.1 Asbestos-Containing Materials (ACMs)
.1 Refer to the Assessment Reports for identities and locations of ACMs that may require disturbance during the Work.

.2 Actions that will disturb identified ACMs are to be conducted in accordance with the requirements of the 2017 WorkSafe BC publication “Safe Work Practices for Handling Asbestos”, by appropriately trained personnel.

.3 Waste transportation to be conducted in accordance with BC Reg. 63/88 and the Federal Transportation of Dangerous Goods Regulation.

.4 Waste disposal to be conducted in accordance with BC Reg. 63/88.

.5 Notify Departmental Representative of suspected ACM discovered during Work and not apparent from drawings, specifications, or report pertaining to Work. Do not disturb such material pending instructions from DepartmentRepresentative.

.6 From beginning of Work until completion of cleaning operations, Departmental Representative will separately engage an Environmental Specialist to take air samples inside and outside of Asbestos Work Area enclosure[s] in accordance with British Columbia’s Occupational Health and Safety Regulation and the current version of the WorkSafeBC Manual entitled “Safe Work Practices for Handling Asbestos”.

.7 If air monitoring shows that areas outside Asbestos Work Area enclosure[s] are contaminated, enclose, maintain and clean these areas in same manner as that applicable to Asbestos Work Area, at no additional cost to the Contract

.8 Ensure that respiratory safety factors are not exceeded.

.2 Lead and Lead-Containing Paints (LCPs)

.1 Refer to the Assessment Reports for identities and locations of lead-containing materials (including LCPs) that may require disturbance during the Work.

.2 Actions that will disturb lead-containing materials (including paints and materials coated with LCPs) are to be conducted in accordance with the requirements of the current version of the WorkSafe BC publication “Lead-Containing Paint and Coatings: Preventing Exposure in the Construction Industry” and “Safe Work Practices for Handling Lead”, keeping airborne exposure to lead dust to less than the 8-hour Occupational Exposure Limit (OEL) for lead of 0.05 milligram per cubic metre (mg/m3).

.3 Although LCPs and items coated with LCPs will be removed for disposal during the Work, unless deemed necessary through risk assessment or cost analysis conducted by the Contractor, comprehensive removal of LCPs from items or surfaces is not expected to be required during the Work.

.1 Refer to the provisions of the 2017 WorkSafe BC publication “Lead-Containing Paint and Coatings: Preventing Exposure in the Construction Industry” and “Safe Work Practices for Handling Lead”, for removal of LCPs from surfaces before any welding and torch-cutting, should the Contractor plan to use such methods to complete the Work.

.1 Contractor will be responsible for verification testing of surfaces where LCPs have been removed. Confirmation of acceptable results is to be provided to the Departmental Representative for review before proceeding with any welding or torch-cutting on surfaces where LCPs were present.

.4 Waste transportation to be conducted in accordance with BC Reg. 63/88 and the Federal Transportation of Dangerous Goods Regulation.

.5 Waste disposal to be conducted in accordance with BC Reg. 63/88.

.3 Polychlorinated Biphenyls (PCBs)

.1 Removal, alteration and/or disposal of PCB-containing equipment is not anticipated to be required during the Work.

.2 Should a material suspected to contain PCBs become uncovered during renovation 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.

.3 PCB-containing items identified for removal and disposal should be handled, transported, stored and disposed of in accordance with the following:

.1 The transportation and disposal requirements of BC Reg. 63/88 .

.2 The transportation requirements of the Federal Transportation of Dangerous Goods Regulation.

.3 The Federal PCB Regulations (SOR/2008-273)

.4 Mould

.1 Removal, alteration and/or disposal of mould-impacted materials is not anticipated to be required during the Work.

.5 Mercury

.1 Removal of mercury-containing materials is not anticipated to be required during the Work:

.2 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 BC Reg. 296/97. This can be achieved by providing respiratory and skin protection applicable to the hazard and task to be completed.

.6 Ozone-Depleting Substances (ODSs)

.1 Removal, alteration and/or disposal of refrigeration or air conditioning equipment with ODS refrigerants is not anticipated to be required during the Work.

.7 Silica

.1 Refer to the Assessment Reports for identities and locations of silica-containing materials that may require disturbance during the Work

.2 When silica-containing materials are to be disturbed and/or removed (e.g., coring through concrete slabs, demolition of masonry or concrete units), ensure dust control measures are employed such that airborne silica dust concentrations do not exceed the exposure limit as stipulated by BC Reg. 296/97 (Cristobalite and Quartz – each 0.025 mg/m3). This would include, but not be limited to, the following:

.1 Developing a Silica Exposure Control Plan

.2 Providing workers with respiratory protection

.3 Wetting the surface of the materials, use of water or dust suppressing agents to prevent dust emissions

.4 Providing workers with facilities to properly wash prior to exiting the work area.

3.2 CLEANING

.1 Progress Cleaning: 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 reuse and recycling.

.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 federal and 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.

END OF SECTION 02 81 01

1.0 GENERAL

1.1 RELATED REQUIREMENTS

.1	Thermal Insulation	Section 07 21 00
.2	Weather Barriers	Section 07 25 00
.3	Air Barriers Descriptive Proprietary	Section 07 27 00.01
.4	Fiber Cement Siding System	Section 07 46 46
.5	Metal Doors and Frames	Section 08 11 00
.6	Windows	Section 08 50 00

1.2 REFERENCES

.1 Canadian Standards Association International (CSA International)

- .1 ANSI-B18.6.4 “Screws, Tapping and Metallic Drive, Inch Series, Thread Forming and Cutting”.
- .2 CSA-B111 “Wire Nails, Spikes and Staples”.
- .3 CAN/CSA-G164 “Hot Dip Galvanizing of Irregularly Shaped Articles”.
- .4 CSA-O86.1 “Engineering Design in Wood”.
- .5 CSA-O86.1S1 “Supplement to CSA-O86.1”.
- .6 CSA-O121 “Douglas Fir Plywood”.
- .7 CAN/CSA-O141 “Softwood Lumber”.
- .8 CSA-O151 “Canadian Softwood Plywood”.
- .9 CAN/CGSB-71.26 “Adhesive for Field-Gluing Plywood to Lumber Framing for Floor Systems”.
- .10 ASTM-A153 “Zinc Coating (Hot Dip) on Iron and Steel Hardware”.
- .11 National Lumber Grades Authority (NLGA) Standard Grading Rules for Canadian Lumber.
- .12 CAN/CSA-G164-18, Hot Dip Galvanizing of Irregularly Shaped Articles.
- .13 CAN/CSA-0325-16, Construction Sheathing.
- .14 Comply with AWPA.M4 and revisions specified in CAN/CSA-080 Series, Supplementary Requirements to AWPA Standard M2.

.2 National Lumber Grades Authority (NLGA)

- .1 Standard Grading Rules for Canadian Lumber 2017.

1.3 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 19 – Demolition Waste Management.

.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard and packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

.4 Divert unused wood materials from landfill to recycling, reuse and composting facility approved by Departmental Representative.

.5 Do not dispose of preservative treated wood through incineration.

.6 Do not dispose of preservative treated wood with materials destined for recycling or reuse.

.7 Dispose of treated wood, end pieces, wood scraps and sawdust at sanitary landfill approved by Departmental Representative.

.8 Dispose of unused wood preservative material at official hazardous material collections site approved by Departmental Representative.

.9 Do not dispose of unused preservative material into sewer system, into streams, lakes, onto ground or in other locations where they will pose health or environmental hazard.

1.5 ACTION & SUBMITTALS

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

.2 Lumber identification: by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.

.3 Plywood identification: by grade mark in accordance with applicable CSA standards.

.4 Do not deliver to site until such time that installation is imminent and sufficient protected staging area is available for on site storage. Staging area to be approved by the Department Representative.

.5 Store up off ground and lay flat on smooth level surface. Store under cover and keep dry prior to installing.

1.6 QUALITY ASSURANCE

.1 Environmental Requirements: Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labeling and provision of material safely data sheets acceptable to Workers' Compensation Board of British Columbia.

.2 Maintain environmental conditions (protection from elements, temperature, humidity and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.0 PRODUCTS

2.1 LUMBER MATERIAL

.1 Lumber: unless specified otherwise, treated, S4S, moisture content 19% or less in accordance with following standards:
1. CAN/CSA-O141 "Softwood Lumber".
2. NLGA Standard Grading Rules for Canadian Lumber.

.2 Lumber size and grade: to match existing size and grade and in accordance with requirements of applicable codes.
1. D. Fir. or Hem-Fir No. 2 or better grade.
2. Report any discrepancies in type and/or grading of existing lumber to The Departmental Representative.

.3 Furring, blocking, nailing strips, cants, curbs, fascia backing and sleepers:
1. Treated in accordance with Section 06070 - Wood Treatment.
2. Board sizes: "Standard" or better grade.
3. Dimension sizes: "Standard" light framing or better grade.

4. Post and timbers sizes: "Standard" or better grade species except as indicated.

5. Framing and board lumber: in accordance with NBCC 2018Subsection 9.3.2, except as follows:
   1. Roof joists, studs, chords in built-up beams: D-Fir NLGA No.2or better U.N.O.
   2. Post and Beams including built-ups: D-Fir species, NLGA No.1 grade
   3. Floor Planks: Yellow Cedar species, NLGA No.1grade or better
   4. Preservative Treated Plywood

6. Adhesives: epoxies, mastics and contact cements for fastening applications, use in accordance with manufacturers' recommendations.

7. Glued end-jointed (finger-jointed) lumber products are acceptable for framing of interior non-load bearing studs.

2.2 PANEL MATERIALS

.1 Douglas fir plywood (DFP): to CSA-O121 “Douglas Fir Plywood”.
   1. Wall Sheathing: non-treated, 19 mm thickness.
   2. Canadian softwood plywood (CSP): to CSA O151, standard construction.
   3. Plywood, OSB and wood based composite panels: to CAN/CSA-O325.

2.3 PANEL MATERIAL END USES

.1 Roof sheathing: DFP sheathing grade T&G edge, 12.5mm thick.

.2 Wall sheathing: DFP sheathing grade square edge, 12.5mm thick.

.3 Miscellaneous plywood panels: DFP or CSP sheathing grade square edge, 19 mm thick, for wall backing, panel mounting boards and as indicated.

.4 Wall sheathing under wall waterproofing membrane: DFP sheathing grade T&G edge, 16 mm thick pressure preservative treated to para. 2.7.1.

2.4 ACCESSORIES

.1 Nails, spikes and staples: to CSA-B111 “Wire Nails, Spikes and Staples”.
   1. Framing and sheathing nails: Galvanized common nails to comply with wood frame construction requirements of applicable codes.
   2. Wood furring / strapping nails: 64 mm hot-dipped galvanized common nails.

.2 Screws: to ANSI-B18.6.4 “Screws, Tapping and Metallic Drive, Inch Series, Tread Forming and Cutting”.

.3 Bolts: 12.5 mm diameter unless indicated otherwise, complete with nuts and washers.

.4 Proprietary fasteners: toggle bolts, expansion shields and lag bolts, screws, explosive actuated fastening devices - in accordance with purpose and instruction recommended by Manufacturer.

.5 All fasteners shall be galvanized steel to CAN/CSA-G164 “Hot Dip Galvanizing or Irregular Shaped Articles” with a minimum zinc coating thickness of 45 µm (320 g/m^2) - except fasteners for, or in ACQ treated wood, which shall be stainless steel.

.6 Anchors as identified on project drawings.

.7 Steel plates: All steel plates used in connection details shall be grade 300W.

.8 Lag screws: Lag screws shall be predrilled with a bit size of 65% of the shank diameter for the threaded portion. Lead holes shall be the same length as the unthreaded portion and the same diameter as the shank. Screw all lags into place. Cut washers shall be provided under heads which bear on wood.

.9 No checks or splits allowed at areas to be bolted or lagged.

.10 All bolts, steel plates/connections and nails for use with yellow cedar wood to be hot dipped galvanized to ASTM A653 class G184as produced by Simpson Strong Tie or approved equal by the Departmental representative.

.11 Galvanizing: to CSA G164 unless noted otherwise. Use galvanized fasteners for exterior work, interior highly humid areas.

.12 Joist/beam hangers, post bases: unless noted otherwise shall be hot dipped galvanized as per manufacture and approved by the Departmental representative

2.5 FINISHES

.1 Galvanizing: to CAN/CSA-G164, use galvanized fasteners & connectors for exterior work, interior highly humid areas, pressure-preservative, and fire-retardant treated lumber.

.2 Stainless steel: use stainless steel G316 or alloy for fasteners & connectors for work mentioned in .1 above or alternative are specified and at contractors' cost.

2.6 WOOD PRESERVATIVE

.1 Surface-applied wood preservative: clear, coloured, or copper napthenate or 5% pentachlorophenol solution, water repellent preservative.

.2 Pentachlorophenol use is restricted to building components that are in ground contact and subject to decay or insect attack only. Where used, pentachlorophenol-treated wood must be covered with two coats of an appropriate sealer

.3 Structures built with wood treated with pentachlorophenol and inorganic arsenicals must not be used for storing food nor should the wood come in contact with drinking water.

3.0 EXECUTION

3.1 PREPARATION

.1 Prior to commencing installation, verify governing dimensions of building and condition of substrate.

.2 If substrate preparation is the responsibility of another installer, notify The Departmental Representative of unsatisfactory preparation before proceeding.

.3 Proceeding with installation acknowledges acceptance of substrate.

.4 All preservative treated plywood sheathing and dimension lumber including blocking, furring and cants are to be treated at an approved facility.

.5 Where directed by The Departmental Representative, treat existing lumber and plywood which is exposed during the course of work but is not replaced with surface-applied wood preservative.

.6 All new installation to meet current code requirements.

3.2 INSTALLATION OF STRAPPING / FURRING AND BLOCKING

.1 Install strapping, furring and blocking as required to space-out and support exterior cladding, wall and ceiling finishes, facings, fascia, soffit, and other work as required.

1. Vertical Furring/Strapping:
    1. Furring/strapping: to be vertically aligned with main wall wood studs, with intermediate strapping located mid-way between the studs.
    2. Furring/strapping fasteners are to be spaced at maximum 150 mm on vertical centres. Minimum 2 fasteners per top and bottom plate.
2. Horizontal Furring/Strapping:
    1. Furring/strapping: to be installed at 400 mm O/C.
    2. Furring/strapping fasteners are to be spaced at maximum 400 mm O/C with two per vertical.

.2 Align and plumb faces of furring and blocking to tolerance of 1:600.

.3 Install rough bucks, nailers and linings to rough openings as required to provide backing for frames and other work.

.4 Install wood cants, fascia backing, nailers, curbs and other wood supports as required and secure using galvanized steel fasteners.

.5 Install sleepers as required to obtain necessary slope and/or venting requirements.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

.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 - Cleaning.

.2 Waste Management: separate waste materials for recycling in accordance with Section 01 74 19 - Waste Management and Disposal.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION 06 10 10

1.0 GENERAL

1.1 RELATED REQUIREMENTS

.1 Rough Carpentry Section 06 10 11

.2 Door Hardware Section 08 71 00

1.2 REFERENCES

.1 Architectural Woodwork Manufacturers Association of Canada (AWMAC) and Architectural Woodwork Institute (AWI)
- .1 Architectural Woodwork Quality Standards, latest edition.

.2 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-11.3-M87, Hardboard.

.3 CSA International
- .1 CSA B111-74(R2003), Wire Nails, Spikes and Staples.
- .2 CAN/CSA G164-M92 (R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
- .3 CSA O121-08, Douglas Fir Plywood.
- .4 CSA O141-05, Softwood Lumber.
- .5 CSA O151-09, Canadian Softwood Plywood.
- .6 CSA O153-M1980 (R2008), Poplar Plywood.

.4 Forest Stewardship Council (FSC)
- .1 FSC-STD-01-001, FSC Principle and Criteria for Forest Stewardship V5-2.
- .2 FSC-STD-20-002, Structure and Content of Forest Stewardship Standards V3-0.
- .3 FSC Accredited Certified Bodies.

.5 National Lumber Grades Authority (NLGA)
- .1 NLGA Standard Grading Rules for Canadian Lumber 2017 including 2019 supplements.

.6 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
- .1 SCAQMD Rule 1168 2017, Adhesives and Sealants Applications.

.7 Underwriters Laboratories of Canada (ULC)
- .1 CAN4-S104-80(R1985), Standard Method for Fire Tests of Door Assemblies.
- .2 CAN/ULC-S105-09, Standard Specification for Fire Door Frames.

1.3 SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for plywood MDF and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Submit two copies of WHMIS MSDS in accordance with Section 01 35 33- Health and Safety Requirements.

.3 Shop Drawings:
- .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of British Columbia, Canada.
- .2 Indicate details of construction, profiles, jointing, fastening and other related details.
- .3 Indicate materials, thicknesses, finishes and hardware.

.4 Samples:
- .1 Submit for review and acceptance of each unit.
- .2 Samples will be returned for inclusion into work.
- .3 Submit duplicate 300 x 300 mm samples of handrails, soffits and cedar siding, wood trim.

.5 Certifications: submit certificates signed by manufacturer certifying materials comply with specified performance characteristics and physical properties.

.6 Test and Evaluation Reports: submit certified test reports for composite wood from approved independent testing laboratories, indicating compliance with specifications for specified performance characteristics and physical properties.

.7 Sustainable Design Submittals:
- .1 Construction Waste Management:
  - .1 Submit project Waste Management Plan highlighting recycling and salvage requirements.
  - .2 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that 75% of construction wastes were recycled or salvaged.
- .2 Recycled Content:
  - .1 Submit listing of recycled content products used, including details of required percentages or recycled content materials and products, showing their costs and percentages of post-consumer and post-industrial content, and total cost of materials for project.
- .3 Regional Materials: submit evidence that project incorporates required percentage 10% of regional materials and products, showing their cost, distance from project to furthest site of extraction or manufacture, and total cost of materials for project.
- .4 Certified Wood:
  - .1 Submit listing of wood products and materials used, produced from wood obtained from forests certified by FSC Accredited Certification Body in accordance with FSC-STD-01-001.
  - .2 Submit manufacturer's FSC Chain-of-Custody Certificate number.
- .5 Low-Emitting Materials:
  - .1 Submit listing of adhesives and sealants used in building, showing compliance with VOC and chemical component limits or restrictions requirements.
  - .2 Submit listing of composite wood products used in building, stating that they contain no added urea-formaldehyde resins, and laminate adhesives used in building, stating that they contain no urea-formaldehyde.

1.4 QUALITY ASSURANCE

.1 Lumber by grade stamp of agency certified by Canadian Lumber Standards Accreditation Board (CLSAB).

.2 Plywood, particleboard, OSB and wood based composite panels to CSA and ANSI standards.

.3 Wood fire rated frames and panels: listed and labelled by an organization accredited by Standards Council of Canada to CAN4-S104 and CAN/ULC-S105.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product

Requirements and with 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 Storage and Handling Requirements:
- .1 Store materials off ground and in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect wood products from nicks, scratches, and blemishes.
- .3 Replace defective or damaged materials with new.

.4 Develop Construction Waste Management Plan Waste Reduction Workplan related to Work of this Section

.5 Packaging Waste Management: remove for reuse of pallets, crates, padding, and packaging materials as specified in Construction Waste Management Plan in accordance with Section 01 74 19 - Waste Management and Disposal.

2.0 PRODUCTS

2.1 MATERIALS

.1 Softwood lumber: S4S, moisture content 19% or less in accordance with following standards:
- .1 CSA O141.
- .2 NLGA Standard Grading Rules for Canadian Lumber
- .3 AWMAC custom or premium grade, where noted, moisture content as specified.
- .4 Machine stress-rated lumber is acceptable.
- .5 Hardwood lumber: moisture content in accordance:
  - .1 AWMAC custom grade, moisture content as specified.

.2 Panel Material: Urea-formaldehyde free
- .1 Recycled content: provide information indicating recycled content on a % (Post-Consumer + ½ Post-Industrial)
- .2 FSC certified.
- .3 Douglas fir plywood (DFP): to CSA O121, standard construction. 6.1.5 and 6.2.5 where both sides exposed to view.
- .4 Hardwood plywood: to ANSI/HPVA HP-1.
- .5 Medium density fibreboard (MDF): to ANSI A208.2, density 640-800 kg/m³.
- .6 Decorative overlaid composite panels.
  - .1 Decorative overlay, heat and pressure laminated with suitable resin to thickness indicated mm thick MDF urea-formaldehyde free core.
  - .2 Overlay bonded to both faces where exposed two sides, and when panel material require surface on one side only, reverse side to be overlaid with a plain (buff) balancing sheet.
  - .3 Furniture finish: stain wood grain pattern selected by Departmental Representative
  - .4 Edge finishing: edges dadoed or saw kerfed to take plastic "T" moulding in width and colour to match melamine finish.

2.2 ACCESSORIES

.1 Nails and staples: to CSA B111; galvanized to CAN/CSA-G164 for exterior work, interior humid areas and for treated lumber; plain finish elsewhere.

.2 Wood screws: plain, type and size to suit application.

.3 Splines: wood

.4 Adhesive and Sealants: in accordance with Section 07 92 00 - Joint Sealants.

3 .0 EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for wood products installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied [and after receipt of written approval to proceed from Departmental Representative.

3.2 INSTALLATION

.1 Do finish carpentry to Quality Standards of (AWMAC).

.2 Scribe and cut as required, fit to abutting walls, and surfaces, fit properly into recesses and to accommodate piping, columns, fixtures, outlets, or other projecting, intersecting or penetrating objects.

.3 Form joints to conceal shrinkage.

3.3 CONSTRUCTION

.1 Fastening:

.1 Position items of finished carpentry work accurately, level, plumb, true and fasten or anchor securely.

.2 Design and select fasteners to suit size and nature of components being joined. Use proprietary devices as recommended by manufacturer.

.3 Set finishing nails to receive filler. Where screws are used to secure members, countersink screw in round smooth cut hole and plug with wood plug to match material being secured.

.4 Replace items of finish carpentry with damage to wood surfaces including hammer and other bruises.

.2 Door frames:

.1 Set frames with plumb sides and level heads and sills and secure.

3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

.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 - Cleaning.

.3 Waste Management: separate waste materials for recycling in accordance with Section 01 74 19 - Waste Management and Disposal

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.5 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by finish carpentry installation.

END OF SECTION 06 20 00

1.0 GENERAL

1.1 RELATED REQUIREMENTS

.1 Weather Barriers Section 07 25 00

.2 Fiber Cement Siding System Section 07 46 46

1.2 REFERENCES

.1 American Society for Testing and Materials International (ASTM)

- .1 ASTM C203 - Standard Test Methods for Breaking Load and Flexural Properties of Block-Type Thermal Insulation.
- .2 ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
- .3 ASTM C1363 – Standard Test Method for Thermal Performance and Building Materials and Envelope Assemblies.
- .4 ASTM D1621 - Standard Test Method for Compressive Properties of Rigid Cellular Plastics.
- .5 ASTM D1622 - Standard Test Method for Apparent Density of Rigid Cellular Plastics.
- .6 ASTM D2126 - Standard Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging.
- .7 ASTM D2863 - Standard Test Method for Measuring the Minimum Oxygen Concentration to Support Candle-Like Combustion of Plastics (Oxygen Index).
- .8 ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.
- .9 FSC – Foam Sheathing Coalition.

.2 Canadian Standards Association (CSA International)

- .1 CAN/ULC S101-14 - Standard Methods of Fire Endurance Tests of Building Construction and Materials.
- .2 CAN/ULC S102.2 - Standard Method of Test for Surface Burning Characteristics of Flooring, Floor Coverings, And Miscellaneous Materials And Assemblies.
- .3 CAN/ULC S701-05 - Thermal Insulation of Polystyrene, Panels and Piping Coatings.
- .4 CAN/ULC S705 - Standard for Thermal Insulation - Spray Applied Rigid Polyurethane Foam, Medium Density – Material
- .5 CSA B111-1974 (R2003), Wire Nails, Spikes and Staples.

.3 Underwriters Laboratories of Canada (ULC)

- .1 CAN/ULC-S702-2012, Standard for Mineral Fiber Insulation for Buildings

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

- .1 Submit manufacturer's instructions, printed product literature and data sheets for blanket insulation and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Certificates:

- .1 Submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.4 Test Reports:

- .1 Submit certified test reports showing compliance with specified performance characteristics and physical properties.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with 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 Storage and Handling Requirements:

.1 Store materials off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect specified materials from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

.4 Packaging Waste Management: remove for reuse and return of pallets, crates, padding, banding, and packaging materials as specified in Construction / Demolition Waste Management Plan in accordance with Section 01 74 19 – Demolition Waste Management and Disposal.

1.5 QUALITY ASSURANCE

.1 Arrange pre-installation conference with The Departmental Representative and installers prior to commencing with installation.

.2 Unless otherwise specified, comply with manufacturer’s latest printed instructions for material usage, storage and installation method.

.3 Notify the Departmental Representative in writing of any conflict between these specifications and manufacturer’s instructions. The Departmental Representative will designate which document is to be followed.

2.0 PRODUCTS

2.1 EXPANDED POLYSTYRENE INSULATION

.1 Type II closed cell expanded polystyrene (EPS) with perforated metalized polymer facers. Inboard facer includes 5 mm deep by 330 mm wide drainage channels for 75% panel surface area. Outboard facer includes shallow depressions 90 mm wide located 400 mm on centre to identify areas where furring strips to be installed. Board edges comes with tongue and groove connections. Board Size; 1.2 m x 2.4 m, Thickness: 75mm.

.2 Does not contain dyes, formaldehyde or blowing agents. It may contain up to 15% recycled (EPS).

.3 Above grade shall be protected with siding.

2.2 ACCESSORIES

.1 Insulation clips:

.1 Impale type, perforated 50 x 50 mm cold rolled carbon steel 0.8 mm thick, adhesive back, spindle of 2.5 mm diameter annealed steel, length to suit insulation, 25 mm diameter washers of self-locking type.

.2 Nails: galvanized steel, length to suit insulation plus 25 mm, to CSA B111.

.3 Staples: 12 mm minimum leg.

.4 Tape: as recommended by manufacturer.

3.0 EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for blanket insulation application in accordance with manufacturer's written instructions.
- .1 Visually inspect substrate.
- .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied

3.2 PREPARATION

.1 Examine, clean and repair as necessary any substrate conditions that would be detrimental to proper installation.

.2 Surfaces to receive insulation shall be smooth, level, dry, clean, free from dust, dirt and other debris. Notify the Departmental Representative in writing of any defects.

.3 Prepare surfaces using the methods recommended by the manufacturer for achieving the best results for the substrate under the project conditions.

.4 Do not begin installation until unacceptable conditions have been corrected.

3.3 INSTALLATION

.1 Install in accordance with Manufacturer’s written instructions.

.2 Insulation board to be installed vertically.

.3 Align furring channels over framing members.

.4 Mechanically fasten furring through insulation board at furring channels to wall framing members. Furring strips centered into 5mm furring channels 400mm on centre.

.5 Secure insulation board and furring strips to framing members using sufficient length fasteners. Screws ensure penetrate the wall studding as per FSC guidelines.

.6 Where furring channels do not align with wall framing members, apply furring over insulation board and secure using sufficient fasteners to compress drainage plane channel.

.7 Apply foam in board groove. Push tongue of next board securely into groove of fastened board.

.8 Vertical and horizontal joints to be foamed and or taped. Use spray foams and/or adhesives compatible with polystyrene foam insulation. For cold weather applications, use cold weather spray foams and adhesives.

.9 Use a spatula to apply uniform pressure to ensure a seal between tape and insulation board.

3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
- .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 - Cleaning.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 19 – Demolition Waste Management and Disposal.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.5 FINAL CLEAN-UP

.1 At completion of work, remove and clean all excess primer from exposed finishes as per manufacturer's recommendations.

.2 Remove all excess materials and debris from site.

.2 Remove and dispose of all solvent based products in accordance with authority having jurisdiction.

END OF SECTION 07 21 00

1.0 GENERAL

1.1 RELATED REQUIREMENTS

.1	Thermal Insulation	Section 07 21 00
.2	Air Barriers - Descriptive Proprietary	Section 07 27 00 01
.3	Fiber Cement Siding System	Section 07 46 46

1.2 REFERENCES

.1 ASTM International

1. ASTM C920; Standard Specification for Elastomeric Joint Sealants
2. ASTM C1193; Standard Guide for Use of Joint Sealants
3. ASTM D882; Test Method for Tensile Properties of Thin Plastic Sheeting
4. ASTM D1117; Standard Guide for Evaluating Non-woven Fabrics
5. ASTM E84; Test Method for Surface Burning Characteristics of Building Materials
6. ASTM E96; Test Method for Water Vapor Transmission of Materials
7. ASTM E1677; Specification for Air Retarder Material or System for Framed Building Walls
8. ASTM E2178; Test Method for Air Permeance of Building Materials

.2 AATCC – American Association of Textile Chemists and Colorists

1. Test Method 127 Water Resistance: Hydrostatic Pressure Test

.3 TAPPI

1. Test Method T-410; Grams of Paper and Paperboard (Weight per Unit Area)
2. Test Method T-460; Air Resistance (Gurley Hill Method)

1.3 SUBMITTALS

.1 Refer to Section 01 33 00 Submittal Procedures.

.2 Product Data: Submit manufacturer current technical literature for each component.

.3 Samples: Weather Barrier membrane, minimum 250mm by 300mm.

.4 Quality Assurance Submittals

1. Manufacturer Instructions: Provide manufacturer's written installation instructions.

.5 Closeout Submittals

1. Refer to Section 01 78 00 Closeout Submittals.

1.4 QUALITY ASSURANCE

.1 Qualifications

1. Installer shall have a minimum of 5 years' experience with installation of similar weather barrier assemblies under similar conditions.
2. Installation shall be in accordance with manufacturer's installation guidelines and recommendations.

3. Source Limitations: Provide weather barrier and accessory materials produced by single manufacturer.
4. Provide mock up of a 1220 x 2440mm installation for review.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Refer to Section 01 61 00 Common Product Requirements.

.2 Deliver weather barrier materials and components in manufacturer's original, unopened, undamaged containers with identification labels intact.

.3 Store weather barrier materials as recommended by system manufacturer.

1.6 SCHEDULING

.1 Review requirements for sequencing of installation of weather barrier assembly with installation of windows, doors, louvers and flashings to provide a weather-tight barrier assembly.

2.0 PRODUCTS

2.1 MATERIALS

.1 HPDE non-woven, non-perforated weather barrier.

.2 Performance Characteristics:
1. Air Penetration: <.004 cfm/ft^2 at 1.57 psf, when tested in accordance with ASTM E2178. Type I per ASTM E1677.
2. Water Vapor Transmission: 56 perms, when tested in accordance with ASTM E96-05, Method A.
3. Water Penetration Resistance: 250 cm when tested in accordance with AATCC Test Method 127.
4. Basis Weight: 1.8 oz/yd^2, when tested in accordance with TAPPI Test Method T-410.
5. Air Resistance: 1200 seconds, when tested in accordance with TAPPI Test Method T-460.
6. Breaking Strength: 30/30 lbs/in., when tested in accordance with ASTM D882.
7. Tear Resistance: 8/6 lbs, when tested in accordance with ASTM D1117.
8. Surface Burning Characteristics: Class A, when tested in accordance with ASTM E84. Flame Spread Rating: 15, Smoke Developed Index: 15.

.3 Acceptable Product: Dupont Tyvek HomeWrap or approved equivalent.

2.2 ACCESSORIES

.1 Seam Tape: 75mm wide, Tape as distributed by manufacturer.

.2 Fasteners:
1. #4 nails with large 1-inch plastic cap fasteners, or 25mm plastic cap, staples with leg length sufficient to achieve a minimum penetration of 16mm into the wood stud.

.3 Sealants:
1. Refer to Section 07 92 00 Joint Sealants.

.4 Adhesive:
1. Provide adhesive recommended by weather barrier manufacturer.

.5 Primer:
1. Provide flashing manufacturer recommended primer to assist in adhesion between substrate and flashing.

.6 Flashing

.1 The following products will meet performance criteria and will form the basis of design. Equivalent products are acceptable if they can meet or exceed the performance criteria:

.1 DuPont™ FlexWrap™: butyl (non-asphalt or bitumen containing) self-adhered flexible flashing membrane flashing materials for window openings and penetrations.

.2 Thru-Wall Surface Adhered Membrane with Integrated Drip Edge: Thru-Wall flashing membrane materials for flashing at changes in direction or elevation, and at transitions between different assembly materials.

.3 Preformed Inside and Outside Corners and End Dams: Preformed three-dimensional shapes to complete the flashing system used in conjunction with Thru-Wall Flashing.

3.0 EXECUTION

3.1 EXAMINATION

.1 Verify substrate and surface conditions are in accordance with weather barrier manufacturer recommended tolerances prior to installation of weather barrier and accessories.

3.2 INSTALLATION – WEATHER BARRIER

.1 Install weather barrier over exterior face of exterior wall substrate in accordance with manufacturer recommendations.

.2 Start weather barrier installation at a building corner, leaving 150mm to 300mm of weather barrier extended beyond corner to overlap.

.3 Install weather barrier in a horizontal manner starting at the lower portion of the wall surface. Maintain weather barrier plumb and level.

.4 Extend bottom roll edge over sill plate interface 50mm to 75mm minimum. Seal weather barrier with sealant or tape. Shingle weather barrier over back edge of thru-wall flashings and seal weather barrier with sealant or tape. Ensure weeps are not blocked.

.5 Subsequent layers shall overlap lower layers a minimum of 6 inches horizontally in a shingling manner.

.6 Window and Door Openings: Extend weather barrier completely over openings.

.7 Weather Barrier Attachment:

.1 Attach weather barrier to studs through exterior sheathing. Secure using weather barrier manufacturer recommended fasteners, spaced 305-450mm vertically on center along stud line, and 610mm on center, maximum horizontally.

.2 Apply weather barrier manufacturer approved cladding anchors to weather barrier membrane prior to the installation cladding anchors.

3.3 SEAMING

.1 Seal seams of weather barrier with seam tape at all vertical and horizontal overlapping seams.

.2 Seal any tears or cuts as recommended by weather barrier manufacturer.

3.4 OPENING PREPARATION

.1 Cut weather barrier in an "T-cut" pattern. A modified T-cut is also acceptable.

.1 Cut weather barrier horizontally along the bottom and top of the window opening.

.2 From the top center of the window opening, cut weather barrier vertically down to the sill

.3 Fold side and bottom weather barrier flaps into window opening and fasten.

.2 Cut a head flap at 45-degree angle in the weather barrier membrane at window head to expose 8 inches of sheathing. Temporarily secure weather barrier membrane flap away from sheathing with tape.

3.5 FLASHING

.1 Cut 170mm wide flashing a minimum of 300mm longer than width of sill rough opening. Apply primer as recommended by the manufacturer.

.2 Cover horizontal sill by aligning flashing edge with inside edge of sill. Adhere to rough opening across sill and up jambs a minimum of 150mm. Secure flashing tightly into corners by working in along the sill before adhering up the jambs.

.3 Fan flashing at bottom corners onto face of wall. Firmly press in place. Mechanically fasten fanned edges as required.

.4 On exterior, apply continuous bead of sealant to wall or backside of window mounting flange across jambs and head. Do not apply sealant across sill.

.5 Install window according to manufacturer's instructions.

.6 Apply 100mm wide strips of flashing at jambs overlapping entire mounting flange. Extend jamb flashing 25mm above top of rough opening and below bottom edge of sill flashing.

.7 Apply 100mm wide strip of flashing as head flashing overlapping the mounting flange. Head flashing should extend beyond outside edges of both jamb flashings.

.8 Position weather barrier head flap across head flashing. Adhere using 100mm wide flashing over the 45-degree seams.

.9 Tape head flap in accordance with manufacturer recommendations.

.10 On interior, install backer rod in joint between frame of window and flashed rough framing. Apply sealant around entire window to create air seal. Apply sealant in accordance with sealant manufacturer's instructions and ASTM C1193.

3.6 THRU-WALL FLASHING INSTALLATION

.1 Apply primer per manufacturer's written instructions.

.2 Install preformed corners and end dams bedded in sealant in appropriate locations along wall.

.3 Starting at a corner, remove release sheet and apply membrane to primed surfaces in lengths of 8 to 10 feet.

.4 Extend membrane through wall and leave 6mm minimum exposed to form drip edge.

.5 Roll flashing into place. Ensure continuous and direct contact with substrate.

.6 Lap ends and overlap preformed corners 100mm minimum. Seal all laps with sealant.

.7 Trim exterior edge of membrane 25mm and secure metal drip edge per manufacturer's written instructions.

.8 Terminate membrane on vertical wall. Terminate into reglet, counterflashing or with termination bar.

.9 Apply sealant bead at each termination.

3.7 THRU-WALL FLASHING / WEATHER BARRIER INTERFACE AT BASE OF WALL

.1 Overlap thru-wall flashing with weather barrier by 150mm.

.2 Mechanically fasten bottom of weather barrier through top of thru-wall flashing.

.3 Seal vertical and horizontal seams with tape or sealing membrane.

3.8 THRU-WALL FLASHING / WEATHER BARRIER INTERFACE AT WINDOW HEAD

.1 Cut flap in weather barrier at window head.

.2 Prime exposed sheathing.

.3 Install lintel as required. Verify end dams extend 4 inches minimum beyond opening.

.4 Install end dams bedded in sealant.

.5 Adhere 50mm minimum thru-wall flashing to wall sheathing. Overlap lintel with thru-wall flashing and extend 6mm minimum beyond outside edge of lintel to form drip edge.

.6 Apply sealant along thru-wall flashing edges.

.7 Fold weather barrier flap back into place and tape bottom edge to thru-wall flashing.

.8 Tape diagonal cuts of weather barrier.

.9 Secure weather barrier flap with fasteners.

3.9 PROTECTION

.1 Protect installed weather barrier from damage.

END OF SECTION 07 25 00

1.0 GENERAL

1.1 RELATED REQUIREMENTS

.1	Thermal Insulation	Section 07 21 00
.2	Weather Barriers	Section 07 25 00
.3	Metal Doors & Frames	Section 08 11 00
.4	Windows	Section 08 50 00

1.2 REFERENCES

.1 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-19.13M-M87, Sealing Compound, One Component, Elastomeric Chemical Curing.
- .2 CAN/CGSB-19.24M-M90, Multi-Component, Chemical Curing Sealing Compound.
- .3 CGSB 19-GP-14M-84, Sealing Compound, One Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing.

.2 Sealant and Waterproofer's Institute - Sealant and Caulking Guide Specification.

1.3 SUBMITTALS

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

.2 Product Data:
- .1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Submit WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 35 33 – Health Safety Requirements.

.3 Quality Assurance Submittals: submit following in accordance with Section 01 45 00 - Quality Control.
- .1 Existing Substrate Condition: report deviations, as described in PART 3 -EXAMINATION in writing to Departmental Representative.
- .2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- .3 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, and cleaning procedures.

1.4 QUALITY ASSURANCE

.1 Qualifications:
- .1 Applicator: company that perform work of this section must have 5 years' experience with installation of air/vapour barrier systems

.2 Mock-Up:
- .1 Construct mock-up in accordance with Section 01 45 00 - Quality Control.
- .2 Construct typical exterior wall panel, incorporating louvre and door frame, insulation, illustrating materials interface and seals.
- .3 Locate in location as agreed to with Departmental Representative.
- .4 Mock-up may remain as part of finished work.
- .5 Allow 72hours for inspection of mock-up by Departmental Representative before proceeding with air/vapour barrier Work.

.3 Schedule site visits with Departmental Representative, to review Work, at stages listed:

.1 After delivery and storage of products, and when preparatory Work is complete, but before installation begins.
.2 Minimum twice during progress of Work at 25% and 60% complete.
.3 Upon completion of Work, after cleaning is carried out, prior to cover up by other building component.

1.5 DELIVERY STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.

.2 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.3 Avoid spillage: immediately notify Departmental Representative if spillage occurs and start clean up procedures.

.4 Clean spills and leave area as it was prior to spill.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for recycling in accordance with Section 01 74 19 - Waste Management and Disposal.

.2 Place materials defined as hazardous or toxic waste in designated containers.

.3 Ensure emptied containers are sealed and stored safely for disposal away from children.

1.7 AMBIENT CONDITIONS

.1 Install solvent curing sealants and vapour release adhesive materials in open spaces with ventilation.

.2 Ventilate enclosed spaces in accordance with Section 01 51 00 - Temporary Utilities.

.3 Maintain temperature and humidity recommended by materials manufactures before, during and after installation.

1.8 SEQUENCING

.1 Sequence work in accordance with Section 01 32 16.07 - Construction Progress Schedules - Bar (GANTT) Charts.

.2 Sequence work to permit installation of materials in conjunction with related materials and seals.

1.9 WARRANTY

.1 For sealant and sheet materials the 12 months warranty period is extended to 24 months.

2.0 PRODUCTS

2.1 SELF ADHESIVE MEMBRANE

.1 Membrane composed of high temperature grade SBS modified bitumen and a Tri-laminate woven polyethylene face on the top surface. The self-adhesive bottom surface is protected by a silicone release sheet.
.1 Water Vapour transmission 202 g/m² /24 hours/ASTM E96/B (Dessicant).
.2 Dry Tensile Strength 41 lbf/182N MD, 29 lbf/129N CD, ASTM D 828.
.3 Average Dry Breaking Force 127 lbf/565N MD, 91 lbf/405N CD, ASTM D 5034.
.4 Accelerated Aging, Pass, ICC-ES AC 48, 25 cycles.
.5 Cycling and Elongation, Pass, ICC-ES AC48, 100 cycles at -29°C (20°F).

.6 Application Temperature Minimum 5°C (41°F).
.7 Flame Spread Index 0, Class A, ASTM E-84.
.8 Smoke Developed 105, Class A, ASTM E-84.
.9 Membrane thickness, Minimum 40 mil.
.10 Air Permeance, Pass, ASTM E 2178 (Maximum 0.02 L/m²s @ 75Pa or 0.004 cfm/ft² @ 1.57pcf) ASTM E 2357 – assembly, Pass.
.11 Criteria for Water Resistive Barriers, Pass, ICC-ES AV 38.
.12 Low Temp Flexibility, Pass, ICC-AC38/3.3.4.
.13 Peel-adhesion to Unprimed Plywood, PASS, ICC-ES AC48, Control 62 lbf/ft-905N/m, After 7 day water immersion 54 lbf/ft-788N/m, After accelerated aging 72 lbf/ft-1051N/m, After UV exposure 77 lbf/ft-1124N/m
.14 Water Penetration Resistance around Nails, PASS, AAMA 711-05 and ASTM D 1970 modified.

2.2 SEALANTS

.1 Sealants in accordance with Section 07 92 10 - Joint Sealing.

.2 Sealant compatible with membrane as recommended by the manufacturer:
.1 Silicone Sealant specifically for use with self-adhered membrane.

.3 Primer: recommended by sealant manufacturer as appropriate to application.

.4 Substrate Cleaner: non-corrosive type recommended by sealant manufacturer and compatible with adjacent materials.

2.3 PRIMER

.1 Apply primer to plywood according to manufacturer’s specification. Ensure proper adhesion and compatibility to the membrane.

2.4 ACCESSORIES

.1 Provide mechanically fastened stainless steel termination bar with gumlip edge.

3.0 EXECUTION

3.1 MANUFACTURER’S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 GENERAL

.1 Perform Work in accordance with Sealant and Waterproofer's Institute - Sealant and Caulking Guide Specification requirements for materials.

3.3 EXAMINATION

.1 Verify that surfaces and conditions are ready to accept work of this section.

.2 Ensure surfaces are clean, dry, sound, smooth, continuous and comply with air barrier manufacturer's requirements.

.3 Report unsatisfactory conditions to Departmental Representative in writing.

.4 Do not start work until deficiencies have been corrected.
.1 Beginning of Work implies acceptance of conditions.

3.4 PREPARATION

.1 All surfaces to receive the membrane must be thoroughly cleaned so as to have removed all concrete spatter, job dirt, laitance, from release agents, curing compounds, or any other substance which could inhibit the adhesion, and long term performance of the membrane.

.2 All honeycombing in concrete shall be grouted flush prior to application of primer.

.3 Apply primer as per manufacturer's recommendation to all surfaces to receive the membrane. Use a 2 coat application on gypsum board or plywood substrate.

.4 Prepare in accordance with manufacturer's instructions.

.5 Apply a horizontal membrane strip over vertical leg and fasteners of all horizontal cladding supports. Seal top with mastic regular.

.6 Fill all joints or gaps wider than ¼" with galvanized steel sheet steel or wood backing and apply 12" strip of membrane over joints prior to application of the field membrane. Seal all side laps without factory bitumen self-adhering edge and all top laps with mastic.

3.5 APPLICATIONS

.1 Apply in accordance with manufacturer's instructions.

.2 All joints within and between back up walls and window frames shall be sealed according to detail drawings.

.3 Ensure continuity of air barrier. Co-ordinate construction of roof/wall junction to maintain continuity of air barrier from wall to roof. Co-ordinate with construction of exterior walls to maintain continuity of air barrier between various exterior wall construction types.

.4 Shingle laps to drain. Minimum side and end laps as per manufacturer's recommendation with a minimum of 75mm.

.5 Membrane should be adhered onto window frame section as per detail drawings.

.6 Lap and seal air barrier membrane over through-wall flashing at base of wall and at all horizontal wall flashings.

.7 Lap roof membrane flashing over air/vapour barrier membrane at parapets and seal.

.8 Seal all through-wall equipment flanges with air barrier membrane flashing strips; apply mastic to edges.

.9 Seal all metal fabrication flanges with air/vapour barrier membrane flashing strips; apply mastic to edges.

.10 Seal all horizontal drip flashings to air/vapour barrier membrane with minimum 150 mm strips of membrane flashing applied horizontally; apply mastic to edges of flashing membrane.

3.6 CLEANING

.1 Proceed in accordance with Section 01 74 11 - Cleaning.

.2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

3.7 PROTECTION OF WORK

.1 Protect finished work in accordance with Section 01 61 00 - Common Product Requirements.

.2 Do not permit adjacent work to damage work of this section.

.3 Ensure finished work is protected from climatic conditions.

END OF SECTION 07 27 00.01

1.0 GENERAL

1.1 RELATED REQUIREMENTS

.1	Rough Carpentry	Section 06 10 11
.2	Thermal Insulation	Section 07 21 00
.3	Weather Barriers	Section 07 25 00
.4	Air Barriers – Descriptive or Proprietary	Seation 07 27 00.01
.5	Sheet Metal Flashing and Trim	Section 07 62 00
.6	Joint Sealants	Section 07 92 00
.7	Metal Doors and Frames	Section 08 11 00
.8	Windows	Section 08 50 00

1.2 REFERENCES

.1 American Society of Civil Engineers (ASCE) 7 - Minimum Design Loads for Buildings and Other Structures.

.2 ASTM International (ASTM):

- .1 B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
- .2 C1186 - Standard Specification for Flat, Non-Asbestos, Fiber-Cement Sheets.
- .3 E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- .4 E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
- .5 E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 degrees C..
- .6 E330 - Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.

1.3 SUBMITTALS

.1 Shop Drawings:

- .1 Submit shop drawings in accordance with Section 01 33 00 – Submittal Procedures. Indicate dimensions, proposed siding profiles, reinforcement , anchorage, fastenings and method of installation, schedule of wall elevations, trim and closure pieces, fascia and related work.
- .2 Construction details should accurately reflect actual job conditions.

.2 Samples:

- .1 Submit samples in accordance with Section 01 33 00.
  - .1 Samples: 305mm x 305mm panel sample, 75mm long trim sample.
- .2 Submit copies of specifications, installation data and other pertinent manufacturer's literature

1.4 DELIVERY, STORAGE AND HANDLING

.1 Coordinate delivery of materials with scheduled installation date to allow minimum storage time at job-site.

.2 Stack claddings on edge or lay flat on a smooth, level surface. Protect edges and corners from chipping.

.3 Store materials under cover and protect from weather and damage in compliance with manufacturer's requirements.

.4 Comply with recommended procedures, precautions or remedies described in material safety data sheets as applicable.

.5 Do not use damaged materials.

1.5 PROJECT CONDITIONS

.1 At exterior locations, install weather-resistive barriers and claddings to dry surfaces.

.2 Verify existing conditions and substrates before starting work. Repair any punctures or tears in the weather-resistive barrier or any other unsatisfactory conditions before installation of the siding.

.3 Protect sidings from other trades.

1.6 QUALITY ASSURANCE

.1 Single Source Responsibility: Panels, metal trim, and fasteners furnished by single manufacturer.

.2 Installer Qualifictions: Minimum 5 yers documented experience in work of this Section.

.3 Mockup:

.1 Size: Minimum (1200 x 2400mm)
.2 Show: Moisture barrier, insulation furring, panels, trim, flashings, and joint sealers. Include one horizontal flashing and one external corner.
.3 Locate where directed.
.4 Approved mockup may remain as part of the Work.

1.7 WARRANTIES

.1 Provide manufacturer's non-pro-rated 30 year warranty providing coverage against hail and termite damage and any defects in materials and workmanship.

2.0 PRODUCTS

2.1 MATERIALS

.1 Fiber Cement Siding:

.1 Basis of Design: Artisan Collection by James Hardie
.2 Fiber Cement Siding.
.3 Meet ASTM C1186, Type A, Grade II.
.4 Formulated from Portland cement, ground sand, cellulose fibers, additives, and water; formed under pressure to required profile.
.5 Type: Artisan lap and matching artisan trim, factory painted.
.6 Thickness: 5/16 inch (7.5 mm).
.7 Surface texture: Smooth.
.8 Fire hazard classification: Maximum flame spread/smoke developed rating of 0/5, tested to ASTM E84.
.9 Combustibility; Noncombustible, tested to ASTM E136.
.10 Finish: ColorPlus factory-applied, baked on finish,
.1 Color 1: Night Gray
.2 Color 2: Deep Ocean
.11 Departemental Representative will consider products which meet or exceed the properties of specified product that is used as the basis of design, and are similar in material, construction, thickness, color, texture, and overall quality, provided that proposed products are submitted to Departmental Representative completed with

samples and data sheets that Departmental Representative may require to evaluate the proposed product.

.2 Trim:
- .1 Same material as panel system
- .2 Texture: Rustic Grain
- .3 Color: White
- .4 Dimensions: 20mm thick x 64mm (3/4” thick x 2.5”)

2.2 ACCESSORIES

.1 Fasteners: Stainless steel, Tor pan head type as recommended by panel manufacturer, of equal or greater holding power than required by manufacturer’s Code compliance reports.

.2 Sheet Metal Flashing and Trim: Specified in Section 07 62 00.

.3 Edge Sealer: Type recommended by panel manufacturer.

3.0 EXECUTION

3.1 INSTALLATION

.1 Install panel system in accordance with manufacturer's instructions and approved Shop Drawings.

.2 Install trim:
- .1 Inside corners: Install Inside Corner Trim.
- .2 Outside corners: Install Outside Corner Trim.
- .3 Over openings in walls and at bottom of walls: Install Drip Cap Trim.

.3 Fasten trim at maximum 305mm on center or as shown on drawings.

.4 Lap siding by minimum of 32mm as recommended by manufacturers.

.5 Allow minimum vertical clearance between edge of panel system and adjacent materials in accordance with manufacturer's instructions.

.6 Cut panels to fit around penetrations with maximum 6mm gaps. Smooth and seal cut edges.

.7 Fasten panel system at maximum spacing as per Engineer’s design. Fasteners to be covered by vertical trim.

.8 Apply joint sealer between panel system and adjacent surfaces as specified in Section 07 92 00 except at horizontal drainage flashings.

END OF SECTION 07 46 46

1.0 GENERAL

1.1 RELATED REQUIREMENTS

.1	Weather Barriers	Section 07 25 00
.2	Air Barriers Descriptive or Proprietary	Section 07 27 00.01
.3	Fiber Cement Siding System	Section 07 46 46
.4	Windows	Section 08 50 00

1.2 REFERENCES

.1 The Aluminum Association Inc. (AAI)
- .1 AAI-Aluminum Sheet Metal Work in Building Construction-2002.
- .2 AAI DAF45-03, Designation System for Aluminum Finishes.

.2 American Society for Testing and Materials International (ASTM)
- .1 ASTM A 653/A 653M-11, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .2 ASTM A 792/A 792M-10, Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.

.3 Roofing Contractors Association of B.C. (RCABC)
- .1 RGC Roofing Practice Manual.

.4 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-51.32-M77, Sheathing, Membrane, Breather Type.

.5 Canadian Standards Association (CSA International)
- .1 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.

.7 Green Seal Environmental Standards
- .1 Standard GS-03-93, Anti-Corrosive Paints.
- .2 Standard GS-11-97, Architectural Paints.
- .3 Standard GS-36-00, Commercial Adhesives.

.8 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
- .1 Material Safety Data Sheets (MSDS).

.9 British Columbia Sheet Metal Association (SMACNA-BC)
- .1 Architectural Sheet Metal Manual- 6th Edition 2003.

1.3 SUBMITTALS

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

.2 Product Data:
- .1 Submit manufacturer's printed product literature for sheet metal flashing systems materials, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Submit two copies WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 35 33- - Health and Safety Requirements.

.3 Samples:
.1 Submit duplicate 50 x 50 mm samples of each type of sheet metal material, finishes and colours.

.4 Quality assurance submittals: submit following in accordance with Section 01 45 00 - Quality Control.
.1 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence and cleaning procedures.

1.4 QUALITY ASSURANCE
.1 Pre-Installation Meetings: convene pre-installation meeting one week prior to beginning work of this Section and with Departmental Representative in accordance with Section 01 32 16.07 - Construction Progress Schedule - Bar (GANTT) Chart to:
.1 Verify project requirements.
.2 Review installation and substrate conditions.
.3 Co-ordination with other building sub trades.
.4 Review manufacturer's installation instructions and warranty requirements.

1.5 DELIVERY, STORAGE AND HANDLING
.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.

.2 Waste Management and Disposal:
.1 Separate waste materials for and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.

2.0 PRODUCTS

2.1 PRE-FINISHED SHEET METAL
.1 Zinc coated steel sheet: 24ga thickness thickness, commercial quality to ASTM A 792, with Z275 designation zinc coating, silicone-modified polyester (SMP) factory applied paint system to CGSB 93-GP-3m Class F29.

.2 Color: Colors to be selected from full range of manufacturer’s standard color. Allow different color for windows, doors, through wall flashings, roof flashings and foundation wall base flashings.

2.2 PREFINISHED ALUMINUM SHEET
.1 Prefinished aluminum sheet: 0.81mm (20 gauge).

2.3 ACCESSORIES
.1 Isolation coating: alkali resistant bituminous paint.

.2 Plastic cement: to CAN/CGSB 37.5.
.1 Maximum VOC limit 50 g/L to SCAQMD Rule 1168.

.3 Underlay for metal flashing: asphalt laminated 3.6 to 4.5 kg kraft paper.

.4 Sealants.
.1 Maximum VOC limit 50 g/L to SCAQMD Rule 1168.

.5 Cleats: of same material, and temper as sheet metal, minimum 50 mm wide. Thickness same as sheet metal being secured.

.6 Fasteners: stainless steel, flat head roofing nails of length and thickness suitable for metal flashing application.

.7 Washers: of same material as sheet metal, 1 mm thick with rubber packings.

.8 Touch-up paint: as recommended by prefinished material manufacturer.
.1 Maximum VOC limit 50 g/L to SCAQMD Rule 1113.

2.4 FABRICATION

.1 Fabricate metal flashings and other sheet metal work in accordance with applicable RCABC and SMACNA Standards. Guarantee standard as specified in 1.4 Quality Assurance.

.2 Form pieces in 2400 mm maximum lengths.
.1 Make allowance for expansion at joints.

.3 Hem exposed edges on underside 12 mm.
.1 Mitre and seal corners with sealant.

.4 Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.

.5 Apply isolation coating to metal surfaces to be embedded in concrete or mortar.

2.5 METAL FLASHINGS

.1 Form flashings, copings and fascia to profiles indicated of galvanized steel as indicated on drawings.

.2 Caulk perimeter flashings with specified sealant where necessary to make a proper seal.

.3 'S' Lock and caulk end joints in flashing. Provide standing seams with concealed clips at corners. Hem exposed edges of flashing a minimum of 12.5 mm for rigidity.

.4 Provide flashings with edges turned to form a drip. Make proper allowance for expansion and contraction. Face clip flashings with concealed clips (600 mm) on centre.

.5 Provide flashings at vents, chimneys and control joints.

.6 Carry face metal down exterior face a minimum of 100 mm or as indicated on drawings.

.7 Provide metal base and cap flashings to extend to within 25 mm of roof surface.

.8 At vent stacks, install aluminum vent stacks and include for aluminum metal caps.

3.0 EXECUTION

3.1 MANUFACTURER’S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 INSTALLATION

.1 Install sheet metal work in accordance with R.C.A.B.C standards. Guarantee standard as per 1.4 Quality Assurance.

.2 Use concealed fastenings except where approved before installation.

.3 Provide underlay under sheet metal.
.1 Secure in place and lap joints 100 mm.

.4 Counterflash bituminous flashings at intersections of roof with vertical surfaces and curbs.
.1 Flash joints using S-lock forming tight fit over hook strips.

.5 Lock end joints and caulk with sealant.

.6 Install pans, where shown around items projecting through roof membrane.

3.3 CLEANING

.1 Proceed in accordance with Section 01 74 11 - Cleaning.

.2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

.3 Leave work areas clean, free from grease, finger marks and stains.

END OF SECTION 07 62 00

1 .0 GENERAL

1.1 RELATED REQUIREMENTS

.1	Finish Carpentry	Section 06 20 00
.2	Fiber Cement Siding System	Section 07 46 46
.3	Metal Doors and Frames	Section 08 11 00
.4	Windows	Section 08 50 00

1.2 REFERENCES

.1 American Society for Testing and Materials International, (ASTM)
- .1 ASTM C 919- 12, Standard Practice for Use of Sealants in Acoustical Applications.

.2 ASTM C920-11 Standard Specification for Elastomeric Joint Sealants

.3 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
- .1 Material Safety Data Sheets (MSDS).

1.3 SUBMITTALS

.1 Submit product data in accordance with Section 01 33 00 - Submittal Procedures.

.2 Manufacturer's product to describe.
- .1 Caulking compound.
- .2 Primers.
- .3 Sealing compound, each type, including compatibility when different sealants are in contact with each other.

.3 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.

.4 Submit duplicate samples of each type of material and colour.

.5 Cured samples of exposed sealants for each color where required to match adjacent material.

.6 Submit manufacturer's instructions in accordance with Section 01 33 00 - Submittal Procedures.
- .1 Instructions to include installation instructions for each product used.

1.4 QUALITY ASSURANCE / MOCK-UPS

.1 Construct mock-up in accordance with Section 01 45 00 - Quality Control.

.2 Construct mock-up to show location, size, shape and depth of joints complete with back-up material, primer, caulking and sealant.

.3 Mock-up will be used:
- .1 To judge workmanship, substrate preparation, operation of equipment and material application.

.4 Location to be decided with Departmental Representative.

.5 Allow 24 hours for inspection of mock-up by Departmental Representative before proceeding with sealant work.

.6 When accepted, mock-up will demonstrate minimum standard of quality required for this Work. Approved mock-up may remain as part of finished Work.

1.5 DELIVERY, STORAGE & HANDLING

.1 Deliver, handle, store and protect materials in accordance with Section 01 61 00 - Common Product Requirements.

.2 Deliver and store materials in original wrappings and containers with manufacturer's seals and labels, intact. Protect from freezing, moisture, water and contact with ground or floor.

.3 Upon completion of Work, after cleaning is carried out.

1.6 ENVIRONMENTAL REQUIREMENTS

.1 Environmental Limitations:

.1 Do not proceed with installation of joint sealants under following conditions:

.1 When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 4.4 degrees C.

.2 When joint substrates are wet.

.2 Joint-Width Conditions:

.1 Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.

.3 Joint-Substrate Conditions:

.1 Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

.4 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and provision of Material Safety Data Sheets (MSDS) acceptable to Labour Canada.

.5 Conform to manufacturer's recommended temperatures, relative humidity, and substrate moisture content for application and curing of sealants including special conditions governing use.

.6 Ventilate area of work as directed by Departmental Representative by use of approved portable supply and exhaust fans.

2.0 PRODUCTS

2.1 SEALANT MATERIALS

.1 Do not use caulking that emits strong odours, contains toxic chemicals or is not certified as mould resistant in air handling units.

.2 When low toxicity caulks are not possible, confine usage to areas which offgas to exterior, are contained behind air barriers, or are applied several months before occupancy to maximize offgas time.

.3 Where sealants are qualified with primers use only these primers.

.4 Standard: For interior and exterior work unless otherwise specified, ensure compatibility of sealants being used and other materials in contact with them, meet VOC level of 250 g/L for architectural sealant.

2.2 SEALANT TYPE

.1 S-1:
- .1 ASTM C920, polyurethane or polysulfide.
- .2 Type M.
- .3 Class 25.
- .4 Grade NS.
- .5 Shore A hardness of 20-40.

.2 S-2:
- .1 ASTM C920, polyurethane or polysulfide.
- .2 Type M.
- .3 Class 25.
- .4 Grade P.
- .5 Shore A hardness of 25-40.

.3 S-3:
- .1 ASTM C920, polyurethane or polysulfide.
- .2 Type S.
- .3 Class 25, joint movement range of plus or minus 50 percent.
- .4 Grade NS.
- .5 Shore A hardness of 15-25.
- .6 Minimum elongation of 700 percent.

.4 S-4:
- .1 ASTM C920, polyurethane or polysulfide.
- .2 Type M.
- .3 Class 25,
- .4 Grade NS.
- .5 Shore A hardness of 25-40.

.5 S-5:
- .1 ASTM C920, polyurethane or polysulfide.
- .2 Type M.
- .3 Class 25.
- .4 Grade P.
- .5 Shore A hardness of 25-40.

.6 S-6:
- .1 ASTM C920, silicone, neutral cure.
- .2 Type S.
- .3 Class: Joint movement range of plus 100 percent to minus 50 percent.
- .4 Grade NS.
- .5 Shore A hardness of 15-20.
- .6 Minimum elongation of 1200 percent.

.7 S-7:
- .1 ASTM C920, silicone, neutral cure.
- .2 Type S.
- .3 Class 25.
- .4 Grade NS.
- .5 Shore A hardness of 25-30.
- .6 Structural glazing application.

.8 S-8:
- .1 ASTM C920, silicone, acetoxy cure.
- .2 Type S.
- .3 Class 25.
- .4 Grade NS.
- .5 Shore A hardness of 25-30.
- .6 Structural glazing application.

.9 S-9:
- .1 ASTM C920, silicone.
- .2 Type S.
- .3 Class 25.
- .4 Grade NS.
- .5 Shore A hardness of 25-30.
- .6 Non-yellowing, mildew resistant.

.10 S-10:
- .1 ASTM C920, coal tar extended fuel resistance polyurethane.
- .2 Type M/S.
- .3 Class 25.
- .4 Grade P/NS.
- .5 Shore A hardness of 15-20.

.11 S-11:
- .1 ASTM C920, polyurethane.
- .2 Type M/S.
- .3 Class 25.
- .4 Grade P/NS.
- .5 Shore A hardness of 35-50.
- .6 Structural glazing application.

.12 S-12:
- .1 ASTM C920, polyurethane.
- .2 Type M/S.
- .3 Class 25, joint movement range of plus or minus 50 percent.
- .4 Grade P/NS.
- .5 Shore A hardness of 25-50.

2.3 CAULKING COMPOUND

.1 C-1: ASTM C834, acrylic latex.

.2 C-2: One component acoustical caulking, non-drying, non-hardening, synthetic rubber.

2.4 JOINT CLEANER

.1 Non-corrosive and non-staining type, compatible with joint forming materials and sealant recommended by sealant manufacturer.

.2 Primer: as recommended by manufacturer.

3.0 EXECUTION

3.1 PROTECTION

.1 Protect installed Work of other trades from staining or contamination.

3.2 SURFACE PREPARATION

.1 Examine joint sizes and conditions to establish correct depth to width relationship for installation of backup materials and sealants.

.2 Clean bonding joint surfaces of harmful matter substances including dust, rust, oil grease, and other matter which may impair Work.

.3 Do not apply sealants to joint surfaces treated with sealer, curing compound, water repellent, or other coatings unless tests have been performed to ensure compatibility of materials. Remove coatings as required.

.4 Ensure joint surfaces are dry and frost free.

.5 Prepare surfaces in accordance with manufacturer's directions.

3.3 PRIMING

.1 Where necessary to prevent staining, mask adjacent surfaces prior to priming and caulking.

.2 Prime sides of joints in accordance with sealant manufacturer's instructions immediately prior to caulking.

3.4 BACKUP MATERIAL

.1 Apply bond breaker tape where required to manufacturer's instructions.

.2 Install joint filler to achieve correct joint depth and shape, with approximately 30% compression.

3.5 MIXING

.1 Mix materials in strict accordance with sealant manufacturer's instructions.

3.6 APPLICATION

.1 Sealant

- .1 Apply sealant in accordance with manufacturer's written instructions and ASTM C919.
- .2 Mask edges of joint where irregular surface or sensitive joint border exists to provide neat joint.
- .3 Apply sealant in continuous beads.
- .4 Apply sealant using gun with proper size nozzle.
- .5 Use sufficient pressure to fill voids and joints solid.
- .6 Form surface of sealant with full bead, smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities.
- .7 Tool exposed surfaces before skinning begins to give slightly concave shape.
- .8 Remove excess compound promptly as work progresses and upon completion.

.2 Curing

- .1 Cure sealants in accordance with sealant manufacturer's instructions.
- .2 Do not cover up sealants until proper curing has taken place.

.3 Cleanup

- .1 Clean adjacent surfaces immediately and leave Work neat and clean.

.2 Remove excess and droppings, using recommended cleaners as work progresses.
.3 Remove masking tape after initial set of sealant.

3.7 CLEANING

.1 Clean adjacent surfaces immediately and leave work clean and neat. Remove excess sealant and droppings using recommended cleaners as work progresses. Remove masking after tooling of joints.

END OF SECTION 07 92 00

1.0 GENERAL

1.1 RELATED REQUIREMENTS

.1	Rough Carpentry	Section 06 10 11
.2	Finish Carpentry	Section 06 20 00
.3	Fiber Cement Siding System	Section 07 46 46
.4	Finish Hardware	Section 08 71 00
.5	Exterior Painting	Section 09 91 13

1.2 REFERENCES

.1 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating.
- .2 CGSB 41-GP-19Ma-84, Rigid Vinyl Extrusions for Windows and Doors.

.2 Canadian Standards Association (CSA International)
- .1 CSA-G40.20-04/G40.21-04, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
- .2 CSA W59-03, Welded Steel Construction (Metal Arc Welding).

.3 Canadian Steel Door Manufacturers' Association (CSDMA)
- .1 CSDMA, Recommended Specifications for Commercial Steel Doors and Frames, 2000.
- .2 CSDMA, Selection and Usage Guide for Commercial Steel Doors, 1990.

.4 National Fire Protection Association (NFPA)
- .1 NFPA 80-2007, Standard for Fire Doors and Fire Windows.
- .2 NFPA 252-2012, Standard Methods of Fire Tests of Door Assemblies.

.5 South Coast Air Quality Management District (SCAQMD), California State
- .1 SCAQMD Rule 1113-04, Architectural Coatings.
- .2 SCAQMD Rule 1168-05, Adhesives and Sealants Applications.

.6 Underwriters' Laboratories of Canada (ULC)
- .1 CAN/ULC-S701-05, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.
- .2 CAN/ULC-S702-09, Standard for Thermal Insulation, Mineral Fibre, for Buildings.
- .3 CAN/ULC-S704-03, Standard for Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced.
- .4 CAN4-S104-M80, Standard Method for Fire Tests of Door Assemblies.
- .5 CAN4-S105-M85, Standard Specification for Fire Door Frames Meeting the Performance Required by CAN4-S104.

1.3 SYSTEM DESCRIPTION

.1 Design Requirements:
- .1 Provide fire labeled frames for openings requiring fire protection ratings. Test products in conformance with CAN4-S104, and listed by nationally recognized agency having factory inspection services and to ULC fire protection rating.

1.4 SUBMITTALS

.1 Provide shop drawings: in accordance with Section 01 33 00 - Submittal Procedures.

.1 Indicate each type of door, material, steel core thicknesses, mortises, reinforcements, location of exposed fasteners, openings, glazed, arrangement of hardware and fire rating and finishes.
.2 Indicate each type frame material, core thickness, reinforcements, glazing stops, location of anchors and exposed fastenings and finishes.
.3 Include schedule identifying each unit, with door marks and numbers relating to numbering on drawings and door schedule.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.

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

2.0 PRODUCTS

2.1 MATERIALS

.1 All exterior doors to be hot dipped galvanized with Z275 designation zinc coatings, and door frames to be wood frame. Interior doors and door frames to be zinc wiped galvanized; having zinc coating finish designation ZF075 to ASTM 525. Exterior and interior door face to be 18 gauge, factory painted.

.2 Reinforcement to CSA G40.20/G40.21, Type 44W, coating designation to ASTM A 653M, ZF75.

2.2 DOOR CORE MATERIALS

.1 Honeycomb construction:
.1 Structural small cell, 24.5 mm maximum kraft paper 'honeycomb', weight: 36.3 kg per ream minimum, density: 16.5 kg/m³ minimum sanded to required thickness.

.2 Stiffened: doors to be reinforced with 0.8mm (20 gauge) hat shaped steel stiffeners welded to inside of face sheets. Stiffeners to be located a maximum 152mm (6”) on center and welded to face sheet on 100mm(4”) centers. Areas between stiffeners to be filled with polyurethane insulation.

.3 All exterior doors are to be insulated with polyurethane core.

2.3 ADHESIVES

.1 Honeycomb cores and steel components: heat resistant, spray grade, resin reinforced neoprene/rubber (polychloroprene) based, low viscosity, contact cement.
.1 Adhesive: maximum VOC content 50 g/L to SCAQMD Rule 1168.

.2 Lock-seam doors: fire resistant, resin reinforced polychloroprene, high viscosity, and sealant/adhesive.

2.4 ACCESSORIES

.1 Door silencers: single stud rubber/neoprene type.

.2 Weather stripping / gasket on all 3 sides of door.

.3 Fabricate glazing stops as formed channel, minimum 16 mm height, accurately fitted, butted at corners and fastened to frame sections with counter-sunk oval head sheet metal screws.

.4 Metallic paste filler: to manufacturer's standard.

.5 Fire labels: metal riveted.

.6 Sealant:
.1 Maximum VOC limit 250 g/L to SCAQMD Rule 1168.

.7 Glazing: Refer to Section 08 80 50.

.8 Make provisions for glazing as indicated and provide necessary glazing stops.
.1 Provide removable steel glazing beads for use with glazing tapes and compounds and secured with countersunk stainless steel screws.
.2 All exterior and interior glazing stops to be tamperproof.

2.5 DOOR FABRICATION GENERAL

.1 Doors: swing type, flush, with provision for glass and/or louvre openings as indicated.

.2 Fabricate doors with longitudinal edges welded. Seams: grind welded joints to a flat plane, fill with metallic paste filler and sand to a uniform smooth finish.

.3 Blank, reinforce, drill doors and tap for mortised, templated hardware and electronic hardware.

.4 Factory prepare holes 12.7 mm diameter and larger except mounting and through-bolt holes, on site, at time of hardware installation.

.5 Reinforce doors where required, for surface mounted hardware. Provide flush steel top caps to exterior doors. Provide inverted, recessed, spot welded channels to top and bottom of interior doors.

.6 Provide factory-applied touch-up primer at areas where zinc coating has been removed during fabrication.

.7 Manufacturer's nameplates on doors are not permitted.

2.6 DOORS: HONEYCOMB CORE CONSTRUCTION

.1 Form face sheets for exterior and interior doors from 1.2 mm sheet steel with honeycomb or laminated under pressure to face sheets.

2.7 HOLLOW STEEL CONSTRUCTION

.1 Form face sheets for interior doors from 1.2mm sheet steel.

.2 Reinforce doors with vertical stiffeners, securely welded to face sheets at 150 mm on centre maximum.

.3 Fill voids between stiffeners of interior doors with honeycomb core.

.4 Exterior doors: insulated core filled with rigid foam modified polyisocyanurate.

3.0 EXECUTION

3.1 MANUFACTURER’S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 INSTALLATION GENERAL

.1 Install labelled steel fire rated doors and frames to NFPA 80 except where specified otherwise.

.2 Install doors and frames to CSDMA Installation Guide.

3.3 FRAME INSTALLATION

.1 Set frames plumb, square, level and at correct elevation.

.2 Secure anchorages and connections to adjacent construction.

.3 Brace frames rigidly in position while building-in. Install temporary horizontal wood spreader at third points of door opening to maintain frame width. Provide vertical support at centre of head for openings over 1200 mm wide. Remove temporary spreaders after frames are built-in.

.4 Make allowances for deflection of structure to ensure structural loads are not transmitted to frames.

.5 Caulk perimeter of frames between frame and adjacent material.

.6 Maintain continuity of air barrier and vapour retarder.

3.4 DOOR INSTALLATION

.1 Install doors and hardware in accordance with hardware templates and manufacturer's instructions and Section 08 71 00 - Finish Hardware.

.2 Provide even margins between doors and jambs and doors and finished floor and thresholds as follows.

- .1 Hinge side: 1.0 mm.
- .2 Latchside and head: 1.5 mm.
- .3 Finished floor: 13 mm.

.3 Adjust operable parts for correct function.

.4 Install window.

3.5 FINISH REPAIRS

.1 Touch up with primer finishes damaged during installation.

.2 Fill exposed frame anchors and surfaces with imperfections with metallic paste filler and sand to a uniform smooth finish.

3.6 GLAZING

.1 Install glazing for doors and frames in accordance with Section 08 80 50 - Glazing.

END OF SECTION 08 11 00

1.0 GENERAL

1.1 RELATED REQUIREMENTS

.1	Rough Carpentry	Section 06 10 11
.2	Air Barriers – Descriptive or Proprietary	Section 07 27 00.1
.3	Fiber Cement Siding System	Section 07 46 46
.4	Sheet Metal Flashing and Trim	Section 07 62 00
.5	Sealants and Caulking	Section 07 92 00
.6	Glass and Glazing	Section 08 80 00

1.2 REFERENCE STANDARDS

.1 ASTM International (ASTM)
- .1 ASTM A 123/A 123M-15, Standard Specification for Zinc (Hot-Dip galvanized) Coatings on Iron and Steel Products.
- .2 ASTM E 1748-95(2009), Standard Test Method for Evaluating the Engagement Between Windows and Insect Screens as an Integral System.

.2 Canada Green Building Council (CaGBC)
- .1 LEEDv4 Canada-BD+C 2013, LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Package New Construction and Major Renovation.

.3 CSA Group (CSA)
- .1 CAN/CSA A440.0 4-2019 NAFS - North American Fenestration Standard for Windows, Doors, and Skylights.
- .2 CSA A440S1-09, Canadian Supplement to AAMA/WDMA/CSA 101/1.S.2/A440, NAFS - North American Fenestration Standard for Windows, Doors, and Skylights.
- .3 CAN/CSA-A440.2-14/A440.3-14, Fenestration energy performance/User guide to CSA A440.2, Fenestration energy performance.
- .4 CAN/CSA-A440.4-07(R2016), Window, Door, and Skylight Installation.
- .5 CAN/CSA-Z809-08, Sustainable Forest Management.

.4 Forest Stewardship Council (FSC)
- .1 FSC-STD-01-001 V5-2-2015, FSC Principle and Criteria for Forest Stewardship.

.5 Green Seal (GS)
- .1 GS-11-11, Paints and Coatings.

.6 Master Painters Institute (MPI)
- .1 Architectural Painting Specification Manual - current edition.
  - .1 MPI #79, Primer, Alkyd, Anti-Corrosive for Metal.

.7 South Coast Air Quality Management District (SCAQMD)
- .1 SCAQMD Rule 1113-A2016, Architectural Coatings.
- .2 SCAQMD Rule 1168-A2005, Adhesives and Sealants.

.8 Sustainable Forestry Initiative (SFI)
- .1 SFI-2010-2014 Standard.

.9 Screen Manufacturers Association (SMA)
.1 SMA 1201R-2012 Specification for Insect Screens for Windows, Sliding Doors and Swinging Doors.

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Pre-Installation Meetings:
.1 Convene pre-installation meeting 1 week prior to beginning on-site installation, with Contractor and Departmental Representative in accordance with Section 01 31 19 - Project Meetings to:
.1 Verify project requirements.
.2 Review installation and substrate conditions.
.3 Co-ordination with other construction subtrades.
.4 Review manufacturer's written installation instructions and warranty requirements.

.2 Sequencing and scheduling: sequence and schedule with other work in accordance with Section 01 14 00 Work Restrictions. Comply with manufacturer's written recommendations for sequencing construction operations.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for windows and include product characteristics, performance criteria, physical size, finish and limitations.
.2 Submit 1 copy of WHMIS SDS in accordance with Section 01 35 33 - Health and Safety Requirements.

.3 Shop Drawings:
.1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of BC, Canada.
.2 Indicate materials and details in full size scale for head, jamb and sill, profiles of components, interior and exterior trim junction between combination units elevations of unit, anchorage details, location of isolation coating, description of related components and exposed finishes fasteners, and caulking. Indicate location of manufacturer's nameplates.
.3 Indicate locations, dimensions, openings and requirements of related work.

.4 Samples:
.1 Submit for review and acceptance of each unit.
.2 Samples returned for inclusion into work.
.3 Submit one representative section of each type window.
.4 Include frame, sash, sill, glazing and weatherproofing method, insect screens, surface finish and hardware. Show location of manufacturer's nameplates.
.5 Include 300mm long samples of head, jamb, sill, mullions to indicate profile.

.5 Test and Evaluation Reports:
.1 Submit test reports from approved independent testing laboratories, certifying compliance with specifications.
.2 All test reports that reference the NAFS must include, on the first page, a summary of the results including, at minimum:
.1 The product manufacturer.
.2 The type of product.

.3 The model number/series number.
.4 The primary product designation.
.5 The secondary product designation.
.6 The test completion date.

.3 The report will also contain the following information:
.1 Test dates.
.2 Report preparation dates.
.3 Test information retention period.
.4 Location of testing facilities.
.5 Full description of test samples, including:
.6 Complete description of amendments, as applicable.
.7 Conclusion.
.8 Drawings signed by the testing laboratory, if provided.

.6 Sustainable Design Submittals:
.1 Construction Waste Management:
.1 Submit project Waste Management Plan highlighting recycling and salvage requirements.
.2 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating 75% of construction wastes recycled or salvaged.

.2 Regional Materials: submit evidence project incorporates required percentage 20% of regional materials and products, showing their cost, distance from project to furthest site of extraction or manufacture, and total cost of materials for project.

.3 Wood Certification: submit manufacturer's Chain-of-Custody Certificate number for CAN/CSA-Z809 or FSC or SFI certified wood.

.4 Low-Emitting Materials:
.1 Submit listing of sealants, primers and coatings used in building, comply with VOC and chemical component limits or restriction requirements.
.2 Submit listing of composite wood products used in building, stating they contain no added urea-formaldehyde resins, and laminate adhesives used in building, stating they contain no urea-formaldehyde.

1.5 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for [windows] for incorporation into manual.

.3 Warranty Documentation: submit warranty documents specified.

1.6 QUALITY ASSURANCE

.1 Test and Evaluation Reports:
.1 Submit test reports from approved independent testing laboratories, certifying compliance with specifications.
.2 Test reports that reference the NAFS include, on the first page, a summary of the results including, at minimum:
.1 Product manufacturer.
.2 Type of product.
.3 Model number/series number.
.4 Primary product designation.
.5 Secondary product designation.
.6 Test completion date.

.3 Report to contain the following information:
.1 Test dates.
.2 Report preparation dates.
.3 Test information retention period.
.4 Location of testing facilities.
.5 Full description of test samples, including:
.6 Complete description of amendments, as applicable.
.7 Conclusion.
.8 Drawings signed by the testing laboratory, if provided.

.2 Certifications: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.3 Mock-Up:
.1 Provide site mock-up for work of this Section indicating methods and materials, and procedures proposed to achieve final results in accordance with Section 01 45 00 - Quality Control, and to comply with following requirements, using materials indicated for completed work:
.1 Build mock-ups in location of one complete unit as directed by Departmental Representative.
.2 Obtain Departmental Representative’s acceptance of mock-ups before starting construction; mock-up used throughout construction period as standard of acceptance for subsequent work.
.3 Mock-up may form part of permanent structure when accepted by; repair or replace unacceptable mock-ups at no additional cost to the contract.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
.1 Store materials off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect windows from nicks, scratches, and blemishes.
.3 Replace defective or damaged materials with new.

.4 Develop Construction Waste Management Plan related to Work of this Section and in accordance with Section 01 74 19 – Waste Management and Disposal.

.5 Packaging Waste Management: remove for reuse and return of pallets, crates, padding, and packaging materials as specified in Construction Waste Management Plan in accordance with Section 01 74 19 - Waste Management and Disposal.

1.8 WARRANTY

.1 Manufacturer's warranty: Submit, for Departmental Representative acceptance, manufacturer's warranty document executed by authorized company official.
.1 The frames and sash members are warranted against chipping, flaking, peeling, blistering, cracking and corroding for 10 years.
.2 The insulating glass units are warranted against seal failure for 20 years
.3 All moving parts are warranted against defects in material and workmanship for 10 years.

.4 Frame finish is warranted against defects in material and workmanship that might result in peeling, blistering, flaking, cracking or colour notably fading for 15 years.

2.0 PRODUCTS

2.1 MATERIALS

.1 Materials: to CAN/CSA A440 supplemented as follows:

.2 Windows by same manufacturer.

.3 Sash: vinyl thermally broken.

.4 Main frame: vinyl thermally broken.

.5 Glass: triple glazing with low-e coating, in accordance with Section 08 80 00 - Glazing.

.6 Screens: to section 7.3 of CAN/CSA A440 on ventilating portion of windows.
- .1 Type: glass fibre mesh.
- .2 Style: top hung.
- .3 Insect screening mesh.
- .4 Fasteners: stainless steel.
- .5 Screen frames: aluminum colour to match window frames.
- .6 Mount screen frames for interior replacement.

.7 Exterior brake formed aluminum sheet metal of type and size as detailed minimum 24ga thick, complete with joint covers, jamb drip deflectors, chairs, anchors.

.8 Isolation coating: alkali resistant bituminous paint.

.9 Sealants:
- .1 VOC limit 250g/L maximum to SCAQMD Rule 1168.

2.2 WINDOW TYPE AND CLASSIFICATION

.1 Product types:
- .1 C - Casement window.
- .2 FW- Fixed window.

.2 Classification rating: to CSA-A440/A440.1
- .1 Airtightness: A3
- .2 Water tightness: B7
- .3 Wind load resistance: C5

2.3 FABRICATION

.1 Fabricate in accordance with CSA A440 supplemented as follows:

.2 Fabricate units square and true with maximum tolerance of plus or minus 1.5 mm for units with a diagonal measurement of 1800 mm or less, and plus or minus 3 mm for units with a diagonal measurement over 1800 mm.

.3 Face dimensions detailed maximum permissible sizes.

.4 Brace frames to maintain squareness and rigidity during shipment and installation.

.5 Finish steel clips and reinforcement with shop coat primer to 380 g/m^2 zinc coating to ASTM A123/A123M.

2.4 VINYL FINISHES

.1 Vinyl finishes: in accordance with CSA A440, including appendices, supplemented as follows:
- .1 White colour.

2.7 ISOLATION COATING

.1 Coatings: in accordance with manufacturer's recommendations for surface conditions.
- .1 Primer: VOC limit 100 g/L maximum to GS-11 SCAQMD Rule 1113.
- .2 Coating: VOC limit g/L maximum to SCAQMD Rule 1113.
- .3 Paint: VOC limit 150g/L maximum to SCAQMD Rule 1113.

.2 Isolate aluminum from following components, by means of isolation coating:
- .1 Dissimilar metals except stainless steel, zinc, or white bronze of small area.
- .2 Concrete, mortar and masonry.
- .3 Wood.

2.8 GLAZING

.1 Glaze windows in accordance with CSA A440.
- .1 Refer section 08 80 50 Glazing for glazing type.

2.9 HARDWARE

.1 Hardware: stainless steel or white bronze sash locks and aluminum handles to provide security and permit easy operation of units.

.2 Locks: provide operating sash with spring loading locking device, to provide automatic locking in closed position.

.3 Include special keyed opening device for windows normally locked.

2.10 AIR BARRIER AND VAPOUR RETARDER

.1 Equip window frames with site installed air barrier and vapour retarder material for sealing to building air barrier and vapour retarder as follows:
- .1 Material: identical to, or compatible with, building air barrier and vapour retarder materials to provide required air tightness and vapour diffusion control throughout exterior envelope assembly.
- .2 Material width: adequate to provide required air tightness and vapour diffusion control to building air barrier and vapour retarder from interior.

3.0 EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts acceptable for product installation in accordance with manufacturer's written instructions.
- .1 Visually inspect substrate in presence of Departmental Representative.
- .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 INSTALLATION

.1 Window installation:
- .1 Install in accordance with CSA A440.
- .2 Arrange components to prevent abrupt variation in colour.

.2 Sill installation:
- .1 Install metal sills with uniform wash to exterior, level in length, straight in alignment with plumb upstands and faces. Use one piece at each location.
- .2 Cut sills 25mm longer than window opening on each side.
- .3 Secure sills in place with anchoring devices located at ends and evenly spaced 600mm on centre in between.
- .4 Fasten drip deflectors with self tapping stainless steel screws.
- .5 Maintain 3 to 6 mm space between butt ends of continuous sills. For sills over 1200 mm in length, maintain 3 to 6 mm space at each end.

.3 Caulking:
- .1 Seal joints between windows and window sills with sealant. Bed sill expansion joint cover plates and drip deflectors in bedding compound. Caulk between sill upstand and window-frame. Caulk butt joints in continuous sills.
- .2 Apply sealant in accordance with Section 07 92 00 - Joint Sealants. Conceal sealant within window units except where exposed use is permitted by Departmental Representative.

3.3 FIELD QUALITY CONTROL

.1 Have manufacturer of products supplied under this Section review Work involved in handling, installation/application, protection and cleaning of its product[s], and submit written reports in acceptable format to verify compliance of Work with Contract.

.2 Manufacturer's field services: provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

.3 Schedule site visits to review Work at stages listed:
- .1 After delivery and storage of products, and when preparatory Work on which Work of this Section depends completed, but before installation begins.
- .2 Twice during progress of Work at 25% and 60% complete.
- .3 Upon completion of Work, after cleaning carried out.

3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
- .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 00 - Cleaning.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.
- .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.5 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by window installation.

END OF SECTION 08 50 00

1.0 GENERAL

1.1 RELATED REQUIREMENTS

.1 Finish Carpentry Section 06 20 00

.2 Metal Doors and Frames Section 08 11 00

1.2 REFERENCES

.1 American National Standards Institute (ANSI) / Builders Hardware Manufacturers Association (BHMA)

- .1 ANSI/BHMA A156.1- 2000 , American National Standard for Butts and Hinges.
- .2 ANSI/BHMA A156.2- 2003 , Bored and Preassembled Locks and Latches.
- .3 ANSI/BHMA A156.3- 2001 , Exit Devices.
- .4 ANSI/BHMA A156.4- 2000 , Door Controls - Closers.
- .5 ANSI/BHMA A156.5- 2001 , Auxiliary Locks and Associated Products.
- .6 ANSI/BHMA A156.6- 2005 , Architectural Door Trim.
- .7 ANSI/BHMA A156.8- 2005 , Door Controls - Overhead Stops and Holders.
- .8 ANSI/BHMA A156.10- 1999 , Power Operated Pedestrian Doors.
- .9 ANSI/BHMA A156.12- 2005 , Interconnected Locks and Latches.
- .10 ANSI/BHMA A156.13- 2002 , Mortise Locks and Latches Series 1000.
- .11 ANSI/BHMA A156.14- 2002 , Sliding and Folding Door Hardware.
- .12 ANSI/BHMA A156.15- 2006 , Release Devices - Closer Holder, Electromagnetic and Electromechanical.
- .13 ANSI/BHMA A156.16- 2002 , Auxiliary Hardware.
- .14 ANSI/BHMA A156.17- 2004 , Self-closing Hinges and Pivots.
- .15 ANSI/BHMA A156.18- 2006 , Materials and Finishes.
- .16 ANSI/BHMA A156.19- 2002 , Power Assist and Low Energy Power - Operated Doors.
- .17 ANSI/BHMA A156.20- 2006 , Strap and Tee Hinges and Hasps.

.2 Canada Green Building Council (CaGBC)

- .1 LEED Canada-CI Version 1.0- 2007, LEED (Leadership in Energy and Environmental Design): Green Building Rating System and Reference Guide For Commercial Interiors.

.3 Canadian Steel Door and Frame Manufacturers' Association (CSDMA)

- .1 CSDMA Recommended Dimensional Standards for Commercial Steel Doors and Frames - 2009.

1.3 HARDWARE/SECURITY COORDINATION

.1 Prior to preparation and submittal of hardware list, door hardware supplier’s hardware consultant shall arrange a coordination meeting with the following attendees:

- .1 Hardware supplier’s hardware consultant.
- .2 Facility’s Building Maintenance Manager.
- .3 Departmental Representative.
- .4 General Contractor.

.2 The final door hardware lists shall reflect all decisions made at said coordination meeting.

1.4 ACTION & INFORMAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for door hardware and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Samples:
.1 Submit for review and acceptance of each unit.
.2 Samples will be returned for inclusion into work.
.3 Identify each sample by label indicating applicable specification paragraph number, brand name and number, finish and hardware package number.
.4 After approval samples will be returned for incorporation in Work.

.4 Hardware List:
.1 Submit contract hardware list.
.2 Indicate specified hardware, including make, model, material, function, size, finish and other pertinent information.

.5 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

.6 Manufacturer's Instructions: submit manufacturer's installation instructions.

.7 Sustainable Design Submittals:
.1 LEED Canada CI Version 1.0. Submittals: in accordance with Section 01 35 21 - LEED Requirements.
.2 Construction Waste Management:
.1 Submit project Construction Waste Management Plan highlighting recycling and salvage requirements.
.2 Submit calculations on end-of-project recycling rates salvage rates, and landfill rates demonstrating that 75% of construction wastes were recycled or salvaged.
.3 Recycled Content:
.1 Submit listing of recycled content products used, including details of required percentages or recycled content materials and products, showing their costs and percentages of post-consumer and post-industrial content, and total cost of materials for project.
.4 Regional Materials: submit evidence that project incorporates required percentage 20 % of regional materials and products, showing their cost, distance from project to furthest site of extraction or manufacture, and total cost of materials for project.

1.5 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for door hardware for incorporation into manual.

1.6 MAINTENANCE MATERIALS SUBMITTALS

.1 Extra Stock Materials:
.1 Supply maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.
.2 Tools:
.1 Supply 2 sets of wrenches for door closers, locksets, and fire exit hardware.

1.7 QUALITY ASSURANCE

.1 Regulatory Requirements:

.1 Hardware for doors in fire separations and exit doors certified by a Canadian Certification Organization accredited by Standards Council of Canada.

.2 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.8 DELIVERY, STORAGE & HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with 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 Package items of hardware including fastenings, separately or in like groups of hardware, label each package as to item definition and location.

.4 Storage and Handling Requirements:

.1 Store materials off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect door hardware from nicks, scratches, and blemishes.

.3 Protect prefinished surfaces with wrapping strippable coating.

.4 Replace defective or damaged materials with new.

.5 Packaging Waste Management: remove for reuse and return by manufacturer of packaging materials as specified in Construction Waste Management Plan in accordance with Section 01 74 19 - Waste Management and Disposal and Section 01 35 21 - LEED Requirements.

1.9 REBUNDENT LOCKSETS

.1 Where existing and other lock-bearing devices are to be removed and disposed of: turn-over to Departmental Representative and obtain receipt. In order to maintain building keying security, no existing locksets are to be removed from building.

1.10 MAINTENANCE

.1 Extra Materials:

.1 Provide maintenance materials in accordance with Section 01 78 30-Closeout Submittals.

.2 Supply two sets of wrenches for door closers.

2.0 PRODUCTS

2.1 HARDWARE ITEMS

.1 Use one manufacturer's products only for similar items.

2.2 DOOR HARDWARE

.1 Locks and latches:

.1 Mortise locks and latches: to ANSI/BHMA A156.13, series 1000 mortise lock, grade 1, designed for function and keyed as stated in Hardware Schedule.

.2 Lever handles: plain 64mm x 114mm x 51mm design.

.3 Roses: round

.4 Normal strikes: box type, lip projection not beyond jamb.

.5 Cylinders: key into keying system as noted as directed.

.6 Finished to 652, 626 & 630

.7 6 pin (or 7) tumbler keying to Maintenance's Master System.
.8 Dead bolt equivalent to BEST lock 83T series.

.2 Butts and hinges:
.1 Butts and hinges: to CAN/CGSB-69.18 / ANSI/BHMA A156.1, designated by letter A and numeral identifiers, followed by size and finish, listed in Hardware Schedule.

.3 Exit devices: to ANSI/BHMA A156.3, type & function as listed, grade (1)
.1 Auxiliary items: door coordinator.

.4 Door Closers and Accessories:
.1 Door controls (closers): to CAN/CGSB-69.20 / ANSI/BHMA A156.4, listed in Hardware Schedule, multi-sized sized 1 to though 6 in accordance with ANSI/BHMA A156.4, table A1, finished to 689.
.2 Door controls - overhead holders: to CAN/CGSB-69.24 / ANSI/BHMA A156.8, designated by letter C and numeral identifiers listed in Hardware Schedule, finished to 626.
.3 Closer/holder release devices: to CAN/CGSB/ANSI / ANSI/BHMA listed in hardware schedule, finished to 689.
.4 Door co-ordinator: surface for pairs of doors with overlapping astragal.
.5 Magnetic holder floor or wall mounted release on fire alarm: finished to 689.

.5 Auxiliary locks and associated products: to ANSI/BHMA A156.5, numeral identifiers listed in Hardware Schedule, finished to 626.
.1 Cylinders: type as listed, finished to 626, for installation in deadlocks provided with special doors as listed in Hardware Schedule. Key into keying system [as noted] [as directed].

.6 Architectural door trim: to ANSI/BHMA A156.6, designated by letter J and numeral identifiers listed in Hardware Schedule as listed below, finished to 626 or 630.
.1 Architectural door trim: to ANSI/BHMA A156.6, listed in Hardware Schedule as listed below, finished to 626 or 630
.1 Door protection plates: kick plate type as listed, 1.27 mm thick stainless steel 1 edges, finished to 630.
.2 Push plates: type as listed, 1.27 mm thick stainless steel 1 edge, as listed, finished to 630.
.3 Push/Pull units: type as listed, finished to 630.

.7 Auxiliary hardware: to ANSI/BHMA A156.16, listed in Hardware Schedule finished to 626 or 630.

.8 Door bottom seal: heavy duty, door seal of extruded aluminum frame and solid closed cell neoprene weather seal, recessed in door bottom surface mounted recessed in door face, closed ends, adjustable automatic retract mechanism when door is open, clear anodized finish.

.9 Thresholds: 127mm wide x full width of door opening, extruded aluminum mill finish, serrated surface, with lip and vinyl door seal insert.

.10 Weatherstripping:
.1 Head and jamb seal:
.1 Adhesive backed neoprene vinyl covered foam material.
.2 Door bottom seal:
.1 Extruded aluminum frame and [closed cell neoprene vinyl sweep, clear anodized finish.

.11 Astragal: overlapping, Primed steel meeting stiles Pile

.12 Barrier Free Electric Door Operator:
- .1 Power-operated pedestrian doors: to ANSI/BHMA A156.10.
- .2 Power assist and low energy power operated doors: to ANSI/BHMA A156.19.
- .3 Heavy duty pneumatically assisted door closer, capable of multi-door operation, complete with actuators, control boxes, and electric motor.
- .4 Self-contained control box/compressor combination for independent operation of two door leaves.
- .5 Control boxes: complete with electric strike relay.
- .6 Mount operators on either push or pull sides of doors as required to place them inside rooms.
- .7 Actuation of operators by push button.
- .8 Electrical box and actuator: Hardwired low voltage actuator with stainless steel 114 mm round plate, engraved blue filled with handicap symbol. Box 51 mm wide x 102 mm high x 50 mm deep single gang electrical box, flush mounted in wall, locations indicated.
- .9 Supply switched line voltage to control box. Locate switch adjacent to box.

.13 Electric Strikes
- .1 Weatherproof type includes all accessories, transformer and housing. Conduit by Division 26, connection by Division 28.

2.3 MISCELLANEOUS HARDWARE

.1 Indexed key control system: to ANSI/BHMA A156.5, designated by letter E and numeral identifiers, wall mounted, type 50% expandable colour enamel paint finish.

2.4 FASTENINGS

.1 Use only fasteners provided by manufacturer. Failure to comply may void warranties and applicable licensed labels.

.2 Supply screws, bolts, expansion shields and other fastening devices required for satisfactory installation and operation of hardware.

.3 Exposed fastening devices to match finish of hardware.

.4 Where pull is scheduled on one side of door and push plate on other side, supply fastening devices, and install so pull can be secured through door from reverse side. Install push plate to cover fasteners.

.5 Use fasteners compatible with material through which they pass.

2.5 KEYING

.1 Doors, padlocks and cabinet locks to be keyed to grand master keyed as directed and as noted in Hardware Schedule. Prepare detailed keying schedule in conjunction with Departmental Representative.

.2 Supply keys in duplicate for every lock in this Contract.

.3 Supply (five) 5 master keys for each master key or grand master key group.

.4 Supply 5 keys for each lock.

.5 Stamp keying code numbers on keys and cylinders.

.6 Supply construction cores.

.7 Hand over permanent cores and keys to Departmental Representative.

.8 All core to be high security interchangeable core.

2.6 KEYS

.1 Use standard construction cylinders for locks for Contractor's use during the construction period.

.2 Issue instructions to employees and sub-trades, as necessary, to ensure safe custody of the construction set of keys.

.3 Upon completion of each phase of the construction, the Departmental Representative will, in conjunction with the lock manager:
- .1 Prepare an operational keying schedule.
- .2 Accept the operational keys and cylinders directly from the lock manufacturer.
- .3 Arrange for removal and return of the construction cores and install the operational core in all locks.

2.7 ADDITIONAL DOOR HARDWARE SCHEDULED ELSEWHERE

.1 Refer to Division 28- Electronic Safety and Security, for additional door items including, but not limited to the following:
- .1 Access and intrusion control panels.
- .2 Card readers.
- .3 Door Contracts.
- .4 Intrusion detection.

.2 Refer to Division 26-Electrical for all wiring and conduit for above items.

3.0 EXECUTION

3.1 INSTALLATION

.1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

.2 Supply metal door and frame manufacturers with complete instructions and templates for preparation of their work to receive hardware.

.3 Supply manufacturers' instructions for proper installation of each hardware component.

.4 Install hardware to standard hardware location dimensions in accordance with CSDFMA Canadian Metric Guide for Steel Doors and Frames (Modular Construction.

.5 Where door stop contacts door pulls, mount stop to strike bottom of pull.

.6 Install key control cabinet.

.7 Use only manufacturer's supplied fasteners.
- .1 Use of "quick" type fasteners, unless specifically supplied by manufacturer, is unacceptable.

.8 Remove construction cores locks when directed by Departmental Representative.

.1 Install permanent cores and ensure locks operate correctly.

3.2 ADJUSTING

.1 Adjust door hardware, operators, closures and controls for optimum, smooth operating condition, safety and for weather tight closure.

.2 Lubricate hardware, operating equipment and other moving parts.

.3 Adjust door hardware to ensure tight fit at contact points with frames.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  .1 Leave Work area clean at end of each day.
  .2 Clean hardware with damp rag and approved non-abrasive cleaner, and polish hardware in accordance with manufacturer's instructions.
  .3 Remove protective material from hardware items where present.
  .4 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.
  .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.4 DEMONSTRATION

.1 Keying System Setup and Cabinet:
  .1 Set up key control system with file key tags, duplicate key tags, numerical index, alphabetical index and key change index, label shields, control book and key receipt cards.
  .2 Place file keys and duplicate keys in key cabinet on their respective hooks.
  .3 Lock key cabinet and turn over key to Departmental Representative.

.2 Maintenance Staff Briefing:
  .1 Brief maintenance staff regarding:
    .1 Proper care, cleaning, and general maintenance of projects complete hardware.
    .2 Description, use, handling, and storage of keys.
    .3 Use, application and storage of wrenches for door closers locksets and fireexit hardware.

.3 Demonstrate operation, operating components, adjustment features, and lubrication requirements.

3.5 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by door hardware installation.

3.6 DOOR HARDWARE TYPE

.1 HINGES:

A1 – Heavy Duty Hinge 5 Knuckle-.180gauge-114mm x 101mm x Non Removable Pin x 630
A2 – Hinge 5 Knuckle-.134 gauge- 114mm x 101mm x Non Removable Pin x 652
A3 – self-closing, 5 tension adjustments, stainless steel hinge, round or Flat post compatibility, Adjustable yoke, Load Rating: 2,000 lbs

A4 - Four sealed bearings (no greasing) , stainless Steel hinge, Bolt-on installations, Load Rating: 3,000+ lbs

.2 LOCKS

B1 - CYLINDER	TYPE X LENGTH X CAM TO SUIT	626
B2 – DEADBOLT	ANSI E06091	626
B3 - LOCK SET	ANSI F07	626
B4 - LOCK SET	ANSI F19 WITH OCCUPANCY INDICATOR ROSE	626

.3 CLOSERS:

Note: Include thru-bolts and grommet nuts fasteners.

C1 – Closer Institutional, non sized, rigid parallel with fixed door stop arm x delayed action x 689

.4 AUXILIARY HARDWARE:

F1 - Wall stop Cast concealed mount, concave bumper with back plate x 626

F2 - Heavy duty surface mount over-head door hold & stop x 689

.5 ARCHITECTURAL DOOR TRIM:

J1 - Kick Plate 254mm x width less 38mm x 630

J2 - Pull 25mm dia x 305mm x 630

J3 - Push Plate 101mm x 406mm x 630

.6 THRESHOLDS, SEALS, DOOR BOTTOMS, ASTRAGAL:

M1 – Threshold Barrier free Saddle 127 mm x 13.7 mm x width x stainless steal

M2 – Door Sweep Similar to Pemko 345AV-width

M3 – Seals Adjustable jamb type x silicone insert x 2/height x 1 width

M4 – Stainless Steel heavy duty door holder 101.6 mm kick-down style holder with rubber tip

3.7 FINISH HARDWARE SCHEDULE

.1 Typical exterior door:

3 Hinges (NRP)
1 Door Stop (wall/floor)
1 Entrance lock set with thumb turn dead bolt
1 Eye Viewer (main entry door only)
1 Weather Stripping (on 3 sides)
1 Door bottom
1 Aluminum Threshold

END OF SECTION 08 71 00

1.0 GENERAL

1.1 RELATED REQUIREMENTS

.1 Metal Doors and Frames Section 08 11 00

.2 Windows Section 08 50 00

1.2 REFERENCES

.1 ASTM International
- .1 ASTM C 542-05 (2011), Standard Specification for Lock-Strip Gaskets.
- .2 ASTM D 2240-05 (2010), Standard Test Method for Rubber Property - Duromete Hardness.
- .3 ASTM E 330-02, Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.

.2 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-12.1-M90, Tempered or Laminated Safety Glass.
- .2 CAN/CGSB-12.2-M91, Flat, Clear Sheet Glass.
- .3 CAN/CGSB-12.3-M91, Flat, Clear Float Glass.
- .4 CAN/CGSB-12.8-97, Insulating Glass Units.
- .5 CAN/CGSB-12.8-97, (Amendment), Insulating Glass Units.
- .6 CAN/CGSB-12.10-M76, Glass, Light and Heat Reflecting.
- .7 CAN/CGSB-12.11-M90, Wired Safety Glass.

.3 Glass Association of North American (GANA)
- .1 GANA Glazing Manual – 50th Anniversary Edition.
- .2 GANA Laminated Glazing Reference Manual - 2009.

.4 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
- .1 SCAQMD Rule 1168-A2005, Adhesives and Sealants Applications.

1.3 SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for glass, sealants, and glazing accessories and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Low-Emitting Materials:
- .1 Submit listing of adhesives and sealants used in building, showing compliance with VOC and chemical component limits or restrictions requirements.

.4 Samples: Provide 1 glazed units samples, 300 x 300, in accordance with Section 01 33 00- Submittal Procedures.

.5 Shop Drawings:
- .1 Provide shop drawings in accordance with Section 01 33 00- Submittal Procedures:
  - .1 Shop drawing consist of aluminum framing installation details. Indicate sizes, spacing, location and quantities.

1.4 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for glazing for incorporation into manual.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product ‘Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labeled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect glazing and frames from nicks, scratches, and blemishes.

.3 Protect prefinished aluminum surfaces with wrapping.

.4 Replace defective or damaged materials with new.

.4 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials as specified in Construction Waste Management Plan in accordance with Section 01 74 19 - Waste Management and Disposal

1.6 AMBIENT CONDITIONS

.1 Ambient Requirements:

.1 Install glazing when ambient temperature is 10 degrees C minimum. Maintain ventilated environment for 24 hours after application.

.2 Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.7 WARRANTY

.1 Provide manufacturer’s warranty in writing for insulating glass units against failure of seal of enclosed air space and deposits on inner faces of glass detrimental to vision for a period of ten(10) years from date of Substantial Performance of Work.

2.0 PRODUCTS

2.1 MATERIALS

.1 Design Criteria:

.1 Ensure continuity of building enclosure vapour and air barrier using glass and glazing materials as follow:

.1 Utilize inner light of multiple light sealed units for continuity of air and vapour seal.

.2 Size glass to withstand wind loads, dead loads and positive and negative live loads to National Building Code 2015 and BCBC 2018.

.3 Limit glass deflection to 1/200 with full recovery of glazing materials.

.2 Triple Glazed Insulated Glass Unit (for typical window):

.1 Float Glass: to CAN/CGSB-12.3, glazing quality.

.2 Exterior Insulated glass unit: performance requirements for insulated glass units with air space and three 4 mm lites, Exterior light clear with low-E coating on surface #2, interior lite clear , outer and inner lite both tempered, shall have minimum performance as follows:

.1 Transmittance: UV-18%, Visible-70%, Solar-32%.

.2 Outdoor reflectance: Visible-11%, Total Solar Energy-29%.
.3 U-Value W/m^2/°C: Winter 1.6466 (029 BTU/Hr/Ft/°F) Summer 1.5898 (028 BTU/HR/Ft/°F)
.4 Solar heat gain coefficient: 0.38
.5 Shading coefficient: 0.43
.6 Warm edge spacer bar and argon gas filled cavity
.7 Total thickness: 32 mm minimum.

.3 Tempered Glass (for typical door):
.1 Single glazed obscured tempered glass.

2.2 ACCESSORIES

.1 Setting blocks: neoprene Shore A durometer hardness to ASTM D 2240, minimum 100 mm x width of glazing rabbet space minus 1.5 mm x height.

.2 Spacer shims: neoprene Shore A durometer hardness to ASTM D 2240, 75 mm long x one half height of glazing stop x thickness to suit application. Self-adhesive on one face.

.3 Glazing tape:
.1 Preformed butyl compound Shore A durometer hardness to ASTM D 2240; coiled on release paper; black colour. Width x thickness recommended by manufacturer to suit installation.

.4 Glazing splines: resilient neoprene, extruded shape to suit glazing channel retaining slot, black colour as selected.

.5 Glazing clips: manufacturer's standard type.

.6 Lock-strip gaskets: to ASTM C 542.

3.0 EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for glazing installation in accordance with manufacturer's written instructions.
.1 Verify that openings for glazing are correctly sized and within tolerance.
.2 Verify that surfaces of glazing channels or recesses are clean, free of obstructions, and ready to receive glazing.
.3 Visually inspect substrate in presence of Departmental Representative.
.4 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
.5 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 PREPARATION

.1 Clean contact surfaces with solvent and wipe dry.

.2 Seal porous glazing channels or recesses with substrate compatible primer or sealer.

.3 Prime surfaces scheduled to receive sealant.

3.3 INSTALLATION

.1 All glass shall be cushioned and rattle free. Draw marks shall be installed horizontally unless prohibited by the size of the sheet.

.2 Install all glass on glazing blocks with spacer blocks, of sizes required to ensure shim spaces as recommended by the glass manufacturer with adequate space for glazing compounds and sealants.

.3 Fill gap between glass and applied stop with sealant to depth equal to bite of frame on glass but not more than 10 mm below sightline.

.4 Apply sealant to uniform and level line, flush with sightline and tooled or wiped with solvent to smooth appearance.

3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

.1 Leave Work area clean at end of each day.

.1 Remove traces of primer, caulking.

.2 Remove glazing materials from finish surfaces.

.3 Remove labels.

.4 Clean glass and mirrors using approved non-abrasive cleaner in accordance with manufacturer's instructions.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

3.5 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 After installation, mark each light with an "X" by using removable plastic tape or paste.

.1 Do not mark heat absorbing or reflective glass units.

.3 Repair damage to adjacent materials caused by glazing installation.

END OF SECTION 08 80 50

1.0 GENERAL

1.1 RELATED REQUIRMENTS

.1 Rough Carpentry Section 06 10 11

.2 Finish Carpentry Section 06 20 00

.3 Fiber Cement Siding System Section 07 46 46

.4 Metal Doors and Frames Section 08 11 00

1.2 REFERENCES

.1 Environmental Protection Agency (EPA)
- .1 Test Method for Measuring Total Volatile Organic Compound Content of Consumer Products, Method 24 (for Surface Coatings).

.2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
- .1 Material Safety Data Sheets (MSDS).

.3 The Master Painters Institute (MPI)
- .1 Architectural Painting Specification Manual – Latest Edition.
- .2 Standard GPS-1- 05, MPI Green Performance Standard for Painting and Coatings.

.4 National Fire Code of Canada 2015.

.5 Society for Protective Coatings (SSPC)
- .1 Systems and Specifications, SSPC Painting Manual 2005.

1.3 QUALITY ASSURANCE

.1 Conform to the standards contained in the Master Painters Institute Architectural Painting Specification Manual, latest edition (hereafter referred to as MPI Painting Specification Manual) for all painting products including preparation and application of materials. MPI Painting Specification Manual as issued by the local MPI Accredited Quality Assurance Association having jurisdiction.

.2 All paint manufacturers and products used shall be as listed under the “Approved Products” section of the MPI Painting Specification manual.

.3 Other paint materials shall be the highest quality product of an approved manufacturer listed in MPI Painting Specification Manual and shall be compatible with other coating materials as required.

.4 Single-Source Responsibility: provide primers and undercoat paint produced by the same manufacturer as the finish coat.

.5 All painting and decorating work shall be inspected by Paint Inspection Agency (inspector) acceptable to the specifying authority and the local MPI Accredited Quality Assurance Association. The painting contractor shall notify the Paint Inspection Agency a minimum of one week prior to commencement of work and provide a copy of the project painting specification, plans and elevation drawings (including pertinent details) as well as a Finish Schedule.

.6 All surfaces requiring painting or repainting shall be inspected by the inspection agency who shall advise on all aspects of painting work including preparation, notifying the Consultant, the Contractor and the Trade Contractor of any defects or problems prior to commencing painting work or after the prime coat shows defects in the substrate, and as the work progresses.

.7 Standard of Acceptance:
.1 Wall: No defects visible from a distance of 1000mm at 90° to surface.
.2 Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area.

.8 Mock-Ups:
1 Construct mock-ups in accordance with Section 01 45 00 - Quality Control.
.1 Prepare and paint designated surface, area, room or item (in each colour scheme) to specified requirements, with specified paint or coating showing selected colours, gloss/sheen, textures.
.2 Mock-up will be used:
.1 To judge workmanship, substrate preparation, operation of equipment and material application and workmanship to MPI Architectural Painting Specification Manual standards.
.3 Locate where directed.
.4 Allow 24 hours for inspection of mock-up before proceeding with work.
.5 When accepted, mock-up will demonstrate minimum standard of quality required for this work. Approved mock-up may remain as part of finished work.

.9 Pre-Installation Meeting:
.1 Convene pre-installation meeting one week prior to beginning work of this Section and on-site installations in accordance with Section 01 32 16.07 - Construction Progress Schedules - Bar (GANTT) Chart
.1 Verify project requirements.
.2 Review installation and substrate conditions.
.3 Coordination with other building subtrades.
.4 Review manufacturer's installation instructions and warranty requirements.

.10 Health and Safety:
.1 Do construction occupational health and safety in accordance with Section 01 35 33 - Health and Safety Requirements.

1.4 PERFORMANCE REQUIREMENTS
.1 Environmental Performance Requirements:
.1 Provide paint products meeting MPI "Environmentally Friendly” E2 ratings based on VOC (EPA Method 24) content levels.

.2 Green Performance in accordance with MPI Standard GPS-1.

1.5 SCHEDULING
.1 Submit work schedule for various stages of painting to Departmental Representative for approval. Submit schedule minimum of 48 hours in advance of proposed operations.

.2 Obtain written authorization from Departmental Representative for changes in work schedule.

.3 Schedule painting operations to prevent disruption of occupants in and about building.

1.6 SUBMITTALS
.1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:
.1 Submit product data and instructions for each paint and coating product to be used.
.2 Submit product data for the use and application of paint thinner.
.3 Submit two copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS) in accordance with Section 01 33 00 – Submittal Procedures. Indicate VOCs during application.

.3 Samples:
.1 Submit manufacturer's standard range of color choices on each specified color type as listed in Colour Schedule of this section for selection, review and acceptance of each color.
.2 Submit triplicates 200 x 300 mm sample panels of each paint with specified paint in colours, gloss/sheen and textures required, based on selected colors, to MPI Architectural Painting Specification Manual standards submitted on following substrate materials:
.1 1 mm plate steel for finishes over metal surfaces.

.3 Retain reviewed samples on-site to demonstrate acceptable standard of quality for appropriate on-site surface.

.4 Test reports: submit certified test reports for paint from approved independent testing laboratories, indicating compliance with specifications for specified performance characteristics and physical properties.
.1 Lead, cadmium and chromium: presence of and amounts.
.2 Mercury: presence of and amounts.
.3 Organochlorines and PCBs: presence of and amounts.

.5 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.6 Manufacturer's Instructions:
.1 Submit manufacturer's installation instructions.

.7 Closeout Submittals: submit maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals include following:
.1 Product name, type and use.
.2 Manufacturer's product number.
.3 Colour numbers.
.4 MPI Environmentally Friendly classification system rating.

1.7 MAINTENANCE

.1 Extra Materials:
.1 Deliver to extra materials from same production run as products installed. Package products with protective covering and identify with descriptive labels. Comply with Section 01 78 00 - Closeout Submittals.
.2 Quantity: provide one - 4 litre (1 gallon) can of each type and colour of primer stain finish coating. Identify colour and paint type in relation to established colour schedule and finish system.
.3 Delivery, storage and protection: comply with Departmental Representative requirements for delivery and storage of extra materials.

1.8 DELIVERY, STORAGE & HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements, supplemented as follows:
.1 Deliver and store materials in original containers, sealed, with labels intact.
.2 Labels: to indicate:
.1 Manufacturer's name and address.
.2 Type of paint or coating.
.3 Compliance with applicable standard.
.4 Colour number in accordance with established colour schedule.
.3 Remove damaged, opened and rejected materials from site.
.4 Provide and maintain dry, temperature controlled, secure storage.
.5 Observe manufacturer's recommendations for storage and handling.

.6 Store materials and supplies away from heat generating devices.
.7 Store materials and equipment in well-ventilated area with temperature range 7 degrees C to 30 degrees C.
.8 Store temperature sensitive products above minimum temperature as recommended by manufacturer.
.9 Keep areas used for storage, cleaning and preparation, clean and orderly to approval of Departmental Representative. After completion of operations, return areas to clean condition to approval of Departmental Representative
.10 Remove paint materials from storage only in quantities required for same day use.
.11 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling storage, and disposal of hazardous materials.
.12 Fire Safety Requirements:
.1 Provide one 9 kg Type ABC dry chemical fire extinguisher adjacent to storage area.
.2 Store oily rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site on a daily basis.
.3 Handle, store, use and dispose of flammable and combustible materials in accordance with the National Fire Code of Canada.

.2 Waste Management and Disposal:
.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.
.2 Paint, stain and wood preservative finishes and related materials (thinners, solvents, etc.) are regarded as hazardous products and are subject to regulations for disposal. Information on these controls can be obtained from Provincial Ministries of Environment and Regional levels of Government.
.3 Material which cannot be reused must be treated as hazardous waste and disposed of in an appropriate manner.
.4 Place materials defined as hazardous or toxic waste, including used sealant and adhesive tubes and containers, in containers or areas designated for hazardous waste.
.5 To reduce the amount of contaminants entering waterways, sanitary/storm drain systems or into the ground the following procedures shall be strictly adhered to:
.1 Retain cleaning water for water-based materials to allow sediments to be filtered out.
.2 Retain cleaners, thinners, solvents and excess paint and place in designated containers and ensure proper disposal.
.3 Return solvent and oil soaked rags used during painting operations for contaminant recovery, proper disposal, or appropriate cleaning and laundering.
.4 Dispose of contaminants in an approved legal manner in accordance with hazardous waste regulations.
.5 Empty paint cans are to be dry prior to disposal or recycling (where available).
.6 Where paint recycling is available, collect waste paint by type and provide for delivery to recycling or collection facility.
.7 Set aside and protect surplus and uncontaminated finish materials: Deliver to or arrange collection by employees, individuals, or organizations for verifiable re-use or re-manufacturing.
.8 Close and seal tightly partly used sealant and adhesive containers and store protected in well ventilated fire-safe area at moderate temperature.

1.9 AMBIENT CONDITIONS
.1 Heating, Ventilation and Lighting:
.1 Perform no painting work unless a minimum lighting level of 323 Lux is provided on surfaces to be painted. Adequate lighting facilities to be provided by General Contractor.

.2 Temperature, Humidity and Substrate Moisture Content Levels:

.1 Unless specifically pre-approved by specifying body, Paint Inspection Agency and, applied product manufacturer, perform no painting work when:

.1 Ambient air and substrate temperatures are below 10 degrees C.

.2 Substrate temperature is over 32 degrees C unless paint is specifically formulated for application at high temperatures.

.3 Substrate and ambient air temperatures are expected to fall outside MPI or paint manufacturer's prescribed limits.

.4 Relative humidity is above 85 % or when dew point is less than 3 degrees C variance between air/surface temperature.

.5 Rain or snow are forecast to occur before paint has thoroughly cured or when it is foggy, misty, raining or snowing at site.

.3 Surface and Environmental Conditions:

.1 Apply paint finish in areas where dust is no longer being generated by related construction operations or when wind or ventilation conditions are such that airborne particles will not affect quality of finished surface.

.2 Apply paint to adequately prepared surfaces and to surfaces within moisture limits noted herein.

.3 Apply paint when previous coat of paint is dry or adequately cured.

.4 Apply paint finishes when conditions forecast for entire period of application fall within manufacturer's recommendations.

.5 Do not apply paint when:

.1 Temperature is expected to drop below 10 degrees C before paint has thoroughly cured.

.2 Substrate and ambient air temperatures are expected to fall outside MPI or paint manufacturer's limits.

.3 Surface to be painted is wet, damp or frosted.

.6 Provide and maintain cover when paint must be applied in damp or cold weather. Heat substrates and surrounding air to comply with temperature and humidity conditions specified by manufacturer. Protect until paint is dry or until weather conditions are suitable.

.7 Schedule painting operations such that surfaces exposed to direct, intense sunlight are scheduled for completion during early morning.

.8 Remove paint from areas which have been exposed to freezing, excess humidity, rain, snow or condensation. Prepare surface again and repaint.

.9 Paint occupied facilities in accordance with approved schedule only. Schedule operations to approval of Departmental Representative such that painted surfaces will have dried and cured sufficiently before occupants are affected.

1.10 GUARANTEE

.1 Furnish a 100% two (2) year Maintenance Bond.

.2 Painting and decorating Subcontractors providing a Maintenance Bond shall provide a maintenance bond consent from a reputable surety company licensed to do business in Canada. Cash or certified cheque are not acceptable in lieu of surety consent.

2.0 PRODUCTS

2.1 MATERIALS

.1 Paint materials listed in latest edition of MPI Approved Products List (APL) are acceptable for use on this project.

.2 Paint materials for paint systems: to be products of single manufacturer.

.3 Only qualified products with E2 “Environmentally Friendly" ratings are acceptable for use on this project.

.4 Use only MPI listed materials.

.5 Paints, coatings, adhesives, solvents, cleaners, lubricants, and other fluids, to be as follows:
- .1 Be water-based.
- .2 Be non-flammable biodegradable.
- .3 Be manufactured without compounds which contribute to ozone depletion in upper atmosphere.
- .4 Be manufactured without compounds which contribute to smog in the lower atmosphere.
- .5 Do not contain methylene chloride, chlorinated hydrocarbons, toxic metal pigments.

.6 Water-borne surface coatings must be manufactured and transported in a manner that steps of processes, including disposal of waste products arising therefrom, will meet requirements of applicable governmental acts, by-laws and regulations including, for facilities located in Canada.

.7 Water-borne surface coatings must not be formulated or manufactured with aromatic solvents, formaldehyde, halogenated solvents, mercury, lead, cadmium, hexavelant chromium or their compounds.

.8 Water-borne surface coatings and recycled water-borne surface coatings must have flash point of 61.0 degrees C or greater.

.9 Both water-borne surface coatings and recycled water-borne surface coatings must be made by a process that does not release:
- .1 Matter in undiluted production plant effluent generating a 'Biochemical Oxygen Demand' (BOD) in excess of 15 mg/L to a natural watercourse or a sewage treatment facility lacking secondary treatment.
- .2 Total Suspended Solids (TSS) in undiluted production plant effluent in excess of 15 mg/L to a natural watercourse or a sewage treatment facility lacking secondary treatment.

.10 Recycled water-borne surface coatings must contain 50 % post-consumer material by volume.

.11 Recycled water-borne surface coatings must not contain:
- .1 Lead in excess of 600.0 ppm weight/weight total solids.
- .2 Mercury in excess of 50.0 ppm weight/weight total product.
- .3 Cadmium in excess of 1.0 ppm weight/weight total product.
- .4 Hexavelant chromium in excess of 3.0 ppm weight/weight total product.
- .5 Organochlorines or polychlorinated biphenyls (PCBS) in excess of 1.0 ppm weight/weight total product.

.12 The following must be performed on each batch of consolidated post-consumer material before surface coating is reformulated and canned. These tests must be performed at a laboratory or facility which has been accredited by the Standards Council of Canada.
- .1 Lead, cadmium and chromium are to be determined using ICP-AES (Inductively Coupled Plasma - Atomic Emission Spectroscopy) technique no. 6010 as defined in EPA SW-846.
- .2 Mercury is to be determined by Cold Vapour Atomic Absorption Spectroscopy using Technique no. 7471 as defined in EPA SW-846.
- .3 Organochlorines and PCBs are to be determined by Gas Chromatography using Technique no. 8081 as defined in EPA SW-846.

2.2 COLOURS

.1 Departmental Representative will provide Colour Schedule after Contract award. Submit proposed Colour Schedule to Departmental Representative for approval.

.2 Colour schedule will be based upon selection of two base colours and three accent colours. No more than five colors will be selected for entire project and no more than three colours will be selected in each area.

.3 Selection of colours will be from manufacturers full range of colours.

.4 Where specific products are available in restricted range of colours, selection will be based on limited range.

2.3 MIXING AND TINTING

.1 Perform colour tinting operations prior to delivery of paint to site. On-site tinting of painting materials is allowed only with Departmental Representative's written permission.

.2 Mix paste, powder or catalyzed paint mixes in accordance with manufacturer's written instructions.

.3 Add thinner to paint manufacturer's recommendations. Do not use kerosene or organic solvents to thin water-based paints.

.4 Thin paint for spraying according in accordance with paint manufacturer's instructions. If directions are not on container, obtain instructions in writing from manufacturer and provide copy of instructions to Departmental Representative .

.5 Re-mix paint in containers prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment, and colour and gloss uniformity.

2.4 GLOSS/SHEEN RATINGS

.1 Paint gloss is defined as sheen rating of applied paint, in accordance with following values:

	Gloss @ 60 degrees	Sheen @ 85 degrees
Gloss Level 1 Matte	Max.5	Max.10
Finish (flat) Gloss Level 2 -Velvet-Like Finish	Max.10	10 to 35
Gloss Level 3 -Eggshell Finish	10 to 25	10 to 35
Gloss Level 4 -Satin-Like Finish	20 to 35	Min.35
Gloss Level 5 -Traditional Semi-Gloss Finish	35 to 70	
Gloss Level 6 -Gloss finish	70 to 85	
Gloss Level 7 -High Gloss Finish	More than 85	

.2 Gloss level ratings of painted surfaces as indicated.

2.5 EXTERIOR PAINTING SYSTEMS

.1 Dimension lumber: REX 6.2A latex, gloss level 4, over latex primer.

.2 Steel/Metal: REX 5.1DD Alkyd (gloss level 4) finish, over anti-corrosive metal primer.

.3 Cementitious Composite Board Surfaces (site touch up only): EXT 3.3B Alkyd (gloss level 3) finish.

.4 All paint systems to be MPI Premium Grade minimum 3 coat system.

.5 Provide additional coat as required to achieve the desired colour output, such as light colour over dark surface or dark accent colour.

3.0 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and data sheet.

3.2 EXISTING CONDITIONS

.1 Investigate existing substrates for problems related to proper and complete preparation of surfaces to be painted. Report to Departmental Representative damages, defects, unsatisfactory or unfavourable conditions before proceeding with work.

3.3 EXAMINATION

.1 Exterior repainting work: inspected by MPI Accredited Paint Inspection Agency (inspector) acceptable to specifying authority and local Painting Contractor's Association. Painting contractor to notify Paint Inspection Agency minimum of one week prior to commencement of work and provide copy of project repainting specification and Finish Schedule.

.2 Exterior surfaces requiring repainting: inspected by both painting contractor and Paint Inspection Agency who will notify Departmental Representative in writing of defects or problems, prior to commencing repainting work, or after surface preparation if unseen substrate damage is discovered.

.3 Where assessed degree of surface degradation of DSD-1 to DSD-3 before preparation of surfaces for repainting is revealed to be DSD-4 after preparation, repair or replacement of such unforeseen defects discovered are to be corrected, as mutually agreed, before repainting is started.

3.4 PROTECTION

.1 Protect existing building surfaces and adjacent structures from paint spatters, markings and other damage by suitable non-staining covers or masking. If damaged, clean and restore such surfaces as directed by Departmental Representative.

.2 Protect items that are permanently attached such as Fire Labels on doors and frames.

.3 Protect factory finished products and equipment.

.4 Protect passing pedestrians, building occupants and general public in and about building.

.5 Remove light fixtures, surface hardware on doors, and other surface mounted equipment, fittings and fastenings prior to undertaking painting operations. Store items and re-install after painting is completed.

.6 Move and cover exterior furniture and portable equipment as necessary to carry out painting operations. Replace as painting operations progress.

.7 As painting operations progress, place "WET PAINT" signs in pedestrian and vehicle traffic areas to approval of Departmental Representative.

3.5 APPLICATION

.1 Method of application to be as approved by Departmental Representative. Apply paint by brush or roller. Conform to manufacturer's application instructions unless specified otherwise.

.2 Brush and Roller Application:
- .1 Apply paint in a uniform layer using brush and/or roller of types suitable for application.
- .2 Work paint into cracks, crevices and corners.
- .3 Paint surfaces and corners not accessible to brush using spray daubers and/or sheepskins. Paint surfaces and corners not accessible to roller using brush, daubers or sheepskins.
- .4 Brush and/or roll out runs and sags, and over-lap marks. Rolled surfaces shall be free of roller tracking and heavy stipple unless approved by Departmental Representative.
- .5 Remove runs, sags and brush marks from finished work and repaint.

.3 Spray Application:
- .1 Provide and maintain equipment that is suitable for intended purpose, capable of properly atomizing paint to be applied, and equipped with suitable pressure regulators and gauges.
- .2 Keep paint ingredients properly mixed in containers during paint application either by continuous mechanical agitation or by intermittent agitation as frequently as necessary.
- .3 Apply paint in a uniform layer, with overlapping at edges of spray pattern.
- .4 Brush out immediately runs and sags.
- .5 Use brushes to work paint into cracks, crevices and places which are not adequately painted by spray.

.4 Use dipping, sheepskins or daubers when no other method is practical in places of difficult access and when specifically authorized by Departmental Representative.

.5 Apply coats of paint as continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.

.6 Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum time period as recommended by manufacturer.

.7 Sand and dust between coats to remove visible defects.

.8 Finish surfaces both above and below sight lines as specified for surrounding surfaces, including such surfaces as projecting ledges.

.9 Finish top, bottom, edges and cutouts of doors after fitting as specified for door surfaces.

3.6 MECHANICAL/ELECTRICAL EQUIPMENT

.1 Unless otherwise specified, paint exterior exposed conduits, piping, hangers, duct work and other mechanical and electrical equipment with colour and finish to match adjacent surfaces, except as noted otherwise.

.2 Touch up scratches and marks on factory painted finishes and equipment with paint as supplied by manufacturer of equipment.

.3 Do not paint over nameplates.

.4 Paint fire protection piping red.

.5 Paint steel electrical light standards. Do not paint outdoor transformers and substation equipment.

3.7 RESTORATION & CLEANING

.1 Clean and re-install hardware items removed before undertaken painting operations.

.2 Remove protective coverings and warning signs as soon as practical after operations cease.

.3 Remove paint splashings on exposed surfaces that were not painted. Remove smears and spatter

immediately as operations progress, using compatible solvent.

.4 Protect freshly completed surfaces from paint droppings and dust to approval of Departmental Representative. Avoid scuffing newly applied paint.

.5 Restore areas used for storage, cleaning, mixing and handling of paint to clean condition as approved by Departmental Representative.

.6 Proceed in accordance with Section 01 74 11 - Cleaning.

.1 Remove paint where spilled, splashed, splattered or sprayed as work progresses using means and materials that are not detrimental to affected surfaces.

3.8 COLOUR SCHEDULE

.1 Metal doors and frames to match 2121-10 gray by Benjamin Moore.

END OF SECTION 09 91 13

APPENDIX 1-1

Hazardous Building Materials Assessment
Government of Canada, Building E0192, Employee Housing, House 01, British Columbia

ARCADIS Design & Consultancy for natural and built assets

Public Services and Procurement Canada

HAZARDOUS BUILDING MATERIALS ASSESSMENT

Government of Canada, Building E0192, Employee Housing, House 01, British Columbia

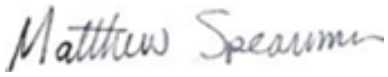
PSPC Project # R.112077.001

October 23, 2020

Arcadis Project No.: 30053059

HAZARDOUS BUILDING MATERIALS ASSESSMENT

Authored by:



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01	00	August 6, 2020	All	Draft Report	J. Botti
02	01	August 11, 2020	All	Final Report	J. Botti
03	02	October 23, 2020	All	Final Report	J. Botti

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ACRONYMS AND ABBREVIATIONS

ACM	Asbestos-Containing Materials
Arcadis	Arcadis Canada Inc.
CLC	Canada Labour Code
COHSR	Canada Occupational Health and Safety Regulations
HPP	Hazard Prevention Program
LCB	Lead-Containing Paints
NIOSH	National Institute for Occupational Safety and Health
NJC	National Joint Council
OHS	Occupational Health and Safety
PCBs	Polychlorinated Biphenyls
PLM	Polarized Light Microscopy
PSPC	Public Services and Procurement Canada
TEM	Transmission Electron Microscopy
USEPA	United States Environmental Protection Agency

EXECUTIVE SUMMARY

Arcadis Canada Inc. (Arcadis) was retained by Public Services and Procurement Canada (PSPC, Client) to conduct a hazardous building materials assessment of Building E0192, House 01, located in British Columbia.

This project consisted of a limited pre-renovation assessment to identify suspect hazardous materials in areas that were excluded from the original survey.

The renovation scope was limited to the part of the building scheduled for renovation, which consisted of replacing exterior windows, doors and vinyl siding as well as replacing metal fascia and gutters.

The hazardous building materials considered during this assessment included the following:

- Asbestos-containing materials (ACMs)
- Lead, including lead-containing paints (LCPs)
- Polychlorinated biphenyls (PCBs) in electrical equipment
- Suspect visible mould
- Mercury materials/products/equipment
- Ozone-depleting substances (ODSs) in heating, ventilation, and air conditioning (HVAC) equipment or fixed fire suppression systems
- Silica in building materials

Arcadis performed the assessment on July 8, 2020. The assessment was conducted by Matthew Spearman, Dipl T (Env), Field Technologist of Arcadis.

Summary of Findings

Asbestos: Asbestos-containing materials (ACM) were confirmed to be present.

Material	Location(s)	Total Quantity	Condition (action)	Asbestos Type (%)
Black Window Sealant*	Exterior at front entrance	2 windows	Good (7)	3% Chrysotile
Black Vapour Barrier Mastic*	Exterior wall cavities	Throughout	Good (7)	1% Chrysotile

*Arcadis February 6, 2020 HBMA Report.

Lead: Confirmed lead is not present in assessed area.

Polychlorinated Biphenyls (PCBs): No PCBs were observed in the assessed area.

Suspect Visible Mould: No suspect visible mould was observed in the assessed area.

Mercury: No mercury vapour was visually confirmed in the assessed area.

Ozone Depleting Substances (ODS): ODS were not observed in the assessed area.

Silica: Crystalline silica is a presumed component of the following materials throughout the building: poured concrete.

Recommendations

The following is a summary of significant recommendations; refer to the body of the report for detailed recommendations.

1. Remove and properly dispose of asbestos-containing materials if disturbed by the planned renovation work.
2. Follow appropriate safe work procedures when handling or disturbing asbestos, and silica.
3. Provide this report and the detailed plans and specifications to the contractor prior to bidding or commencing work.
4. Retain a qualified consultant to specify, inspect and verify the successful removal of hazardous materials.
5. Update the asbestos inventory upon completion of the abatement and removal of asbestos-containing materials.

Findings of this report are subject to our standard Limitations, as outlined in Section 7.

This Executive Summary is subject to the same standard limitations as contained in the report and must be read in conjunction with the entire report.

1 INTRODUCTION

1.1 Purpose

Arcadis Canada Inc. (Arcadis) was retained by Public Services and Procurement Canada (PSPC, Client) to conduct a hazardous building materials assessment of Building E0192, House 01, located in British Columbia.

This project consisted of a limited pre-renovation assessment to identify suspect hazardous materials in areas that were excluded from the original surveys.

The renovation scope was limited to the part of the building scheduled for renovation, which consisted of replacing exterior windows, doors and vinyl siding as well as replacing metal fascia and gutters.

Arcadis performed the assessment on July 8, 2020. The assessment was conducted by Matthew Spearman, Dipl T (Env), Field Technologist of Arcadis.

1.2 Scope of Work

The scope of work for the project, as referenced in the Arcadis Workplan dated June 4, 2020, identifies the requirement to conduct a hazardous building material assessment within building E0192. Specifically, the scope of work included:

- Review of previous reports, construction specifications and drawings and identify any gaps related to hazardous building materials.
- Development of sampling strategy to address the identified gaps.
- Collect and submit representative suspect asbestos material and lead paint chip samples for analysis.
- Collect and submit representative samples of caulking for PCBs where impacted by the proposed renovations.
- Submit samples to accredited laboratories for analysis.
- Evaluation and interpretation of field findings and sample analytical results to develop conclusions and recommendations pertaining to hazardous building materials identified

For the purpose of this assessment, hazardous building materials re defined as follows:

- Asbestos-containing materials (ACMs)
- Lead, including lead-containing paints (LCPs)
- Polychlorinated biphenyls (PCBs) in electrical equipment
- Suspect visible mould
- Mercury materials/products/equipment
- Ozone-depleting substances (ODSs) in heating, ventilation, and air conditioning (HVAC) equipment or fixed fire suppression systems

- Silica in building materials

A general description of the building included in this assessment is provided in the table below:

Table 1. Building Description

Building Number (BU)	Building Name	Total Inside Gross m^2	Year Constructed	Building Description
E0192	House 01	210.90	1988	Two-story building with basement. Asphalt shingle roof. Plywood foundation floating house with Vinyl exterior siding. Drywall interior walls/ ceiling. Texture coat ceiling. Vinyl sheet flooring, carpet and wood laminate flooring. Heating is supplied by gas fired forced air furnace and electric baseboard.

2 BACKGROUND INFORMATION

Arcadis conducted previous assessments of the building and the findings are presented in the following reports:

- Asbestos-Containing Materials Survey Building E0192, dated March 24, 2019, prepared by Arcadis Canada Inc. and,
- Hazardous Building Material Assessment, Building E0192, dated February 6, 2020, prepared by Arcadis Canada Inc.

2.1 Exclusions

The assessment was restricted to accessible locations of the buildings. Roofing or other material that may cause damage to the building envelope were not included unless specifically impacted by the proposed renovations and sampling would not compromise the building envelope integrity. Concrete block walls were not investigated for vermiculite insulation unless specifically impacted by the proposed renovations.

3 SURVEY METHODOLOGY

Sampling activities were conducted in accordance with Arcadis' Standard Operation Procedures which take into account current federal and provincial regulations pertaining to such work (i.e., sampling procedures, required number of samples and laboratory analytical procedures). Regulations are presented in Appendix D.

Representative bulk samples were collected of accessible suspect lead, and asbestos in sufficient quantities for laboratory analysis. Samples were sealed in polyethylene zip-lock bags labeled with the sample number, suspect material description, and sample location. As part of sampling procedures, sampling tools were cleaned between sample collection events to avoid the potential for cross-contamination of samples.

All sample bags were compiled in order and placed into a single container accompanied with a chain of custody form outlining the project information, date, building location, number of samples, and sample description. Samples were submitted to the analytical laboratory in a sealed container via courier.

3.1 Asbestos-Containing Materials

A separate set of samples was collected of each type of homogenous material suspected to contain asbestos. A homogenous material is defined by the US EPA as material that is uniform in texture and appearance, was installed at one time, and is unlikely to consist of more than one type or formulation of material. The homogeneous materials are determined by visual examination, available information on the phases of the construction and prior renovations.

Bulk sampling protocols followed the ASTM E2356 Standard, which indicates requirements for the number of samples to collect for each homogeneous material. The table below provides an outline of the minimum number of samples to be collected from the ASTM E2356 Standard.

Table 2. Bulk Material Sample Quantities

Type of Material	Size of Area of Homogeneous Material	Minimum Number of Samples Collected
Any homogeneous material, including but not limited to fireproofing, drywall joint compound, ceiling tile stucco, acoustical and stipple finishes, and visually similar floor tiles	Less than 90 m^2 (<1,000 ft^2)	3
	90 m^2 or more, but less than 450 m^2 (1,000-5,000 ft^2)	5
	450 m^2 or more (>5,000 ft^2)	7

In some cases, manufactured products such as asbestos cement pipe were visually identified without sample confirmation.

Flooring mastic/adhesive are only sampled and analyzed if present on the underside of flooring samples (vinyl floor tile and vinyl sheet flooring) in sufficient quantity for laboratory analysis.

Attempts to distinguish and delineate asbestos-containing drywall compound from new non-asbestos drywall compound is often unachievable. Arcadis collected drywall joint compound samples from exterior walls, columns or other locations which are unlikely to have been renovated in an attempt to determine the presence of asbestos in the original drywall compound.

Arcadis submitted the bulk samples to a NVLAP accredited laboratory for analysis. The analysis is performed in accordance with Test Method EPA/600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials, July 1993.

EPA Method 600 states that materials characterized by interfering binder/matrix or low asbestos content may require additional gravimetric reduction sample treatment beyond routine polarized light microscopy (PLM) analysis (e.g. dissolution with hydrochloric acid, treatment with organic solvents or ashing in a muffle furnace or low temperature plasma asher to remove unwanted components).

Arcadis submitted one sample of each sample set (3) of vinyl floor tiles be analyzed by transmission electron microscopy (TEM) if the first two samples are reported negative by PLM.

The asbestos analysis was completed using a stop positive approach. Only one result of greater than the regulated criteria is required to determine that a material is asbestos-containing, but all samples must be

analyzed to conclusively determine that a material is non-asbestos. The laboratory stopped analyzing samples from a homogeneous material once greater than the criteria was detected in any of the samples of that material. All samples of a homogeneous material were analyzed if no asbestos was detected. Where building materials are described in this report as non-asbestos, or described as containing no asbestos, this is subject to the limitations of the analytical method used and should be understood to mean no asbestos was detected.

The classification, condition, and accessibility were assessed for the materials which could contain asbestos. To determine these factors, Arcadis followed the methodology outlined in the ASTM E356 Standard. The Standard provides definitions and criteria for the assessment of ACM. The classification, conditions, and accessibility information are provided in Appendix E.

Bulk samples of materials which could contain asbestos were collected and submitted to EMSL Canada Inc. (EMSL) for analysis of asbestos content. Asbestos-containing materials are defined as 0.5% or greater, or any amount if vermiculite.

3.2 Lead

Arcadis collected samples of distinctive paint finishes and surface coatings present in more than a limited application, where removal of the paint is possible. Arcadis collects samples by scraping the painted finish to include base and covering applications. 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. 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 were presumed to be the same, regardless of differing sub surface paints, if any.

The 2017 WorkSafeBC publication *Safe Work Practices for Handling Lead* (Lead Guideline) indicates the following:

> *Unlike for asbestos-containing material, WorkSafeBC does not numerically define what would be considered a lead-containing paint or coating. All suspected paints or coatings should be tested for lead because, depending on the nature of the work, even a small amount could pose a risk to workers. In order to determine which controls and personal protective equipment would be required for a particular job, a qualified person must consider this information as part of the risk assessment.*

- Improper removal of lead paint containing 600 ppm lead results in airborne lead concentrations that exceed half of the exposure limit
  - Exposure limit indicated in both the COHSR and BC Reg. 296/97 is 0.05 mg/m^3
  - Potential for exposure exceeding half of the occupational exposure limit would be the trigger for implementation of an exposure control plan.
- Lead concentrations as low as 90 ppm may present a risk to pregnant women and children
  - Any risk assessment should include for the presence of high risk individuals within the workplace

When reviewing the above, “high risk” individuals are not expected to be present in the workplace associated with this building during building material alteration activities (i.e., demolition) that would create significant disturbance to paint with such individuals present. As such, paints containing 600 ppm lead or

more will be considered “lead-containing” for the purpose of this report, such that appropriate risk assessments can be completed for demolition planning. However, information regarding the lead content of all paints tested is provided herein, for reference and risk assessment should the consideration of high risk individuals be necessary, based on the requirements of a particular situation.

Although a concentration of 600 ppm lead has been used to define paint coatings as LCPs, it should be noted that this is related to painted surfaces and the determination of appropriate provisions to protect occupants and employees from exposure to elevated concentrations of lead during typical operations and maintenance or simple renovation. This does not include painted metal surfaces that are to be welded, burned or torch-cut.

Using an arc welder or oxyacetylene torch on steel that is coated with lead-containing paint can create hazardous lead fumes and is prohibited by section 12.115 of BC Reg. 296/97.

> Regulatory excerpt: **12.115 Coatings on metals**
>
> *A coating on metal which could emit harmful contaminants (such as lead, chromium, organic materials, or toxic combustion products) must be removed from the base metal, whenever practicable, before welding or cutting begins.*

In addition, the following information is provided in the Lead Guideline:

- Welding or torch cutting of paints or coatings on metal can create very high concentrations of airborne lead fumes. Torch cutting structural steel, coated with paint containing as little as 130 mg/kg (equivalent to ppm) lead, can release airborne levels of lead as high as 0.8 mg/m^3 (16 times the exposure limit).

Given this information and that the analytical detection limit for lead paint analysis is approximately 80– 90 ppm (not significantly different than 130 ppm, which, per above, may release airborne lead levels 16 times the exposure limit), any paint coating on a metal surface to be welded, burned or torch-cut must be removed prior to that action being undertaken, unless a project-specific or tasks-specific risk assessment and safe work practices are developed by a qualified person.

Paint and surface coatings are evaluated for condition. The criteria for condition evaluation pertaining to LCPs described herein are generally based on the United States Housing and Urban Development (HUD) 2012 *Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing*.

When evaluating the condition of LCPs, an attempt should be made to determine whether the deterioration is due to a moisture problem or some other existing building deficiency. **“Poor”** surfaces are considered to be a hazard and should be corrected. “**Fair”** surfaces should be repaired but are not yet considered to be a hazard; if not repaired, they should be monitored frequently. “**Good/intact”** surfaces should be monitored to ensure that they remain in a nonhazardous condition.

In addition, the presence of paint debris must be considered in evaluating condition. Given the variety of paint uses, there are many applications that can have a tendency for the paint to “wear” from the surface

slowly, over an extended period of time. Conditions where paint has worn from a surface are worth noting for maintenance discussions (i.e., related to re-coating the surface should, for example, the coating provide weather protection), however, in the absence of loose paint chip debris/dust, such conditions would not represent a potential exposure situation related to lead.

The condition evaluation criteria for LCPs are summarized in the table below.

Table 3. Lead-Containing Paint Condition Categories

Type of Building Component[1]	Total Area of Deteriorated Paint on Each Component		
	Good/Intact	Fair[2]	Poor[3]
Exterior components with large surface areas.	Entire surface is intact.	Less than or equal to 10 square feet	More than 10 square feet
Interior components with large surface areas (walls, ceilings, floors, doors.	Entire surface is intact.	Less than or equal to 2 square feet	More than 2 square feet
Interior and exterior components with small surface areas (windowsills, baseboards, soffits, trim).	Entire surface is intact.	Less than or equal to 10% of the total surface area of the component.	More than 10% of the total surface area of the component

NOTES:

1. Building component in this table refers to each individual component or side of building, not the combined surface area of all similar components in a room (e.g., a wall with 1 square foot of deteriorated paint is in "fair" condition, even if the other three walls in a room are intact).
2. Surfaces in "fair" condition should be repaired and/or monitored but are not considered to be "lead-containing paint hazards".
3. Surfaces in "poor" condition are considered to be "lead-containing paint hazards" and should be addressed through abatement or interim controls.

Analysis for lead in paints or surface coatings was performed in accordance with EPA Method No. 3050B/Method No. 7420; flame atomic absorption at laboratory accredited by the American Industrial Hygiene Association (AIHA).

3.3 Polychlorinated Biphenyls (PCBs)

The presence or absence of fluorescent lights was documented during the course of our investigation to determine whether there were any of the T12 type. T12 fluorescent lamps, with a diameter of 1.5 inches, utilize transformer type magnetic ballasts, which may contain PCBs. The use of T12s has been discontinued and replaced with new high-efficiency 1-inch T8 lamps (and other types) which use electronic ballasts which do not contain PCBs.

Wet transformers were assessed for PCBs based on the age of the building, a review of maintenance records and examination of labels or nameplates on equipment, where present and accessible. The information is compared to known ban dates of PCBs and Environment Canada publications.

Dry type transformers are presumed to be free of dielectric fluids and hence non-PCB. Caulking's were not sampled for PCB content unless specifically impacted by the proposed renovation scope. The material is considered a PCB solid if PCB content is 50ppm or greater based on the threshold given in SOR/2008-273.

3.4 Suspect Visible Mould

Arcadis identified the presence of any suspect mould and/or moisture-impacted building materials by visual inspection during the course of our site investigation. Suspect mould is typically a coloured, textured substance or discolouration/staining on a building material surface which, based on our experience, may be mould growth. If any mould growth is concealed within wall, ceiling, or floor cavities, it is not addressed in this assessment. No mould sampling or moisture testing is performed unless directed by the Client. The adjective *suspect* is used where the presence of mould has not been confirmed by laboratory analysis.

3.5 Mercury

Building materials/products/equipment (e.g. thermostats, barometers, pressure gauges, light tubes), suspected to contain mercury were identified by visually inspection only. Dismantling of equipment suspected of containing mercury was not performed. Sampling of these materials for laboratory analysis of mercury content was not performed.

Mercury spills or damaged mercury-containing equipment was recorded where observed.

3.6 Ozone Depleting Substances (ODS)

Arcadis determined the potential presence of ODS (chlorofluorocarbons, hydrochlorofluorocarbons, hydrofluorocarbons, halons, etc.) in air conditioning units, chillers, commercial coolers, and fire suppression systems by visual inspection of manufactures' labels or plates, maintenance records, or logbooks, etc.

3.7 Silica

Arcadis identified building materials suspected of containing crystalline silica (e.g. concrete, cement, tile, brick, masonry, mortar) by knowledge of current and historic applications and visual inspection only. Arcadis did not perform sampling of these materials for laboratory analysis of crystalline silica content.

4 RESULTS

4.1 Asbestos

During the course of our assessment, representative bulk samples of material were collected by Arcadis staff. The samples were forwarded to EMSL in Burnaby, British Columbia (BC) for asbestos analyses. EMSL holds a current Certificate of Accreditation for Bulk Asbestos Fibre Analysis under the Voluntary Accreditation Program (NVLAP). Bulk sampling was performed in general accordance with the requirements specified in ASTM E2356 Standard, BC Reg. 296/97 and in the WorkSafe BC publication Safe Work Practices for Handling Asbestos.

Results of bulk sample analysis for asbestos content are provided in the table below. Samples that exceed the criteria are highlighted in yellow.

Site Photographs provided in Appendix A. Laboratory certificates of analysis have been provided in Appendix B. Floor plans indicating sample locations and room numbers are provided in Appendix C.

Table 4. Results of Bulk Sample Analysis for Asbestos

Sample Number	Sample Description	Sample Location	Asbestos Type %
S-01A	Building Paper	Exterior – North Face	None Detected
S-01B	Building Paper	Exterior – North Face	None Detected
S-01C	Building Paper	Exterior – West Face	None Detected
S-01D	Building Paper	Exterior – West Face	None Detected
S-01E	Building Paper	Exterior – South Face	None Detected

The following building materials were common in the assessed area: however, these materials do not contain asbestos and were not sampled during the survey:

- Vinyl siding, wood trim, concrete, and styrofoam behind wood trim.

Asbestos-containing materials were confirmed present in the following table:

Table 5. Summary of Confirmed Asbestos-Containing Materials

Material	Location(s)	Total Quantity	Condition	Asbestos Type (%)
Black Window Sealant*	Exterior at front entrance	2 windows	Good (7)	3% Chrysotile
Black Vapour Barrier Mastic*	Exterior wall cavities	Throughout	Good (7)	1% Chrysotile

*Arcadis February 6, 2020 HBMA Report. Black vapour barrier mastic is not expected to be impacted the planned work.

Presumed Materials

No presumed materials that may contain asbestos are suspected to be present in the way of planned work

4.2 Lead

During the course of our site investigation, representative bulk samples of predominant paint types were collected by Arcadis staff. The samples were forwarded to EMSL for lead analyses. Results of bulk sample analysis for lead content are provided in the table below. Results that exceed the criteria re highlighted in yellow.

The laboratory report is provided in Appendix B.

Table 6. Results of Analyses of Bulk Samples for Paint for Lead

Sample No.	Sample Location(s)	Sample Description	Lead Content (ppm)
L-01	Exterior – Deck and stairs	Grey paint on white paint on wood	<80
L-02	Exterior – Metal trim	White paint on metal	290
L-03	Exterior – Metal rain gutter	White paint on metal	<130
L-04	Exterior – Wood trim	White paint on wood	320

No lead was detected at a level above the definition of lead paint (600 ppm) in any samples. No lead paint was identified in the previous reports. Where one colour of paint is indicated in the sample descriptions in the table above, only one layer of paint was observed. Where multiple colours are indicated in the sample description, multiple layers of paint were observed.

All paint applications were noted to be generally in good condition.

4.3 Polychlorinated Biphenyls (PCBs)

PCBs were not observed in the assessed area.

4.4 Suspect Visible Mould

Suspect visible mould was not observed during the assessment.

4.5 Mercury

Mercury-containing items were not observed in the assessed area.

4.6 Ozone Depleting Substances

Ozone Depleting Substances (ODS) were not observed in the assessed area.

4.7 Silica

Crystalline silica is a presumed component of the following materials in the assessed area:

- poured or pre-cast concrete

5 RECOMMENDATIONS

If future building renovation or demolition is required beyond the scope of this project, a detailed intrusive assessment must be conducted. The assessment should include destructive testing (i.e. coring and/or removal of building finishes and components), and sampling of materials not previously tested (i.e. roofing materials, mastics etc.).

All hazardous building materials were reported in good condition. All ACM observed were considered to fall under a recommended Action Level 7 (routine surveillance).

5.1 Building Renovation Work

The following specific recommendations are made regarding renovation involving the hazardous materials identified.

1. Prepare plans and update performance specifications for hazardous material removal required for the planned work. The specifications should include the scope of work, personal protective equipment, respiratory protection, and disposal of waste materials.
2. Provide this report and the detailed plans and specifications to the contractor prior to bidding or commencing work.
3. Retain a qualified consultant to specify, inspect and verify the successful removal of hazardous materials.
4. Update the asbestos inventory upon completion of the abatement and removal of asbestos-containing materials.

The following general recommendations are made regarding renovation involving the hazardous materials identified.

Asbestos

Remove all asbestos-containing materials (ACM) prior to renovation, alteration, maintenance, or demolition work or if ACM may be disturbed by the work.

If the identified ACM will not be removed prior to commencement of the work, disturbance of ACM must follow the appropriate asbestos precautions for the classification of work being performed.

Asbestos-containing materials must be disposed of at a landfill approved to accept asbestos waste.

Suspect Visible Mould

No mould was observed; if mould is uncovered during renovations, use appropriate precautions and protect workers using methods that comply with provincial guidelines.

Silica

Construction disturbance of silica-containing products may result in excessive exposures to airborne silica, especially if performed indoors and dry. Cutting, grinding, drilling or demolition of materials containing silica should be completed only with proper respiratory protection and other worker safety precautions that comply with provincial standards or guidelines.

6 REFERENCES

The following legislation and documents were referenced in completing the assessment and this report:

1. Occupational Health and Safety Regulation, B.C. Reg. 296/97, WorkSafe BC.
2. Safe Work Practices for Handling Asbestos, WorkSafe BC, 2017 Edition.

3. Hazardous Waste Regulation, B.C. Reg. 63/88, November 2017, BC Environmental Management Act.
4. Ozone Depleting Substances and Other Halocarbons Regulation, B.C. Reg. 317/2012 Environmental Management Act.
5. PCB Regulations, SOR/2008-273, Canadian Environmental Protection Act.
6. Lead-Containing Paint and Coatings, Preventing Exposure in the Construction Industry, WorkSafe BC, June 2017.
7. Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing, United States Housing and Urban Development (HUD) 2012.
8. Mould Guidelines for the Canadian Construction Industry, Standard Construction Document 2018, Canadian Construction Association.
9. Minister of Justice Canada Labour Code. R.S.C., 1985, c. L-2. March 2020.
10. Minister of Justice. 2018. Canada Occupational Health and Safety Regulations. SOR/86-304, June 2019.
11. Public Services and Procurement Canada Asbestos Management Standard. June 2019.
12. Transport Canada Consolidated Transport of Dangerous Goods Regulations including Amendment SOR/2019-101.
13. ASTM E2356 Standard Practice for Comprehensive Buildings Asbestos Surveys.
14. Government of Canada, Asbestos Management Plan, Version 2020-01, January 2020.

7 LIMITATIONS

This report, prepared for Public Services and Procurement Canada on behalf of Government of Canada, does not provide certification or warranty, expressed or implied, that the investigation conducted by Arcadis identified all hazardous materials associated with the subject building. The work undertaken by Arcadis was directed to provide information on the presence of hazardous materials in construction materials based on visual inspection of readily accessible areas of the subject building, and on the results of laboratory analysis of a limited number of bulk samples. The material in this report reflects Arcadis' best judgment in light of the information available at the time of the investigation, which was performed on July 8, 2020. This report is not intended to be used as a scope of work or technical specification for remediation of hazardous materials. Any use which any other party makes of the report, or reliance on, or decisions to be based on it, is the responsibility of such parties.

APPENDIX A

Site Photographs

Project Photographs

Public Services and Procurement Canada
Building E0192, House 01, British Columbia

Photo: 1

Date:
July 8, 2020

Description:
View of exterior.
Front of building.

Photo: 2

Date:
July 8, 2020

Description:
View of exterior.
Rear of building.

Project Photographs

Public Services and Procurement Canada
Building E0192, House 01, British Columbia

Photo: 3

Date:
July 8, 2020

Description:
New composite stairs and risers, on old stair foundation with non-lead grey paint.

Photo: 4

Date:
July 8, 2020

Description:
Close up view of new composite stairs and risers.

Project Photographs

Public Services and Procurement Canada
Building E0192, House 01, British Columbia

Photo: 5

Date:
July 8, 2020

Description:
West view of building exterior.

Photo: 4

Date:
July 8, 2020

Description:
Rear of building with damaged wood trim. Both paint on wood trim and metal trim above are non-lead based paint.

APPENDIX B

Laboratory Certificates of Analysis

EMSL Canada Inc.
2333 18th Avenue NE, Unit 48, Calgary, AB T2E 8T6
Phone/Fax: (403) 879-1149 / (403) 879-1152
http://www.EMSL.com CalgaryLab@EMSL.com

EMSL Canada Or	652005051
CustomerID:	55ACAV42
CustomerPO:	30053059
ProjectID:	

Attn: **Jerry Botti**
ARCADIS Canada Inc.
308-1080 Mainland Street
Vancouver, BC V6B 2T4

Phone: (604) 632-9941
Fax:
Received: 7/20/2020 08:30 AM
Collected: 7/8/2020

Project: **30053059 / E0192 / House 01**

Test Report: Lead in Paint Chips by Flame AAS (SW 846 3050B/7000B)*

Client Sample Description	*Lab ID*	*Collected*	*Analyzed*	*Weight*	*Lead Concentration*
L-01	*652005051-0001*	7/8/2020	7/22/2020	0.2592 g	<80 ppm
	Site: EXTERIOR - GREY PAINT ON WHITE PAINT ON WOOD PAINT				
L-02	*652005051-0002*	7/8/2020	7/22/2020	0.2508 g	290 ppm
	Site: EXTERIOR - WHITE PAINT ON METAL TRIM				
L-03	*652005051-0003*	7/8/2020	7/22/2020	0.1508 g	<130 ppm
	Site: EXTERIOR - WHITE PAINT ON METAL GUTTER Insufficient sample to reach reporting limit.				
L-04	*652005051-0004*	7/8/2020	7/22/2020	0.2652 g	320 ppm
	Site: EXTERIOR - WHITE PAINT ON WOOD TRIM				

Client request: Remove address from project name.

Jefferson Salvador, Laboratory Manager
or other approved signatory

Report Amended: 10/22/2020 10:25:28 Replaces the Inital Report 07/24/2020 15:32:14. Reason Code: Client-Other (see report comment)

EMSL Canada Inc.

4506 Dawson Street Burnaby, BC V5C 4C1
Phone/Fax: (604) 757-3158 / (604) 757-4731
http://www.EMSL.com / vancouverlab@EMSL.com

EMSL Canada Order 692001625
Customer ID: 55ACAV42
Customer PO: 30053059
Project ID:

Attn: Jerry Botti
ARCADIS Canada Inc.
308-1080 Mainland Street
Vancouver, BC V6B 2T4

Phone: (604) 632-9941
Fax:
Collected: 7/ 8/2020
Received: 7/16/2020
Analyzed: 7/23/2020

Proj: 30053059 / E0192 / House 01

Test Report: Asbestos Analysis in Bulk Material for Occupational Health and Safety British Columbia Regulation 188/2011 via EPA 600/R-93/116 Method

Client Sample ID: S-01A **Lab Sample ID:** 692001625-0001
Sample Description: EXTERIOR - NORTH/BUILDING PAPER

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	7/21/2020	Brown	85.0%	15.0%	None Detected	

Client Sample ID: S-01B **Lab Sample ID:** 692001625-0002
Sample Description: EXTERIOR - NORTH/BUILDING PAPER

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	7/21/2020	Brown	85.0%	15.0%	None Detected	

Client Sample ID: S-01C **Lab Sample ID:** 692001625-0003
Sample Description: EXTERIOR - WEST/BUILDING PAPER

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	7/21/2020	Brown	85.0%	15.0%	None Detected	

Client Sample ID: S-01D **Lab Sample ID:** 692001625-0004
Sample Description: EXTERIOR - WEST/BUILDING PAPER

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	7/21/2020	Brown	85.0%	15.0%	None Detected	

Client Sample ID: S-01E **Lab Sample ID:** 692001625-0005
Sample Description: EXTERIOR - SOUTH/BUILDING PAPER

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	7/23/2020	Brown	85.0%	15.0%	None Detected	

EMSL Canada Inc.

4506 Dawson Street Burnaby, BC V5C 4C1
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http://www.EMSL.com / vancouverlab@EMSL.com

EMSL Canada Order 692001625
Customer ID: 55ACAV42
Customer PO: 30053059
Project ID:

Test Report: Asbestos Analysis in Bulk Material for Occupational Health and Safety British Columbia Regulation 188/2011 via EPA 600/R-93/116 Method

Analyst(s):

Margaret Lee	PLM (4)
Nicole Yeo	PLM (1)

Reviewed and approved by:

Nicole Yeo, Laboratory Manager
or Other Approved Signatory

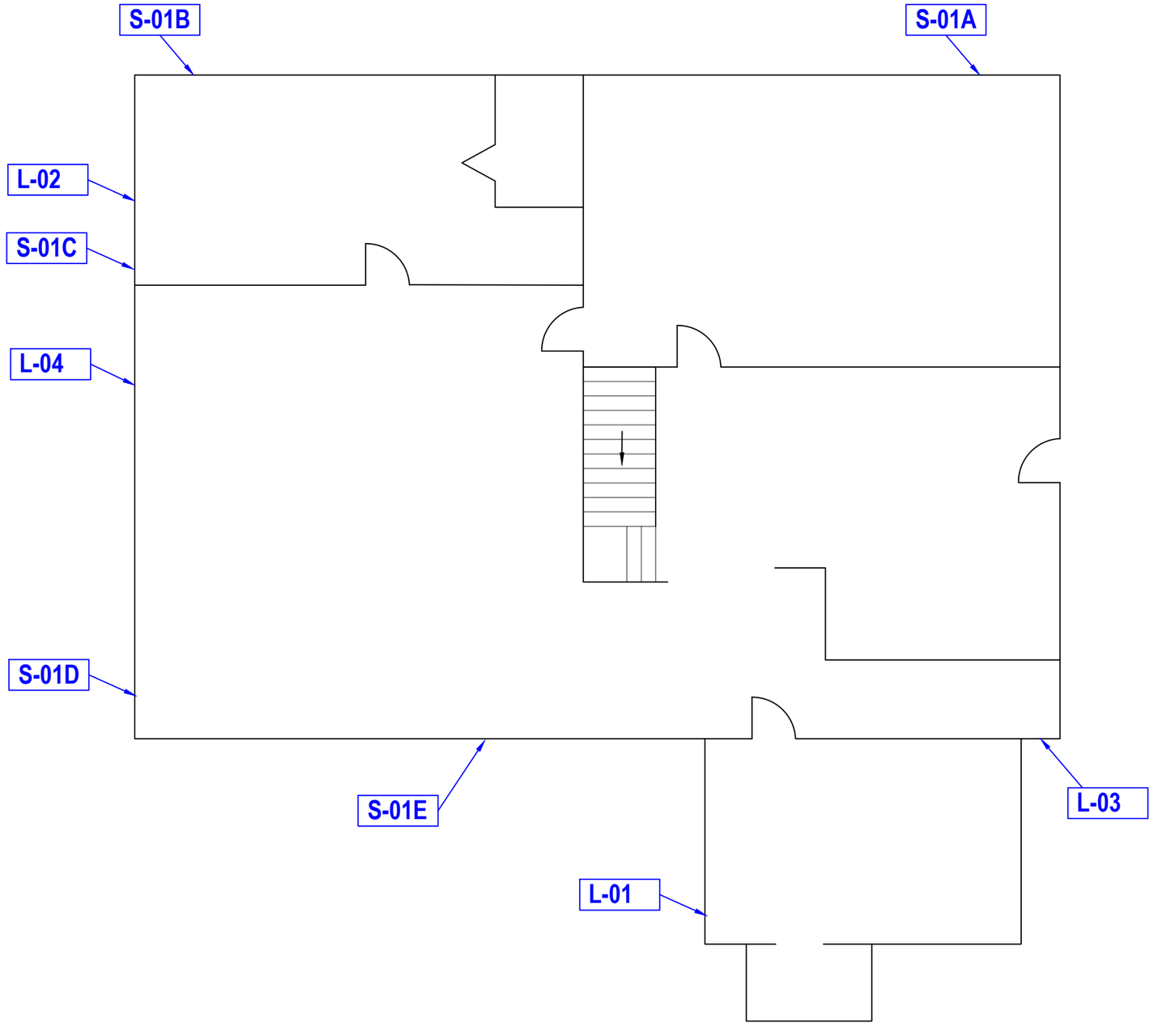
None Detected = <0.1%. EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations.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

Samples analyzed by EMSL Canada Inc. Burnaby, BC

Report amended: 10/21/202016:52:00 Replaces initial report from: 07/23/202011:39:06 Reason Code: Client-Change to Project

APPENDIX C

Floor Plans



LEGEND

S-XXX Bulk Asbestos Sample

L-XXX Bulk Lead Paint Sample

N.T.S

Title: **GOVERNMENT OF CANADA**
HAZARDOUS BUILDING MATERIAL ASSESSMENT - 2020

Project: BUILDING E0192 - HOUSE 01
FIRST FLOOR

Client: PUBLIC SERVICES AND PROCUREMENT CANADA

Project Number:	Drawn By:	Plot Size:	Date:
30053059	CB	11X17"	JULY 2020

ARCADIS

FIGURE 1

firstfloor G:\PROJECTS\30053059 - PSPC_RCMP Construction 2020\CAD\30053059-tuchodl2.dwg

APPENDIX D

Regulations and Health Effects

Asbestos

Occupational Health and Safety (OHS) for federal employees is regulated by the Canada Labour Code (CLC) Part II. The *Canada Occupational Health and Safety Regulations (COHSR), Part X, Hazardous Substances* covers specific requirements related to the management and control of asbestos-containing materials (ACM). The COHSR, Part X, Hazardous Substances, states an employee shall be kept free from exposure to a concentration of airborne chrysotile asbestos in excess of 0.1 fibre/cm^3 or f/cc. There are also specific requirements for hazard prevention detailed in the Hazard Prevention Program (HPP) in the CLC.

For the purposes of this report, the following federal requirements will be followed, unless provincial requirements are more stringent. Federal legislation and policy referenced in this report includes:

- Canada Labour Code, March 2020;
- Canada Occupational Health and Safety Regulations Part X, Hazardous Substances; SOR/86-304, June 2019;
- Public Services and Procurement Canada Asbestos Management Standard, June 2019;
- Asbestos Management Plan, Government of Canada, Version 2020-01, January 2020; and,
- Transport Canada, Transport of Dangerous Goods Regulations

The management and requirements for the potential disturbance of asbestos in buildings is also regulated at the provincial level under the *British Columbia Occupational Health and Safety Regulations,296/97, and Safe Work Practices for Handling Asbestos, WorkSafeBC, 2017 Edition*.

The BC Occupational Health and Safety Regulations, 296/97 (BC Reg 296/97), require specific actions when asbestos is a potential health hazard in a workplace. Section 6.1 of the regulation defines an asbestos-containing material as follows:

"asbestos-containing material" means the following:

(a) a manufactured article or other material, other than vermiculite insulation, that would be determined to contain at least 0.5% asbestos if tested in accordance with one of the following methods:

(i) Asbestos, Chrysotile by XRD, Method 9000 (Issue 2, dated August 15, 1994) in the NIOSH Manual of Analytical Methods, published by the United States National Institute for Occupational Safety and Health, Centre for Disease Control;

(ii) Asbestos (bulk) by PLM, Method 9002 (Issue 2, dated August 15, 1994) in the NIOSH Manual of Analytical Methods, published by the United States National Institute for Occupational Safety and Health, Centre for Disease Control;

(iii) Test Method for the Determination of Asbestos in Bulk Building Materials (EPA/600/R-93/116, dated July 1993) published by the United States Environmental Protection Agency;

(b) vermiculite insulation that would be determined to contain any asbestos if tested in accordance with the Research Method for Sampling and Analysis of Fibrous Amphibole in Vermiculite Attic Insulation (EPA/600/R-04/004, dated January 2004) published by the United States Environmental Protection Agency;

The duties of employers, contractors, or owners include:

- identifying and labeling ACM that can potentially release asbestos fibres;
- keeping a current written record of all ACM present in the workplace;
- conducting regular surveillance and maintenance of asbestos materials to prevent fibre release;
- developing a written exposure control plan if workers may be exposed to harmful levels of asbestos;
- conducting work in a way that prevents the release of asbestos fibres as much as possible;
- notifying, informing, and training workers; and,
- notifying Occupational Health and Safety (OHS) at least 48 hours before beginning an asbestos-abatement.

Disturbance of asbestos during construction and demolition is regulated under section 20.112 of BC Reg 296/97.

The 2017 WorkSafeBC publication Safe Work Practices for Handling Asbestos (Asbestos Guide) is used by Occupational Health and Safety officers as a guide when reviewing abatement work practices and employer codes of practice, and generally meets the requirements of the COHSR.

The Asbestos Guide also provides significant additional background information pertaining to asbestos, along with details on health effects and other applicable legislation within the province of British Columbia (e.g., the federal Hazardous Products Act, the BC Building Code and waste disposal regulations).

Disposal of asbestos waste is governed by the British Columbia Hazardous Waste Regulation (BC Reg. 63/88). The Federal Transportation of Dangerous Goods Regulation and BC Reg. 63/88 set out the requirements for the proper transport of asbestos waste in British Columbia. In general, and for transportation and disposal, the waste must be placed in a double sealed container, properly labeled, free of cuts, tears or punctures and disposed of at a licensed waste station which has been properly notified of the presence of asbestos waste.

Health effects

Undisturbed asbestos within building materials poses no health risks. Asbestos poses a risk when building materials containing asbestos are impacted, or disturbed, thereby releasing the asbestos fibres into the air

Asbestos-related diseases are caused when suspended airborne asbestos fibres are inhaled and the fibres settle into various regions of the lungs and remain for extended periods. Once embedded in the lungs the asbestos fibres cause scarring within the lung tissue, ultimately leading to impaired lung function (asbestosis) and/or various cancers (lung cancer; mesothelioma). These asbestos-related diseases are irreversible and fatal. The risk of lung-related cancers is increased in individuals who smoke.

These asbestos-related diseases most often occur in individuals who have been exposed to high concentrations of airborne asbestos over a long period of time, though mesothelioma has been found in individuals with short-term exposures. Symptoms or the development of these asbestos-related diseases usually occur 10 to 25 years after exposure

Lead

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 (2005) to 90 ppm (2010).

With respect to potential lead exposures associated with disturbance to surfaces coated with lead-containing products, the 2017 WorkSafeBC manual titled Lead-Containing Paint and Coatings: Preventing Exposure in the Construction Industry, indicates the following:

- Improper removal of lead paint containing 600 mg/kg lead results in airborne lead concentrations that exceed half of the exposure limit
    - This potential for exposure exceeding half of the occupational exposure limit would be the trigger for implementation of an exposure control plan.
- Lead concentrations as low as 90 mg/kg may present a risk to pregnant women and children
    - Any risk assessment should include for the presence of high risk individuals within the workplace

The disposal of lead-containing paint is regulated under the Federal *Transportation of Dangerous Goods Act* and by the British Columbia Ministry of Environment. All lead-based paints and associated nonmetal substrate (concrete, plaster, wood, etc.) must undergo Toxicity Characteristic Leachate Properties (TCLP) metals testing to determine disposal procedures. Upon the completion of the test, the total concentration of metals in the waste extract must be compared to Schedule 4, Table 1 of the Hazardous Waste Regulation.

The Federal Transportation of Dangerous Goods Regulation and BC Reg. 63/88 set out the requirements for the proper transport of lead waste in British Columbia.

Health Effects

Elemental lead and inorganic lead compounds are absorbed through ingestion or inhalation and can incorporate into the bone marrow, nerve tissue, brain, and kidneys. In children, symptoms of lead poisoning can include headaches, irritability, abdominal pain, vomiting, anemia, weight loss, poor attention span, noticeable learning difficulty, slowed speech development, and hyperactivity. In adults, symptoms of lead poisoning can include pain, numbness or tingling of the extremities, muscular weakness, headache, abdominal pain, memory loss, unsteady gait, pale skin, weight loss, vomiting, irritability, and anemia. Although adults are susceptible to the toxic effects of lead, children are at high risk due to the nature of a child's activities that involve the introduction of non-food items into their bodies.

Excessive airborne lead and surface contamination can be transferred to employees' hands and may results in lead ingestion. Therefore, work practices intended to minimize surface lead concentrations, such as frequent cleaning of work surfaces should be included in an overall lead exposure control plan

PCB

As of September 5, 2008, under subsection 93(1) of the *Canadian Environmental Protection Act,* (CEPA), Federal PCB regulations were published by the Canada Gazette Part II (SOR/2008-273) that imposed specific deadlines for the elimination of all PCBs in concentrations at or above 50 milligrams/kilogram (mg/kg). This regulation required the elimination of all PCBs and PCB-containing materials currently in-use and in storage and limited the period of time PCB materials could 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.

In British Columbia, PCB equipment becomes PCB wastes as soon as it is removed from service. This is the case even if the intent is to treat, recycle, or reuse the equipment.

When PCB wastes are stored in British Columbia, the full requirements of BC Reg. 63/88 apply to:

- 1.0 kg or more of pure PCB
- 100 L or more of any liquid containing more than 50 ppm of PCB
- 100 kg or more of any material other than a liquid, contaminated with more than 50 ppm of PCB

These amounts are the total of all amounts at a single location owned or controlled by the same person. They include PCB equipment. BC Reg. 63/88 also provides packaging requirements for storage, labeling requirements, waste destruction requirements, and references SOR/2008-273, indicating:

The Federal Transportation of Dangerous Goods Regulation sets out the requirements for the proper transport of PCB waste across provincial boundaries.

In British Columbia, a manifest issued by the Ministry of Environment (or equivalent federal document) must be used for hazardous wastes shipped from sites in British Columbia. A manifest must be used to transport:

- 5 kg or more of PCB solids
- 5 L or more of PCB liquids
- An amount of a PCB solid or PCB liquid containing more than 500 g of PCB within BC
- 500 g or more of solids, liquids, or mixtures of these containing 50 mg/kg of PCB outside of BC

Health effects

PCBs are insoluble in water; however, they readily dissolve in fats and other organic compounds. It is these attributes and fat-solubility that allow PCBs to persist in the environment and bio-accumulate in humans and animals. Exposure to PCBs can affect the immune system, reproductive system, nervous system, and endocrine system. In humans, PCBs are potentially cancer-causing.

Mould

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, occupational health and safety regulations typically require employers to take every precaution reasonable in the circumstances for the protection of workers.

The WorkSafeBC Guideline for Part 4 of BC Reg. 296/97 discusses the application of the Regulation to workplaces with mould showing on exposed or hidden surfaces, or where mould may be a factor in complaints regarding indoor air quality. The guideline provides information for investigating indoor air quality complaints with respect to mould contamination, including information on sampling for the

presence of moulds in buildings. Information is also provided on possible health effects and for cleanup personnel involved in the remediation of buildings damaged by water and mould.

Health Effects

There are a number of documented cases of health problems related to exposure to indoor fungi.

Both high-level, short-term exposures and lower-level, long-term exposures can result in illness. The most common symptoms from exposure to mould in indoor environments are runny nose, eye irritation, cough, congestion, aggravation of asthma, headache, flu-like symptoms, fatigue, and skin rash. People with suppressed immune systems may be susceptible to fungal infections as a result of exposure to indoor moulds.

People who are exposed to mould growth on building materials will not necessarily exhibit adverse health effects. However, the mould must still be removed. Humans are at risk from indoor mould when fungal spores, fragments or metabolites are released into the air and inhaled or physically contacted (dermal exposure).

Not everyone experiences allergic reaction; the susceptibility to exposure varies with the individual's genetic predisposition, age, state of health, and concurrent exposures. For these reasons, and because the measurement of exposure is not standardized and biological markers of exposure to fungi are largely unknown, it is not possible to establish "safe" or "unsafe" levels of exposure. However, federal, and provincial policies have been written to minimize mould exposure and the elimination of mould indoors.

Mercury

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 disposal should be through a scrap dealer (elemental mercury), recycling firm for mercury vapour and returned to the manufacturer for light tubes and fixtures. Disposal of mercury waste is governed by BC Reg. 63/88.

The Federal Transportation of Dangerous Goods Regulation and BC Reg. 63/88 set out the requirements for the proper transport of mercury waste in British Columbia.

Health Effects

Routes of exposure for mercury and mercury compounds include inhalation, ingestion, skin and/or eye contact. 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.

Elemental (metallic) mercury most often causes health effects through inhalation of its vapour, which can be absorbed through the lungs. This kind of exposure can result when elemental mercury is spilled (or products that contain elemental mercury break) and the mercury is exposed to the air. Vapour concentrations can vary especially in warm or poorly-ventilated indoor spaces where the airborne concentration can exceed the permissible exposure limit (provincially set).

Chronic mercury "poisoning" can be caused by long-term exposure to low airborne concentrations (or low levels) of mercury. Symptoms or effects of mercury exposure include: tremors, emotional changes,

neuromuscular effects, mental changes/disturbances, digestive disturbances, headaches, insomnia, and changes in nervous response.

Silica

Regulations pertaining to silica are provided in BC Reg. 296/97. Included are general provisions (minimizing release; keeping worksite clear of unnecessary accumulations; ensuring methods for decontamination prevent generation of airborne silica), provisions for "restricted areas" (where there is a reasonable chance that the airborne concentration of silica exceeds or may exceed the occupational exposure limit), provisions for use in abrasive blasting, and provisions for health assessments for workers exposed to silica.

Health Effects

Crystalline silica dust particles, which are small enough to be inhaled into the lungs (respirable size), can cause a number of health problems. As with asbestos, silica within building materials poses no threat to human health if left undisturbed.

Exposure to crystalline silica airborne dust my cause scaring of the lungs with coughing and shortness of breath—also known as "silicosis", a form of disabling, progressive, and sometimes fatal pulmonary fibrosis.

Ozone Depleting Substances (ODS)

ODSs are regulated in British Columbia by the British Columbia *Waste Management Act*—Ozone Depleting Substances and Other Halocarbons Regulation (BC Reg. 387/99 as amended by BC Reg. 317/2012).

On federal land, aboriginal land and federal works, buildings and undertakings, the Federal Halocarbon Regulation 2003 (SOR/2003-289, including associated amendments) 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.

If ODS-containing materials are to be removed and disposed of, all ODSs must be handled, recycled, stored, and/or disposed of in accordance with the requirements of BC Reg. 63/88.

The Federal Transportation of Dangerous Goods Regulation and BC Reg. 63/88 set out the requirements for the proper transport of ODS waste in British Columbia.

Health Effects

Health effects are not typically related to exposure to ODSs directly, but to the consequences of ODS release to the atmosphere, subsequent degradation of the earth's ozone layer, and implications associated with increased UVB light exposure.

APPENDIX E

Classification, Condition and Accessibility

1.1 Spray Applied Fireproofing, Insulation and Texture Finishes

To evaluate the condition of ACM spray applied as fireproofing, thermal insulation, or texture, decorative or acoustic finishes, the following criteria are applied:

GOOD

Surface of material shows no significant signs of damage, deterioration, or delamination. Up to 1 percent visible damage to surface is allowed within range of **GOOD**. Evaluation of sprayed fireproofing requires the surveyor to be familiar with the irregular surface texture typical of sprayed asbestos products. **GOOD** condition includes un-encapsulated 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 1 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 survey or re-assessment form.

NOTE: **FAIR** condition is not utilized in the evaluation of the 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 are advised to be watchful for ACM **DEBRIS** prior to accessing or working above ceilings in areas of buildings with ACM regardless of the reported condition.

1.2 Mechanical Insulation

The evaluation of the condition of mechanical insulation (on boilers, breaching, ductwork, piping, tanks, equipment etc.) utilizes the following criteria:

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 penetrating 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. It is not possible to observe the full length of mechanical insulation from all angles.

1.3 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 should be treated as a friable product.

2. Evaluation of Accessibility

The accessibility of building materials known or suspected of being ACM is rated according to the following criteria:

ACCESS (A)

Areas of the building within reach (from floor level) of all building users. Includes areas such as gymnasiums, workshops, and storage areas where activities of the building users may result in disturbance of ACM not normally within reach from floor level.

ACCESS (B)

Frequently entered maintenance areas within reach of maintenance staff, without the need for a ladder. Includes: frequently entered pipe chases, tunnels and service areas or areas within reach from a fixed ladder or catwalk, e.g. tops of equipment, mezzanines.

ACCESS (C) EXPOSED

Areas of the building above 2.4 metres where use of a ladder is required to reach the ACM. Only refers to ACM that is exposed to view, from the floor or ladder, without the removal or opening of other building components such as ceiling tiles, or service access door or hatch. Does not include infrequently accessed service areas of the building.

ACCESS (C) CONCEALED

Areas of the building which require the removal of a building component, including lay-in ceilings and access panels into solid ceiling systems. Includes rarely entered crawl spaces, attic spaces, etc. Observations will be limited to the extent visible from the access points.

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 ACM. Evaluation of condition and extent of ACM is limited or impossible, depending on the surveyor's ability to visually examine materials in ACCESS D.

3. ACM DEBRIS

3.1 DEBRIS from Friable ACM

The presence of fallen ACM is noted separately from the presumed friable ACM source (sprayed fireproofing, thermal insulation, texture, decorative or acoustic finishes or mechanical insulation) and is referred to as **DEBRIS**.

3.2 DEBRIS from Damaged Non-Friable ACM

The presence of fallen ACM from damaged non-friable ACM is also reported separately from the non-friable ACM source. Only fallen non-friable ACM that has become friable is reported as **DEBRIS**.

The identification of the exact location or presence of **DEBRIS** on the top of ceiling tiles is limited by the number of observations made and the presence of building components such as ducts or full height walls

that obstruct observations. Workers are advised to be watchful for the presence of **DEBRIS** prior to accessing or working in proximity to mechanical insulation or above ceilings in areas of buildings with ACM regardless of the reported presence or absence of **DEBRIS**.

4. Action Matrix and Action Descriptions

The Asbestos Management Plan requires the following responses:

- Immediately clean-up **DEBRIS** that is likely to be disturbed.
- Remove, repair, or enclose friable ACM in **POOR** or **FAIR** condition whose continued deterioration will result in **DEBRIS** that is likely to be disturbed.

The following factors shall be considered in making site-specific recommendations for compliance with the existing applicable regulations or codes and the practical implementation of the Asbestos Management Plan:

1. ACM in **POOR** condition is not routinely repairable. If an abatement action is necessary, removal is the recommended action (enclosure is a viable option in unusual circumstances, e.g. where removal is difficult or costly and the asbestos-containing material can be thoroughly enclosed).

2. Mechanical insulation in **FAIR** condition will be repaired or removed based on the following general recommendations, applied on a case-by-case basis:
   - ACM insulation found in **FAIR** condition in ACCESS (B) or ACCESS (C) EXPOSED areas is to be repaired.
   - ACM mechanical insulation found in **FAIR** condition in ACCESS (B) and ACCESS (C) EXPOSED areas, where future damage to the ACM is likely to occur, is to be removed.

3. ACM in **GOOD** condition present in ACCESS (A) can be managed by surveillance, as long as it is not disturbed by future renovation, maintenance, or demolition. Proactive removal of the ACM in ACCESS (A) will be considered where damage is possible by on-going occupant activity (accidental or intentional).

4. Non-friable or manufactured products are considered in the action matrix as follows:
   - Non-friable and manufactured products reported in **POOR** condition, or friable **DEBRIS** resulting from the deterioration of non-friable ACM, are treated as friable materials and the appropriate action, and depending on accessibility is determined from the action matrix for friable ACM.
   - For non-friable or manufactured products reported in **GOOD** condition, Action 7 (surveillance) is recommended regardless of accessibility.

5. All asbestos-containing material from a particular area is to be removed where small quantities of asbestos are present, and removal will negate the need for the use of an Asbestos Management Program in that area.

The action matrix provided below establishes the recommended asbestos control action. The ACTIONS themselves are described in full following the table.

4.1 Action Matrix Tables

FRIABLE ACM				
ACCESS	**CONDITION**			**DEBRIS**
	GOOD	**FAIR**	**POOR**	
(A)	ACTION 5/7[1]	ACTION 5/6[2]	ACTION 3	ACTION 1
(B)	ACTION 7	ACTION 6/5[3]	ACTION 3	ACTION 1
(C) EXPOSED	ACTION 7	ACTION 6	ACTION 4	ACTION 2
(C) CONCEALED	ACTION 7	ACTION 7	ACTION 4	ACTION 2
(D)	ACTION 7	ACTION 7	ACTION 7	ACTION 7

[1] If material in **ACCESS (A)/GOOD** condition is not removed **ACTION 7** is required.

[2] If material in **ACCESS(A)/FAIR** condition is not removed **ACTION 6** is required.

[3] Remove ACM in **ACCESS (B)/FAIR** condition if ACM is likely to be disturbed.

4.2 Action Descriptions

ACTION 1 - Immediate Clean-Up of DEBRIS that is Likely to Be Disturbed

Access that is likely to cause a disturbance of the ACM **DEBRIS** is to be restricted and **clean up ACM DEBRIS is to be done immediately**. Use correct asbestos procedures. This action is required for compliance with regulatory requirements and good practice. The assessor should immediately notify the Asset or Property and Facility Manager, or Regional/Area Asbestos Management Coordinator of this condition.

ACTION 2 - Intermediate risk precautions for Entry into Areas with ACM DEBRIS

At locations where ACM **DEBRIS** can be isolated in lieu of removal or cleaned up, use appropriate means to limit entry to the area. Restrict access to the area to persons using intermediate risk asbestos precautions. The precautions will be required until the ACM **DEBRIS** has been cleaned up, and the source of the **DEBRIS** has been stabilized or removed.

ACTION 3 - ACM Removal Required for Compliance

Remove ACM for compliance with regulatory requirements and good practice. Utilize asbestos procedures appropriate to the scope of the removal work.

ACTION 4 - Access into areas where asbestos-containing material is present and likely to be disturbed by access requires intermediate risk precautions.

Intermediate risk asbestos precautions are to be used when entry or access into an area is likely to disturb the ACM. **ACTION 4** must be used until the ACM is re-moved (Use **ACTION 1** or **2** if **DEBRIS** is present). Intermediate risk or high-risk precautions should be used for removal (depending on extent of removal).

ACTION 5 - Proactive ACM Removal

Removal of ACM in lieu of repair may be considered, even if it is in **GOOD** condition at locations, where ACM is easily accessible, limited in quantity, and removal would be cost-effective.

ACTION 6 - ACM Repair

Repair ACM found in **FAIR** condition, and not likely to be damaged again or disturbed by normal use of the area or room. Upon completion of the re-pair work treat ACM as material **in GOOD** condition and implement **ACTION 7**. If ACM is likely to be damaged or disturbed during normal use of the area or room, **ACTION 5** is to be implemented.

ACTION 7 - Routine Surveillance

Institute routine surveillance of the ACM. Trained workers or contractors must use appropriate asbestos precautions (low, intermediate, or high) during disturbance of the remaining ACM.

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APPENDIX 1-2

Hazardous Building Materials Assessment
Building E0163, Employee Housing, House 02, British Columbia

ARCADIS Design & Consultancy for natural and built assets

Public Services and Procurement Canada

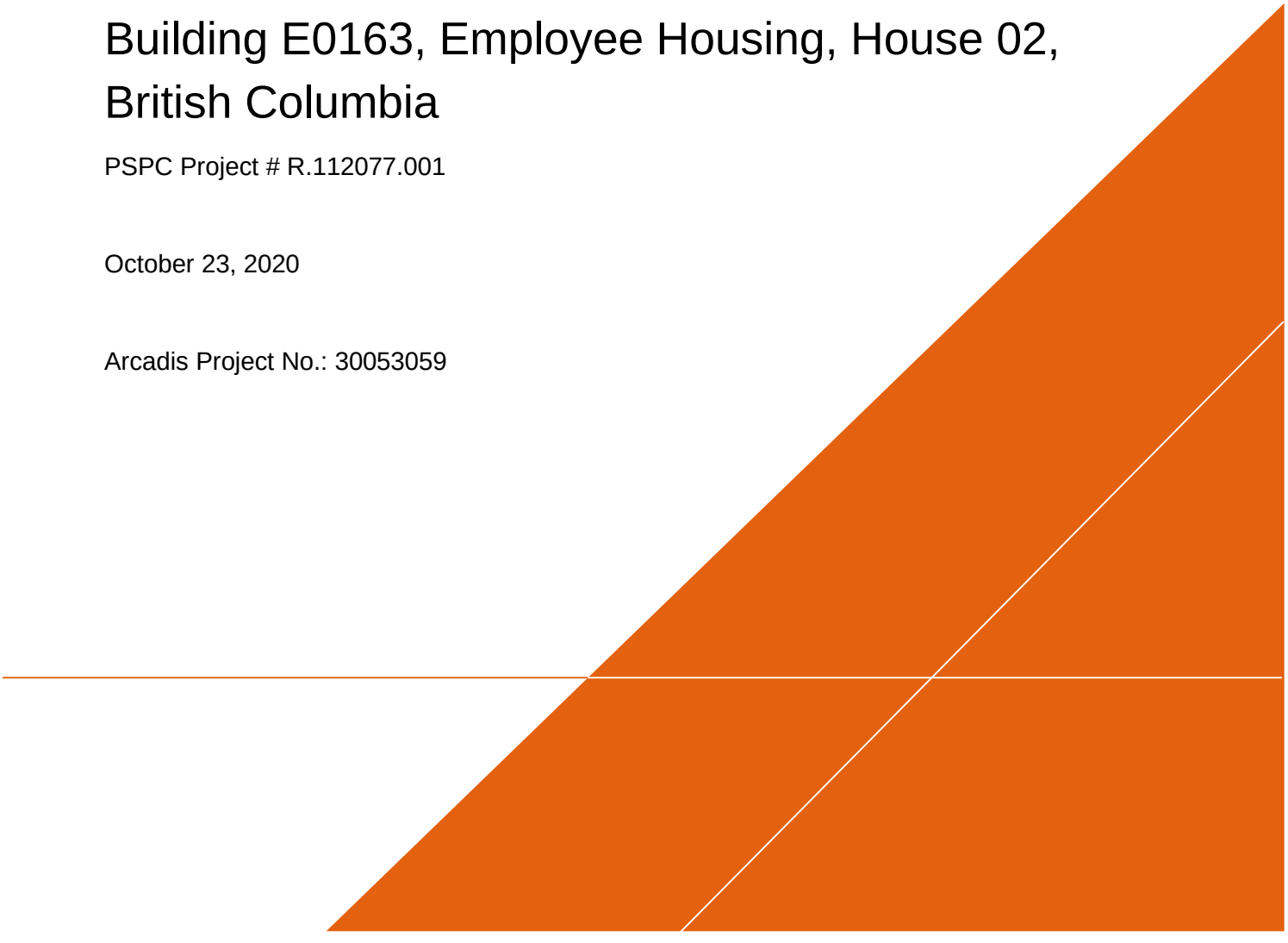
HAZARDOUS BUILDING MATERIALS ASSESSMENT

Building E0163, Employee Housing, House 02, British Columbia

PSPC Project # R.112077.001

October 23, 2020

Arcadis Project No.: 30053059



HAZARDOUS BUILDING MATERIALS ASSESSMENT

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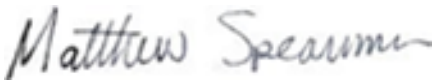

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ACRONYMS AND ABBREVIATIONS

ACM	Asbestos-Containing Materials
Arcadis	Arcadis Canada Inc.
CLC	Canada Labour Code
COHSR	Canada Occupational Health and Safety Regulations
HPP	Hazard Prevention Program
LCB	Lead-Containing Paints
NIOSH	National Institute for Occupational Safety and Health
NJC	National Joint Council
OHS	Occupational Health and Safety
PCBs	Polychlorinated Biphenyls
PLM	Polarized Light Microscopy
PSPC	Public Services and Procurement Canada
TEM	Transmission Electron Microscopy
USEPA	United States Environmental Protection Agency

EXECUTIVE SUMMARY

Arcadis Canada Inc. (Arcadis) was retained by Public Services and Procurement Canada (PSPC, Client) to conduct a hazardous building materials assessment of Building E0163, House 02, located in British Columbia. The project consisted of a pre-construction assessment based on the provided renovation scope. The objective of the pre-construction assessment was to identify hazardous building materials in preparation for building renovation.

The renovation scope was limited to the part of the building scheduled for renovation, which consisted of replacing exterior windows and vinyl siding.

The hazardous building materials considered during this assessment included the following:

- Asbestos-containing materials (ACMs)
- Lead, including lead-containing paints (LCPs)
- Polychlorinated biphenyls (PCBs) in electrical equipment
- Suspect visible mould
- Mercury materials/products/equipment
- Ozone-depleting substances (ODSs) in heating, ventilation, and air conditioning (HVAC) equipment or fixed fire suppression systems
- Silica in building materials

Arcadis performed the assessment on July 8, 2020. The assessment was conducted by Matthew Spearman, Dipl T (Env), Field Technologist of Arcadis.

Summary of Findings

Asbestos: Asbestos-containing materials (ACM) were confirmed to be present as follows:

Material	Location(s)	Total Quantity	Condition (action)	Asbestos Type (%)
Brown Firestop Putty*	Exterior at cable penetration	1 penetration	Good (7)	15% Chrysotile
Black window sealant*	Exterior at front entrance	2 windows	Good (7)	3% Chrysotile

*Arcadis February 13, 2020 HBMA Report

Lead: Lead is confirmed present in the following paint:

Color (substrate)	Location(s)	Total Quantity	Condition	Concentration (ppm)
White (Metal Trim)	Exterior - around building, above wood trim	~47 meters	Good	960
White (Wood trim)	Exterior - around base of building	~47 meters	Fair	650

Polychlorinated Biphenyls (PCBs): PCBs were not observed in the way of planned work.

Suspect Visible Mould: Suspect visible mould was not observed in the assessed area.

Mercury: Mercury vapor was observed in the way of planned work: one compact fluorescent light bulb at the front entrance

Ozone Depleting Substances (ODS): ODS were not observed in the assessed area.

Silica: Crystalline silica is a presumed component of the following materials in the assessed area:

- poured or pre-cast concrete

Recommendations

The following is a summary of significant recommendations; refer to the body of the report for detailed recommendations.

1. Remove and properly dispose of asbestos-containing materials if disturbed by the planned renovation work.
2. Remove and dispose of mercury-containing items when taken out of service or if disturbed by the planned renovation work.
3. Follow appropriate safe work procedures when handling or disturbing asbestos, lead and silica.
4. Prepare and update plans and performance specifications regarding hazardous material removal for the planned work. The specifications should include the scope of work, safe work practices, personal protective equipment, respiratory protection, and disposal of waste materials.
5. Provide this report and the detailed plans and specifications to the contractor prior to bidding or commencing work.
6. Retain a qualified consultant to specify, inspect and verify the successful removal of hazardous materials.
7. Update the asbestos inventory upon completion of the abatement and removal of asbestos-containing materials.

Findings of this report are subject to our standard Limitations, as outlined in Section 7.

This Executive Summary is subject to the same standard limitations as contained in the report and must be read in conjunction with the entire report.

1 INTRODUCTION

1.1 Purpose

Arcadis Canada Inc. (Arcadis) was retained by Public Services and Procurement Canada (PSPC, Client) to conduct a hazardous building materials assessment of Building E0163, House 02, located in British Columbia.

The project consisted of a limited pre-construction assessment based on the renovation scope. The objective of the pre-construction assessment was to identify hazardous building materials in preparation for building renovation.

The renovation scope was limited to the part of the building scheduled for renovation, which consisted of replacing exterior windows and vinyl siding.

Arcadis performed the assessment on July 8, 2020. The assessment was conducted by Matthew Spearman, Dipl T (Env), Field Technologist of Arcadis.

1.2 Scope of Work

The scope of work for the project, as referenced in the Arcadis Workplan dated June 4, 2020 , identifies the requirement to conduct a hazardous building material assessment within building E0163. Specifically, the scope of work included:

- Review of previous reports, construction specifications and drawings and identify any gaps related to hazardous building materials.
- Development of sampling strategy to address the identified gaps.
- Collect and submit representative suspect asbestos material and lead paint chip samples for analysis.
- Submit samples to accredited laboratories for analysis.
- Evaluation and interpretation of field findings and sample analytical results to develop conclusions and recommendations pertaining to hazardous building materials identified

For the purpose of this assessment, hazardous building materials re defined as follows:

- Asbestos-containing materials (ACMs)
- Lead, including lead-containing paints (LCPs)
- Polychlorinated biphenyls (PCBs) in electrical equipment
- Suspect visible mould
- Mercury materials/products/equipment
- Ozone-depleting substances (ODSs) in heating, ventilation, and air conditioning (HVAC) equipment or fixed fire suppression systems
- Silica in building materials

A general description of the building included in this assessment is provided in the table below:

Table 1. Building Description

Building Number (BU)	Building Name	Total Inside Gross m^2	Year Constructed	Building Description
E0163	House 02	200.60	1988	Two-story building with asphalt shingle roof and concrete foundation. Vinyl siding exterior. Drywall and ceramic interior walls. Drywall, texture coat, lay-in ceiling tile and plywood ceilings. Carpet, plywood, wood laminate and vinyl sheet flooring. Heating is supplied by gas fired forced air furnace and electric baseboard heaters.

2 BACKGROUND INFORMATION

Arcadis conducted a previous assessment of the building and the findings are presented in the following report:

- Hazardous Building Material Assessment, Building E0163, dated February 13, 2020, prepared by Arcadis Canada Inc.

2.1 Exclusions

The assessment was restricted to accessible locations of the buildings. Roofing or other material that may cause damage to the building envelope were not included unless specifically impacted by the proposed renovations and sampling would not compromise the building envelope integrity. Concrete block walls were not investigated for vermiculite insulation unless specifically impacted by the proposed renovations.

3 SURVEY METHODOLOGY

Sampling activities were conducted in accordance with Arcadis' Standard Operation Procedures which take into account current federal and provincial regulations pertaining to such work (i.e., sampling procedures, required number of samples and laboratory analytical procedures). Regulations are presented in Appendix D.

Representative bulk samples were collected of accessible suspect, PCB, lead, and asbestos in sufficient quantities for laboratory analysis. Samples were sealed in polyethylene zip-lock bags labeled with the sample number, suspect material description, and sample location. As part of sampling procedures, sampling tools were cleaned between sample collection events to avoid the potential for cross-contamination of samples.

All sample bags were compiled in order and placed into a single container accompanied with a chain of custody form outlining the project information, date, building location, number of samples, and sample description. Samples were submitted to the analytical laboratory in a sealed container via courier.

3.1 Asbestos-Containing Materials

A separate set of samples was collected of each type of homogenous material suspected to contain asbestos. A homogenous material is defined by the US EPA as material that is uniform in texture and

appearance, was installed at one time, and is unlikely to consist of more than one type or formulation of material. The homogeneous materials are determined by visual examination, available information on the phases of the construction and prior renovations.

Bulk sampling protocols followed the ASTM E2356 Standard, which indicates requirements for the number of samples to collect for each homogeneous material. The table below provides an outline of the minimum number of samples to be collected from the ASTM E2356 Standard.

Table 2. Bulk Material Sample Quantities

Type of Material	Size of Area of Homogeneous Material	Minimum Number of Samples Collected
Any homogeneous material, including but not limited to fireproofing, drywall joint compound, ceiling tile stucco, acoustical and stipple finishes, and visually similar floor tiles	Less than 90 m^2 (<1,000 ft^2)	3
	90 m^2 or more, but less than 450 m^2 (1,000-5,000 ft^2)	5
	450 m^2 or more (>5,000 ft^2)	7

In some cases, manufactured products such as asbestos cement pipe were visually identified without sample confirmation.

Flooring mastic/adhesive are only sampled and analyzed if present on the underside of flooring samples (vinyl floor tile and vinyl sheet flooring) in sufficient quantity for laboratory analysis.

Attempts to distinguish and delineate asbestos-containing drywall compound from new non-asbestos drywall compound is often unachievable. Arcadis collected drywall joint compound samples from exterior walls, columns or other locations which are unlikely to have been renovated in an attempt to determine the presence of asbestos in the original drywall compound.

Arcadis submitted the bulk samples to a NVLAP accredited laboratory for analysis. The analysis is performed in accordance with Test Method EPA/600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials, July 1993.

EPA Method 600 states that materials characterized by interfering binder/matrix or low asbestos content may require additional gravimetric reduction sample treatment beyond routine polarized light microscopy (PLM) analysis (e.g. dissolution with hydrochloric acid, treatment with organic solvents or ashing in a muffle furnace or low temperature plasma asher to remove unwanted components).

Arcadis submitted one sample of each sample set (3) of vinyl floor tiles be analyzed by transmission electron microscopy (TEM) if the first two samples are reported negative by PLM.

The asbestos analysis was completed using a stop positive approach. Only one result of greater than the regulated criteria is required to determine that a material is asbestos-containing, but all samples must be analyzed to conclusively determine that a material is non-asbestos. The laboratory stopped analyzing samples from a homogeneous material once greater than the criteria was detected in any of the samples of that material. All samples of a homogeneous material were analyzed if no asbestos was detected. Where building materials are described in this report as non-asbestos, or described as containing no asbestos, this is subject to the limitations of the analytical method used and should be understood to mean no asbestos was detected.

The classification, condition, and accessibility were assessed for the materials which could contain asbestos. To determine these factors, Arcadis followed the methodology outlined in the ASTM E356

Standard. The Standard provides definitions and criteria for the assessment of ACM. The classification, conditions, and accessibility information are provided in Appendix E.

Bulk samples of materials which could contain asbestos were collected and submitted to EMSL Canada Inc. (EMSL) for analysis of asbestos content. Asbestos-containing materials are defined as 0.5% or greater, or any amount if vermiculite.

3.2 Lead

Arcadis collected samples of distinctive paint finishes and surface coatings present in more than a limited application, where removal of the paint is possible. Arcadis collects samples by scraping the painted finish to include base and covering applications. 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. 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 were presumed to be the same, regardless of differing sub surface paints, if any.

The 2017 WorkSafeBC publication *Safe Work Practices for Handling Lead* (Lead Guideline) indicates the following:

> *Unlike for asbestos-containing material, WorkSafeBC does not numerically define what would be considered a lead-containing paint or coating. All suspected paints or coatings should be tested for lead because, depending on the nature of the work, even a small amount could pose a risk to workers. In order to determine which controls and personal protective equipment would be required for a particular job, a qualified person must consider this information as part of the risk assessment.*

- Improper removal of lead paint containing 600 ppm lead results in airborne lead concentrations that exceed half of the exposure limit
  - Exposure limit indicated in both the COHSR and BC Reg. 296/97 is 0.05 mg/m^3
  - Potential for exposure exceeding half of the occupational exposure limit would be the trigger for implementation of an exposure control plan.
- Lead concentrations as low as 90 ppm may present a risk to pregnant women and children
  - Any risk assessment should include for the presence of high risk individuals within the workplace

When reviewing the above, “high risk” individuals are not expected to be present in the workplace associated with this building during building material alteration activities (i.e., demolition) that would create significant disturbance to paint with such individuals present. As such, paints containing 600 ppm lead or more will be considered “lead-containing” for the purpose of this report, such that appropriate risk assessments can be completed for demolition planning. However, information regarding the lead content of all paints tested is provided herein, for reference and risk assessment should the consideration of high risk individuals be necessary, based on the requirements of a particular situation.

Although a concentration of 600 ppm lead has been used to define paint coatings as LCPs, it should be noted that this is related to painted surfaces and the determination of appropriate provisions to protect occupants and employees from exposure to elevated concentrations of lead during typical operations and

maintenance or simple renovation. This does not include painted metal surfaces that are to be welded, burned or torch-cut.

Using an arc welder or oxyacetylene torch on steel that is coated with lead-containing paint can create hazardous lead fumes and is prohibited by section 12.115 of BC Reg. 296/97.

> Regulatory excerpt: **12.115 Coatings on metals**
>
> *A coating on metal which could emit harmful contaminants (such as lead, chromium, organic materials, or toxic combustion products) must be removed from the base metal, whenever practicable, before welding or cutting begins.*

In addition, the following information is provided in the Lead Guideline:

- Welding or torch cutting of paints or coatings on metal can create very high concentrations of airborne lead fumes. Torch cutting structural steel, coated with paint containing as little as 130 mg/kg (equivalent to ppm) lead, can release airborne levels of lead as high as 0.8 mg/m^3 (16 times the exposure limit).

Given this information and that the analytical detection limit for lead paint analysis is approximately 80– 90 ppm (not significantly different than 130 ppm, which, per above, may release airborne lead levels 16 times the exposure limit), any paint coating on a metal surface to be welded, burned or torch-cut must be removed prior to that action being undertaken, unless a project-specific or tasks-specific risk assessment and safe work practices are developed by a qualified person.

Paint and surface coatings are evaluated for condition. The criteria for condition evaluation pertaining to LCPs described herein are generally based on the United States Housing and Urban Development (HUD) 2012 *Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing*.

When evaluating the condition of LCPs, an attempt should be made to determine whether the deterioration is due to a moisture problem or some other existing building deficiency. **"Poor"** surfaces are considered to be a hazard and should be corrected. "**Fair"** surfaces should be repaired but are not yet considered to be a hazard; if not repaired, they should be monitored frequently. "**Good/intact"** surfaces should be monitored to ensure that they remain in a nonhazardous condition.

In addition, the presence of paint debris must be considered in evaluating condition. Given the variety of paint uses, there are many applications that can have a tendency for the paint to "wear" from the surface slowly, over an extended period of time. Conditions where paint has worn from a surface are worth noting for maintenance discussions (i.e., related to re-coating the surface should, for example, the coating provide weather protection), however, in the absence of loose paint chip debris/dust, such conditions would not represent a potential exposure situation related to lead.

The condition evaluation criteria for LCPs are summarized in the table below.

Table 3. Lead-Containing Paint Condition Categories

Type of Building Component[1]	Total Area of Deteriorated Paint on Each Component		
	Good/Intact	Fair[2]	Poor[3]
Exterior components with large surface areas.	Entire surface is intact.	Less than or equal to 10 square feet	More than 10 square feet
Interior components with large surface areas (walls, ceilings, floors, doors.	Entire surface is intact.	Less than or equal to 2 square feet	More than 2 square feet
Interior and exterior components with small surface areas (windowsills, baseboards, soffits, trim).	Entire surface is intact.	Less than or equal to 10% of the total surface area of the component.	More than 10% of the total surface area of the component

NOTES:

1. Building component in this table refers to each individual component or side of building, not the combined surface area of all similar components in a room (e.g., a wall with 1 square foot of deteriorated paint is in "fair" condition, even if the other three walls in a room are intact).
2. Surfaces in "fair" condition should be repaired and/or monitored but are not considered to be "lead-containing paint hazards".
3. Surfaces in "poor" condition are considered to be "lead-containing paint hazards" and should be addressed through abatement or interim controls.

Analysis for lead in paints or surface coatings was performed in accordance with EPA Method No. 3050B/Method No. 7420; flame atomic absorption at laboratory accredited by the American Industrial Hygiene Association (AIHA).

3.3 Polychlorinated Biphenyls (PCBs)

The presence or absence of fluorescent lights was documented during the course of our investigation to determine whether there were any of the T12 type. T12 fluorescent lamps, with a diameter of 1.5 inches, utilize transformer type magnetic ballasts, which may contain PCBs. The use of T12s has been discontinued and replaced with new high-efficiency 1-inch T8 lamps (and other types) which use electronic ballasts which do not contain PCBs.

Wet transformers were assessed for PCBs based on the age of the building, a review of maintenance records and examination of labels or nameplates on equipment, where present and accessible. The information is compared to known ban dates of PCBs and Environment Canada publications.

Dry type transformers are presumed to be free of dielectric fluids and hence non-PCB. Caulking's were not sampled for PCB content unless specifically impacted by the proposed renovation scope. The material is considered a PCB solid if PCB content is 50ppm or greater based on the threshold given in SOR/2008-273.

3.4 Suspect Visible Mould

Arcadis identified the presence of any suspect mould and/or moisture-impacted building materials by visual inspection during the course of our site investigation. Suspect mould is typically a coloured, textured substance or discolouration/staining on a building material surface which, based on our experience, may be

mould growth. If any mould growth is concealed within wall, ceiling, or floor cavities, it is not addressed in this assessment. No mould sampling or moisture testing is performed unless directed by the Client. The adjective *suspect* is used where the presence of mould has not been confirmed by laboratory analysis.

3.5 Mercury

Building materials/products/equipment (e.g. thermostats, barometers, pressure gauges, light tubes), suspected to contain mercury were identified by visually inspection only. Dismantling of equipment suspected of containing mercury was not performed. Sampling of these materials for laboratory analysis of mercury content was not performed.

Mercury spills or damaged mercury-containing equipment was recorded where observed.

3.6 Ozone Depleting Substances (ODS)

Arcadis determined the potential presence of ODS (chlorofluorocarbons, hydrochlorofluorocarbons, hydrofluorocarbons, halons, etc.) in air conditioning units, chillers, commercial coolers, and fire suppression systems by visual inspection of manufactures' labels or plates, maintenance records, or logbooks, etc.

3.7 Silica

Arcadis identified building materials suspected of containing crystalline silica (e.g. concrete, cement, tile, brick, masonry, mortar) by knowledge of current and historic applications and visual inspection only. Arcadis did not perform sampling of these materials for laboratory analysis of crystalline silica content.

4 RESULTS

4.1 Asbestos

During the course of our assessment, representative bulk samples of material were collected by Arcadis staff. The samples were forwarded to EMSL in Burnaby, British Columbia (BC) for asbestos analyses. EMSL holds a current Certificate of Accreditation for Bulk Asbestos Fibre Analysis under the Voluntary Accreditation Program (NVLAP). Bulk sampling was performed in general accordance with the requirements specified in ASTM E2356 Standard, BC Reg. 296/97 and in the WorkSafe BC publication Safe Work Practices for Handling Asbestos.

Results of bulk sample analysis for asbestos content are provided in the table below. Samples that exceed the criteria are highlighted in yellow.

Site Photographs provided in Appendix A. Laboratory certificates of analysis have been provided in Appendix B. Floor plans indicating sample locations and room numbers are provided in Appendix C.

Table 4. Results of Bulk Sample Analysis for Asbestos

Sample Number	Sample Description	Sample Location	Asbestos Type %
S-01A	Building Paper	Exterior – East face	None Detected
S-01B	Building Paper	Exterior – North face, East side	None Detected

Sample Number	Sample Description	Sample Location	Asbestos Type %
S-01C	Building Paper	Exterior – North face, West side	None Detected
S-01D	Building Paper	Exterior – West face, North side	None Detected
S-01E	Building Paper	Exterior - West face, South side	None Detected
S-02A	Window Caulking (White)	Exterior – East face, South window	None Detected
S-02B	Window Caulking (White)	Exterior – East face, North window	None Detected
S-02C	Window Caulking (White)	Exterior – West face, North window	None Detected
S-03A	Deck Caulking (Grey)	Exterior – Wood seams on deck	None Detected
S-03B	Deck Caulking (Grey)	Exterior – Wood seams on deck	None Detected
S-03C	Deck Caulking (Grey)	Exterior – Wood seams on deck	None Detected
S-04A*	Caulking (Grey)	Exterior – East cable penetration above wood carport siding	None Detected
S-05A	Caulking (White)	Exterior – Awning Gutter	None Detected
S-05B	Caulking (White)	Exterior – Awning Gutter	None Detected
S-05C	Caulking (White)	Exterior – Awning Gutter	None Detected

*Only one sample was collected of caulking (grey) on the East cable penetration due to limited quantity present.

The following building materials were common in the building: however, these materials do not contain asbestos and were not sampled during the survey:

- Vinyl siding, metal trim, plywood and poured concrete.

Asbestos-containing materials were confirmed present in the following table:

Table 5. Summary of Confirmed Asbestos-Containing Materials

Material	Location(s)	Total Quantity	Condition	Asbestos Type (%)
Brown Firestop Putty*	Exterior at cable penetration	1 penetration	Good (7)	15% Chrysotile
Black window sealant*	Exterior at front entrance	2 windows	Good (7)	3% Chrysotile

*Arcadis February 13, 2020 HBMA Report

Presumed Materials

No presumed materials that may contain asbestos are suspected to be present in the way of planned work.

4.2 Lead

During the course of our site investigation, representative bulk samples of predominant paint types were collected by Arcadis staff. The samples were forwarded to EMSL for lead analyses. Results of bulk sample analysis for lead content are provided in the table below. Results that exceed the criteria are highlighted in yellow.

The laboratory report is provided in Appendix B.

Table 6. Results of Analyses of Bulk Samples for Paint for Lead

Sample No.	Sample Location(s)	Sample Description	Lead Content (ppm)
L-01	Exterior – Around base of building, above wood trim	White paint on metal trim	960
L-02	Exterior – Wood siding at carport	Grey paint on wood siding	<80
L-03	Exterior – Around base of building	White paint on wood trim	650
L-04	Exterior – Around rooftop and awning at front entrance	White paint on rain gutter	<200

Lead was detected at a level above the definition of lead paint (600 mg/kg) in samples L-01 and L-03. Where one colour of paint is indicated in the sample descriptions in the table above, only one layer of paint was observed. Where multiple colours are indicated in the sample description, multiple layers of paint were observed.

All paint applications were noted to be generally in fair to good condition. Lead paint was not identified in the February 2020 report. Surfaces in “fair” condition should be repaired and/or monitored but are not considered to be lead-containing paint hazards.

4.3 Polychlorinated Biphenyls (PCBs)

PCBs were not observed in the assessed area.

4.4 Suspect Visible Mould

Suspect visible mould was not observed in the assessed area.

4.5 Mercury

Mercury vapor was observed in the assessed area: one compact fluorescent light bulb at the front entrance.

4.6 Ozone Depleting Substances

Ozone Depleting Substances (ODS) were not observed in the assessed area.

4.7 Silica

Crystalline silica is a presumed component of the following materials where present in the building:

- poured concrete

5 RECOMMENDATIONS

If future building renovation or demolition is required beyond the scope of this project, a detailed intrusive assessment must be conducted. The assessment should include destructive testing (i.e. coring and/or removal of building finishes and components), and sampling of materials not previously tested (i.e. roofing materials, mastics etc.).

5.1 Building Renovation Work

The following specific recommendations are made regarding renovation involving the hazardous materials identified.

1. Prepare plans and update performance specifications for hazardous material removal required for the planned work. The specifications should include the scope of work, personal protective equipment, respiratory protection, and disposal of waste materials.
2. Provide this report and the detailed plans and specifications to the contractor prior to bidding or commencing work.
3. Retain a qualified consultant to specify, inspect and verify the successful removal of hazardous materials.
4. Update the asbestos inventory upon completion of the abatement and removal of asbestos-containing materials.

The following general recommendations are made regarding renovation involving the hazardous materials identified.

Asbestos

Remove all asbestos-containing materials (ACM) using “Minimum Asbestos Abatement Precautions” prior to renovation, alteration, maintenance, or demolition work or if ACM may be disturbed by the work.

If the identified ACM will not be removed prior to commencement of the work, disturbance of ACM must follow the appropriate asbestos precautions for the classification of work being performed.

Asbestos-containing materials must be disposed of at a landfill approved to accept asbestos waste.

Lead

Construction disturbance of lead in paint and coatings (or other materials) may result in over-exposure to lead dust or fumes. The need for work procedures, engineering controls and personal protective equipment will need to be assessed on a project-by-project basis and must comply with provincial standards or guidelines. Performing an exposure assessment during work that disturbs lead in paints and coatings may be able to alleviate the use of some of the precautions specified by these standards or guidelines.

For building materials that are to be disposed at a landfill, all lead-based paints and associated substrate (concrete, plaster, wood, etc.) must undergo Toxicity Characteristic Leachate Properties (TCLP) metals testing to determine disposal procedures. A sample has been submitted and results will be presented under separate cover. Upon the completion of the test, the total concentration of metals in the waste extract

will be compared to Schedule 4, Table 1 of the Hazardous Waste Regulation. The disposal of lead-containing paint is regulated under the Federal *Transportation of Dangerous Goods Act* and by the British Columbia Ministry of Environment

Well adhered paints containing elevated levels of lead on metal substrates do not require leachable lead analysis as the materials can be recycled with the paint intact.

Suspect Visible Mould
No mould was observed; if mould is uncovered during removal of siding material, use appropriate precautions, and protect workers using methods that comply with provincial guideline.

Mercury
Do not break compact fluorescent light bulb. Recycle in accordance with local regulations.

Silica
Construction disturbance of silica-containing products may result in excessive exposures to airborne silica, especially if performed indoors and dry. Cutting, grinding, drilling or demolition of materials containing silica should be completed only with proper respiratory protection and other worker safety precautions that comply with provincial standards or guidelines.

6 REFERENCES

The following legislation and documents were referenced in completing the assessment and this report:

1. Occupational Health and Safety Regulation, B.C. Reg. 296/97, WorkSafe BC.
2. Safe Work Practices for Handling Asbestos, WorkSafe BC, 2017 Edition.
3. Hazardous Waste Regulation, B.C. Reg. 63/88, November 2017, BC Environmental Management Act.
4. Ozone Depleting Substances and Other Halocarbons Regulation, B.C. Reg. 317/2012 Environmental Management Act.
5. PCB Regulations, SOR/2008-273, Canadian Environmental Protection Act.
6. Lead-Containing Paint and Coatings, Preventing Exposure in the Construction Industry, WorkSafe BC, June 2017.
7. Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing, United States Housing and Urban Development (HUD) 2012.
8. Mould Guidelines for the Canadian Construction Industry, Standard Construction Document 2018, Canadian Construction Association.
9. Minister of Justice Canada Labour Code. R.S.C., 1985, c. L-2. March 2020.
10. Minister of Justice. 2018. Canada Occupational Health and Safety Regulations. SOR/86-304, June 2019.
11. Public Services and Procurement Canada Asbestos Management Standard. June 2019.

12. Transport Canada Consolidated Transport of Dangerous Goods Regulations including Amendment SOR/2019-101.
13. ASTM E2356 Standard Practice for Comprehensive Buildings Asbestos Surveys.
14. Government of Canada, Asbestos Management Plan, Version 2020-01, January 2020.

7 LIMITATIONS

This report, prepared for Public Services and Procurement Canada on behalf of Government of Canada, does not provide certification or warranty, expressed or implied, that the investigation conducted by Arcadis identified all hazardous materials associated with the subject building. The work undertaken by Arcadis was directed to provide information on the presence of hazardous materials in construction materials based on visual inspection of readily accessible areas of the subject building, and on the results of laboratory analysis of a limited number of bulk samples. The material in this report reflects Arcadis' best judgment in light of the information available at the time of the investigation, which was performed on July 8, 2020. This report is not intended to be used as a scope of work or technical specification for remediation of hazardous materials. Any use which any other party makes of the report, or reliance on, or decisions to be based on it, is the responsibility of such parties.

APPENDIX A

Site Photographs

Project Photographs

Public Services and Procurement Canada
Building E0163, House 02, British Columbia

Photo: 1

Date:
July 8, 2020

Description:
View of building.
Front Entrance. 2 windows with ACM sealant on either side of door.

Photo: 2

Date:
July 8, 2020

Description:
View of Building, Rear.

Project Photographs

Public Services and Procurement Canada
Building E0163, House 02, British Columbia

Photo: 3

Date:
July 8, 2020

Description:
South of Building. New stairs and risers on old wood foundation with non-lead grey paint.

Photo: 4

Date:
July 8, 2020

Description:
Behind vinyl siding contains non-ACM building paper on wood structure.

Project Photographs

Public Services and Procurement Canada
Building E0163, House 02, British Columbia

Photo: 5

Date:
July 8, 2020

Description:
East of building. Non-ACM window caulking.

Photo: 6

Date:
July 8, 2020

Description:
Front entrance. Worn white lead paint on wood trim below door.

Project Photographs

Public Services and Procurement Canada
Building E0163, House 02, British Columbia

Photo: 5

Date:
May 31, 2019

Description:
Light blue lead-based paint on wood frame

Photo: 6

Date:
May 31, 2019

Description:
Cream lead-based paint on wood window frames

APPENDIX B

Laboratory Certificates of Analysis

EMSL Canada Inc.
2333 18th Avenue NE, Unit 48, Calgary, AB T2E 8T6
Phone/Fax: (403) 879-1149 / (403) 879-1152
http://www.EMSL.com CalgaryLab@EMSL.com

EMSL Canada Or	652005050
CustomerID:	55ACAV42
CustomerPO:	30053059
ProjectID:	

Attn: **Jerry Botti**
ARCADIS Canada Inc.
308-1080 Mainland Street
Vancouver, BC V6B 2T4

Phone: (604) 632-9941
Fax:
Received: 7/20/2020 08:30 AM
Collected: 7/8/2020

Project: **30053059 / E0163 / House 02**

Test Report: Lead in Paint Chips by Flame AAS (SW 846 3050B/7000B)*

Client Sample Description	*Lab ID*	*Collected*	*Analyzed*	*Weight*	*Lead Concentration*
L-01	*652005050-0001*	7/8/2020	7/21/2020	0.2552 g	960 ppm
	Site: EXTERIOR - WHITE PAINT ON METAL TRIM				
L-02	*652005050-0002*	7/8/2020	7/21/2020	0.2565 g	<80 ppm
	Site: EXTERIOR - GREY PAINT ON WOOD SIDING				
L-03	*652005050-0003*	7/8/2020	7/21/2020	0.2567 g	650 ppm
	Site: EXTERIOR - WHITE PAINT ON WOOD TRIM				
L-04	*652005050-0004*	7/8/2020	7/21/2020	0.0981 g	<200 ppm
	Site: EXTERIOR - WHITE PAINT ON RAIN GUTTER Insufficient sample to reach reporting limit.				

Client request: Remove address from project name.

Jefferson Salvador, Laboratory Manager
or other approved signatory

Report Amended: 10/22/2020 10:14:18 Replaces the Inital Report 07/24/2020 15:39:00. Reason Code: Client-Other (see report comment)

EMSL Canada Inc.

4506 Dawson Street Burnaby, BC V5C 4C1
Phone/Fax: (604) 757-3158 / (604) 757-4731
http://www.EMSL.com / vancouverlab@EMSL.com

EMSL Canada Order 692001626
Customer ID: 55ACAV42
Customer PO: 30053059
Project ID:

Attn: Jerry Botti
ARCADIS Canada Inc.
308-1080 Mainland Street
Vancouver, BC V6B 2T4

Phone: (604) 632-9941
Fax:
Collected: 7/ 8/2020
Received: 7/16/2020
Analyzed: 7/23/2020

Proj: 30053059 / E0163 / House 02

Test Report: Asbestos Analysis in Bulk Material for Occupational Health and Safety British Columbia Regulation 188/2011 via EPA 600/R-93/116 Method

Client Sample ID: S-01A **Lab Sample ID:** 692001626-0001
Sample Description: EXTERIOR - EAST/BUILDING PAPER

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	7/21/2020	Brown	85.0%	15.0%	None Detected	

Client Sample ID: S-01B **Lab Sample ID:** 692001626-0002
Sample Description: EXTERIOR - NORTH/BUILDING PAPER

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	7/21/2020	Brown	85.0%	15.0%	None Detected	

Client Sample ID: S-01C **Lab Sample ID:** 692001626-0003
Sample Description: EXTERIOR - NORTH/BUILDING PAPER

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	7/21/2020	Brown	85.0%	15.0%	None Detected	

Client Sample ID: S-01D **Lab Sample ID:** 692001626-0004
Sample Description: EXTERIOR - WEST/BUILDING PAPER

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	7/21/2020	Brown	85.0%	15.0%	None Detected	

Client Sample ID: S-01E **Lab Sample ID:** 692001626-0005
Sample Description: EXTERIOR - WEST/BUILDING PAPER

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	7/23/2020	Brown	85.0%	15.0%	None Detected	

Client Sample ID: S-02A **Lab Sample ID:** 692001626-0006
Sample Description: EXTERIOR - EAST WINDOW/WINDOW CAULKING

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	7/21/2020	White	0.0%	100.0%	None Detected	

Client Sample ID: S-02B **Lab Sample ID:** 692001626-0007
Sample Description: EXTERIOR - EAST WINDOW/WINDOW CAULKING

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	7/22/2020	White	0.0%	100.0%	None Detected	

EMSL Canada Inc.

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Phone/Fax: (604) 757-3158 / (604) 757-4731
http://www.EMSL.com / vancouverlab@EMSL.com

EMSL Canada Order 692001626
Customer ID: 55ACAV42
Customer PO: 30053059
Project ID:

Test Report: Asbestos Analysis in Bulk Material for Occupational Health and Safety British Columbia Regulation 188/2011 via EPA 600/R-93/116 Method

Client Sample ID: S-02C ***Lab Sample ID:*** **692001626-0008**
Sample Description: EXTERIOR - WEST WINDOW/WINDOW CAULKING

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	7/23/2020	White	0.0%	100.0%	None Detected	

Client Sample ID: S-03A ***Lab Sample ID:*** **692001626-0009**
Sample Description: EXTERIOR - DECK/CAULKING

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	7/22/2020	Gray	0.0%	100.0%	None Detected	

Client Sample ID: S-03B ***Lab Sample ID:*** **692001626-0010**
Sample Description: EXTERIOR - DECK/CAULKING

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	7/22/2020	Gray	0.0%	100.0%	None Detected	

Client Sample ID: S-03C ***Lab Sample ID:*** **692001626-0011**
Sample Description: EXTERIOR - DECK/CAULKING

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	7/23/2020	Gray	0.0%	100.0%	None Detected	

Client Sample ID: S-04A ***Lab Sample ID:*** **692001626-0012**
Sample Description: EXTERIOR - CABLE PENETRATION/CAULKING

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	7/22/2020	Gray	0.0%	100.0%	None Detected	

Client Sample ID: S-05A ***Lab Sample ID:*** **692001626-0013**
Sample Description: EXTERIOR - RAIN GUTTER/CAULKING

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	7/22/2020	White	0.0%	100.0%	None Detected	

Client Sample ID: S-05B ***Lab Sample ID:*** **692001626-0014**
Sample Description: EXTERIOR - RAIN GUTTER/CAULKING

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	7/22/2020	White	0.0%	100.0%	None Detected	

Client Sample ID: S-05C ***Lab Sample ID:*** **692001626-0015**
Sample Description: EXTERIOR - RAIN GUTTER/CAULKING

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	7/23/2020	White	0.0%	100.0%	None Detected	

EMSL Canada Inc.

4506 Dawson Street Burnaby, BC V5C 4C1
Phone/Fax: (604) 757-3158 / (604) 757-4731
http://www.EMSL.com / vancouverlab@EMSL.com

EMSL Canada Order 692001626
Customer ID: 55ACAV42
Customer PO: 30053059
Project ID:

Test Report: Asbestos Analysis in Bulk Material for Occupational Health and Safety British Columbia Regulation 188/2011 via EPA 600/R-93/116 Method

Analyst(s):

Margaret Lee	PLM (11)
Nicole Yeo	PLM (4)

Reviewed and approved by:

Nicole Yeo, Laboratory Manager
or Other Approved Signatory

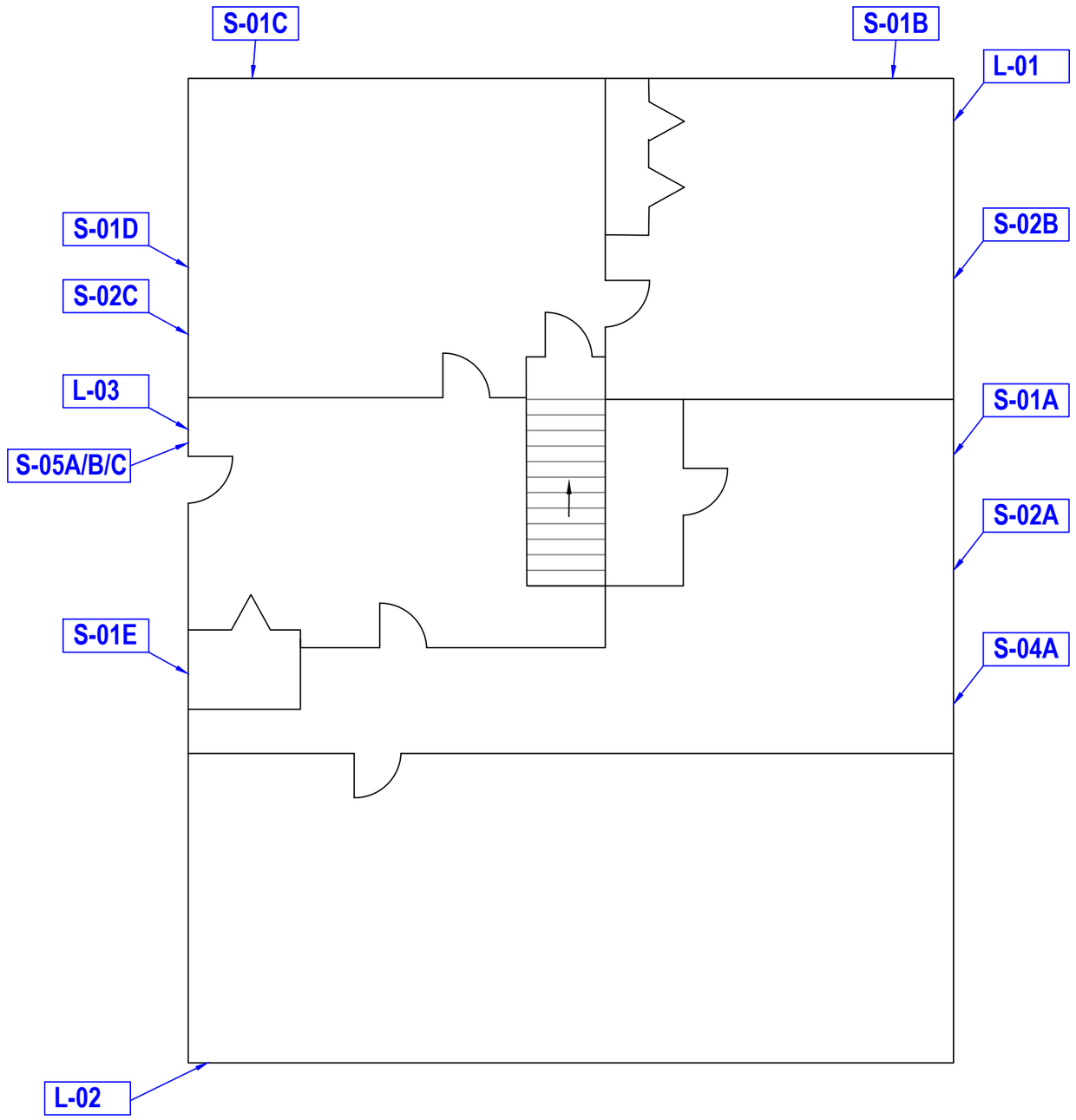
None Detected = <0.1%. EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations.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

Samples analyzed by EMSL Canada Inc. Burnaby, BC

Report amended: 10/21/202016:59:18 Replaces initial report from: 07/23/202011:38:20 Reason Code: Client-Change to Project

APPENDIX C

Floor Plans



LEGEND

S-XXX Bulk Asbestos Sample

L-XXX Bulk Lead Paint Sample

N.T.S

Title: **GOVERNMENT OF CANADA**
HAZARDOUS BUILDING MATERIAL ASSESSMENT - 2020

Project: BUILDING E0163 - HOUSE 02
FIRST FLOOR

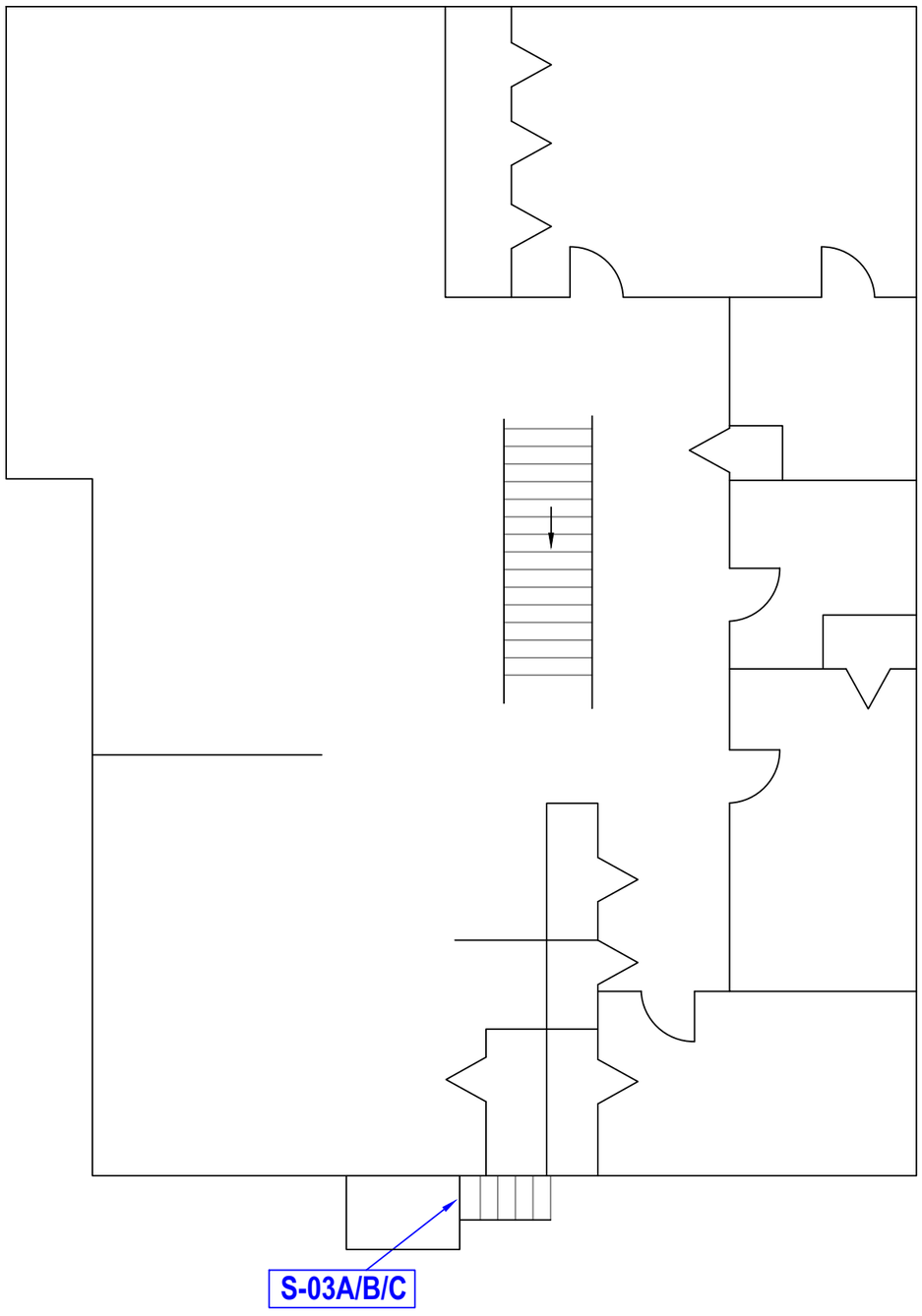
Client: PUBLIC SERVICES AND PROCUREMENT CANADA

Project Number:	Drawn By:	Plot Size:	Date:
30053059	CB	11X17"	JULY 2020

ARCADIS

FIGURE 1

firstfloor G:\PROJECTS\30053059 - PSPC_RCMP Construction 2020\CAD\30053059-Tuchodl5512.dwg



LEGEND

S-XXX Bulk Asbestos Sample

N.T.S

Title: **GOVERNMENT OF CANADA**
HAZARDOUS BUILDING MATERIAL ASSESSMENT - 2020

Project: BUILDING E0163 - HOUSE 02
SECOND FLOOR

Client: PUBLIC SERVICES AND PROCUREMENT CANADA

Project Number:	Drawn By:	Plot Size:	Date:
30053059	CB	11X17"	JULY 2020

ARCADIS

FIGURE 2

secondfloor G:\PROJECTS\30053059 - PSPC_RCMP Construction 2020\CAD\30053059-Tuchodi5512.dwg

APPENDIX D

Regulations and Health Effects

Asbestos

Occupational Health and Safety (OHS) for federal employees is regulated by the Canada Labour Code (CLC) Part II. The *Canada Occupational Health and Safety Regulations (COHSR), Part X, Hazardous Substances* covers specific requirements related to the management and control of asbestos-containing materials (ACM). The COHSR, Part X, Hazardous Substances, states an employee shall be kept free from exposure to a concentration of airborne chrysotile asbestos in excess of 0.1 fibre/cm^3 or f/cc. There are also specific requirements for hazard prevention detailed in the Hazard Prevention Program (HPP) in the CLC.

For the purposes of this report, the following federal requirements will be followed, unless provincial requirements are more stringent. Federal legislation and policy referenced in this report includes:

- Canada Labour Code, March 2020;
- Canada Occupational Health and Safety Regulations Part X, Hazardous Substances; SOR/86-304, June 2019;
- Public Services and Procurement Canada Asbestos Management Standard, June 2019;
- Asbestos Management Plan, Government of Canada, Version 2020-01, January 2020; and,
- Transport Canada, Transport of Dangerous Goods Regulations

The management and requirements for the potential disturbance of asbestos in buildings is also regulated at the provincial level under the *British Columbia Occupational Health and Safety Regulations,296/97, and Safe Work Practices for Handling Asbestos, WorkSafeBC, 2017 Edition*.

The BC Occupational Health and Safety Regulations, 296/97 (BC Reg 296/97), require specific actions when asbestos is a potential health hazard in a workplace. Section 6.1 of the regulation defines an asbestos-containing material as follows:

"asbestos-containing material" means the following:

(a) a manufactured article or other material, other than vermiculite insulation, that would be determined to contain at least 0.5% asbestos if tested in accordance with one of the following methods:

(i) Asbestos, Chrysotile by XRD, Method 9000 (Issue 2, dated August 15, 1994) in the NIOSH Manual of Analytical Methods, published by the United States National Institute for Occupational Safety and Health, Centre for Disease Control;

(ii) Asbestos (bulk) by PLM, Method 9002 (Issue 2, dated August 15, 1994) in the NIOSH Manual of Analytical Methods, published by the United States National Institute for Occupational Safety and Health, Centre for Disease Control;

(iii) Test Method for the Determination of Asbestos in Bulk Building Materials (EPA/600/R-93/116, dated July 1993) published by the United States Environmental Protection Agency;

(b) vermiculite insulation that would be determined to contain any asbestos if tested in accordance with the Research Method for Sampling and Analysis of Fibrous Amphibole in Vermiculite Attic Insulation (EPA/600/R-04/004, dated January 2004) published by the United States Environmental Protection Agency;

The duties of employers, contractors, or owners include:

- identifying and labeling ACM that can potentially release asbestos fibres;
- keeping a current written record of all ACM present in the workplace;
- conducting regular surveillance and maintenance of asbestos materials to prevent fibre release;
- developing a written exposure control plan if workers may be exposed to harmful levels of asbestos;
- conducting work in a way that prevents the release of asbestos fibres as much as possible;
- notifying, informing, and training workers; and,
- notifying Occupational Health and Safety (OHS) at least 48 hours before beginning an asbestos-abatement.

Disturbance of asbestos during construction and demolition is regulated under section 20.112 of BC Reg 296/97.

The 2017 WorkSafeBC publication Safe Work Practices for Handling Asbestos (Asbestos Guide) is used by Occupational Health and Safety officers as a guide when reviewing abatement work practices and employer codes of practice, and generally meets the requirements of the COHSR.

The Asbestos Guide also provides significant additional background information pertaining to asbestos, along with details on health effects and other applicable legislation within the province of British Columbia (e.g., the federal Hazardous Products Act, the BC Building Code and waste disposal regulations).

Disposal of asbestos waste is governed by the British Columbia Hazardous Waste Regulation (BC Reg. 63/88). The Federal Transportation of Dangerous Goods Regulation and BC Reg. 63/88 set out the requirements for the proper transport of asbestos waste in British Columbia. In general, and for transportation and disposal, the waste must be placed in a double sealed container, properly labeled, free of cuts, tears or punctures and disposed of at a licensed waste station which has been properly notified of the presence of asbestos waste.

Health effects

Undisturbed asbestos within building materials poses no health risks. Asbestos poses a risk when building materials containing asbestos are impacted, or disturbed, thereby releasing the asbestos fibres into the air

Asbestos-related diseases are caused when suspended airborne asbestos fibres are inhaled and the fibres settle into various regions of the lungs and remain for extended periods. Once embedded in the lungs the asbestos fibres cause scarring within the lung tissue, ultimately leading to impaired lung function (asbestosis) and/or various cancers (lung cancer; mesothelioma). These asbestos-related diseases are irreversible and fatal. The risk of lung-related cancers is increased in individuals who smoke.

These asbestos-related diseases most often occur in individuals who have been exposed to high concentrations of airborne asbestos over a long period of time, though mesothelioma has been found in individuals with short-term exposures. Symptoms or the development of these asbestos-related diseases usually occur 10 to 25 years after exposure

Lead

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 (2005) to 90 ppm (2010).

With respect to potential lead exposures associated with disturbance to surfaces coated with lead-containing products, the 2017 WorkSafeBC manual titled Lead-Containing Paint and Coatings: Preventing Exposure in the Construction Industry, indicates the following:

- Improper removal of lead paint containing 600 mg/kg lead results in airborne lead concentrations that exceed half of the exposure limit
    - This potential for exposure exceeding half of the occupational exposure limit would be the trigger for implementation of an exposure control plan.
- Lead concentrations as low as 90 mg/kg may present a risk to pregnant women and children
    - Any risk assessment should include for the presence of high risk individuals within the workplace

The disposal of lead-containing paint is regulated under the Federal *Transportation of Dangerous Goods Act* and by the British Columbia Ministry of Environment. All lead-based paints and associated nonmetal substrate (concrete, plaster, wood, etc.) must undergo Toxicity Characteristic Leachate Properties (TCLP) metals testing to determine disposal procedures. Upon the completion of the test, the total concentration of metals in the waste extract must be compared to Schedule 4, Table 1 of the Hazardous Waste Regulation.

The Federal Transportation of Dangerous Goods Regulation and BC Reg. 63/88 set out the requirements for the proper transport of lead waste in British Columbia.

Health Effects

Elemental lead and inorganic lead compounds are absorbed through ingestion or inhalation and can incorporate into the bone marrow, nerve tissue, brain, and kidneys. In children, symptoms of lead poisoning can include headaches, irritability, abdominal pain, vomiting, anemia, weight loss, poor attention span, noticeable learning difficulty, slowed speech development, and hyperactivity. In adults, symptoms of lead poisoning can include pain, numbness or tingling of the extremities, muscular weakness, headache, abdominal pain, memory loss, unsteady gait, pale skin, weight loss, vomiting, irritability, and anemia. Although adults are susceptible to the toxic effects of lead, children are at high risk due to the nature of a child's activities that involve the introduction of non-food items into their bodies.

Excessive airborne lead and surface contamination can be transferred to employees' hands and may results in lead ingestion. Therefore, work practices intended to minimize surface lead concentrations, such as frequent cleaning of work surfaces should be included in an overall lead exposure control plan

PCB

As of September 5, 2008, under subsection 93(1) of the *Canadian Environmental Protection Act,* (CEPA), Federal PCB regulations were published by the Canada Gazette Part II (SOR/2008-273) that imposed specific deadlines for the elimination of all PCBs in concentrations at or above 50 milligrams/kilogram (mg/kg). This regulation required the elimination of all PCBs and PCB-containing materials currently in-use and in storage and limited the period of time PCB materials could 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.

In British Columbia, PCB equipment becomes PCB wastes as soon as it is removed from service. This is the case even if the intent is to treat, recycle, or reuse the equipment.

When PCB wastes are stored in British Columbia, the full requirements of BC Reg. 63/88 apply to:

- 1.0 kg or more of pure PCB
- 100 L or more of any liquid containing more than 50 ppm of PCB
- 100 kg or more of any material other than a liquid, contaminated with more than 50 ppm of PCB

These amounts are the total of all amounts at a single location owned or controlled by the same person. They include PCB equipment. BC Reg. 63/88 also provides packaging requirements for storage, labeling requirements, waste destruction requirements, and references SOR/2008-273, indicating:

The Federal Transportation of Dangerous Goods Regulation sets out the requirements for the proper transport of PCB waste across provincial boundaries.

In British Columbia, a manifest issued by the Ministry of Environment (or equivalent federal document) must be used for hazardous wastes shipped from sites in British Columbia. A manifest must be used to transport:

- 5 kg or more of PCB solids
- 5 L or more of PCB liquids
- An amount of a PCB solid or PCB liquid containing more than 500 g of PCB within BC
- 500 g or more of solids, liquids, or mixtures of these containing 50 mg/kg of PCB outside of BC

Health effects

PCBs are insoluble in water; however, they readily dissolve in fats and other organic compounds. It is these attributes and fat-solubility that allow PCBs to persist in the environment and bio-accumulate in humans and animals. Exposure to PCBs can affect the immune system, reproductive system, nervous system, and endocrine system. In humans, PCBs are potentially cancer-causing.

Mould

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, occupational health and safety regulations typically require employers to take every precaution reasonable in the circumstances for the protection of workers.

The WorkSafeBC Guideline for Part 4 of BC Reg. 296/97 discusses the application of the Regulation to workplaces with mould showing on exposed or hidden surfaces, or where mould may be a factor in complaints regarding indoor air quality. The guideline provides information for investigating indoor air quality complaints with respect to mould contamination, including information on sampling for the

presence of moulds in buildings. Information is also provided on possible health effects and for cleanup personnel involved in the remediation of buildings damaged by water and mould.

Health Effects

There are a number of documented cases of health problems related to exposure to indoor fungi.

Both high-level, short-term exposures and lower-level, long-term exposures can result in illness. The most common symptoms from exposure to mould in indoor environments are runny nose, eye irritation, cough, congestion, aggravation of asthma, headache, flu-like symptoms, fatigue, and skin rash. People with suppressed immune systems may be susceptible to fungal infections as a result of exposure to indoor moulds.

People who are exposed to mould growth on building materials will not necessarily exhibit adverse health effects. However, the mould must still be removed. Humans are at risk from indoor mould when fungal spores, fragments or metabolites are released into the air and inhaled or physically contacted (dermal exposure).

Not everyone experiences allergic reaction; the susceptibility to exposure varies with the individual's genetic predisposition, age, state of health, and concurrent exposures. For these reasons, and because the measurement of exposure is not standardized and biological markers of exposure to fungi are largely unknown, it is not possible to establish "safe" or "unsafe" levels of exposure. However, federal, and provincial policies have been written to minimize mould exposure and the elimination of mould indoors.

Mercury

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 disposal should be through a scrap dealer (elemental mercury), recycling firm for mercury vapour and returned to the manufacturer for light tubes and fixtures. Disposal of mercury waste is governed by BC Reg. 63/88.

The Federal Transportation of Dangerous Goods Regulation and BC Reg. 63/88 set out the requirements for the proper transport of mercury waste in British Columbia.

Health Effects

Routes of exposure for mercury and mercury compounds include inhalation, ingestion, skin and/or eye contact. 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.

Elemental (metallic) mercury most often causes health effects through inhalation of its vapour, which can be absorbed through the lungs. This kind of exposure can result when elemental mercury is spilled (or products that contain elemental mercury break) and the mercury is exposed to the air. Vapour concentrations can vary especially in warm or poorly-ventilated indoor spaces where the airborne concentration can exceed the permissible exposure limit (provincially set).

Chronic mercury "poisoning" can be caused by long-term exposure to low airborne concentrations (or low levels) of mercury. Symptoms or effects of mercury exposure include: tremors, emotional changes,

neuromuscular effects, mental changes/disturbances, digestive disturbances, headaches, insomnia, and changes in nervous response.

Silica

Regulations pertaining to silica are provided in BC Reg. 296/97. Included are general provisions (minimizing release; keeping worksite clear of unnecessary accumulations; ensuring methods for decontamination prevent generation of airborne silica), provisions for "restricted areas" (where there is a reasonable chance that the airborne concentration of silica exceeds or may exceed the occupational exposure limit), provisions for use in abrasive blasting, and provisions for health assessments for workers exposed to silica.

Health Effects

Crystalline silica dust particles, which are small enough to be inhaled into the lungs (respirable size), can cause a number of health problems. As with asbestos, silica within building materials poses no threat to human health if left undisturbed.

Exposure to crystalline silica airborne dust my cause scaring of the lungs with coughing and shortness of breath—also known as "silicosis", a form of disabling, progressive, and sometimes fatal pulmonary fibrosis.

Ozone Depleting Substances (ODS)

ODSs are regulated in British Columbia by the British Columbia *Waste Management Act*—Ozone Depleting Substances and Other Halocarbons Regulation (BC Reg. 387/99 as amended by BC Reg. 317/2012).

On federal land, aboriginal land and federal works, buildings and undertakings, the Federal Halocarbon Regulation 2003 (SOR/2003-289, including associated amendments) 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.

If ODS-containing materials are to be removed and disposed of, all ODSs must be handled, recycled, stored, and/or disposed of in accordance with the requirements of BC Reg. 63/88.

The Federal Transportation of Dangerous Goods Regulation and BC Reg. 63/88 set out the requirements for the proper transport of ODS waste in British Columbia.

Health Effects

Health effects are not typically related to exposure to ODSs directly, but to the consequences of ODS release to the atmosphere, subsequent degradation of the earth's ozone layer, and implications associated with increased UVB light exposure.

APPENDIX E

Classification, Condition and Accessibility

1.1 Spray Applied Fireproofing, Insulation and Texture Finishes

To evaluate the condition of ACM spray applied as fireproofing, thermal insulation, or texture, decorative or acoustic finishes, the following criteria are applied:

GOOD

Surface of material shows no significant signs of damage, deterioration, or delamination. Up to 1 percent visible damage to surface is allowed within range of **GOOD**. Evaluation of sprayed fireproofing requires the surveyor to be familiar with the irregular surface texture typical of sprayed asbestos products. **GOOD** condition includes un-encapsulated 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 1 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 survey or re-assessment form.

NOTE: **FAIR** condition is not utilized in the evaluation of the 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 are advised to be watchful for ACM **DEBRIS** prior to accessing or working above ceilings in areas of buildings with ACM regardless of the reported condition.

1.2 Mechanical Insulation

The evaluation of the condition of mechanical insulation (on boilers, breaching, ductwork, piping, tanks, equipment etc.) utilizes the following criteria:

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 penetrating 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. It is not possible to observe the full length of mechanical insulation from all angles.

1.3 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 should be treated as a friable product.

2. Evaluation of Accessibility

The accessibility of building materials known or suspected of being ACM is rated according to the following criteria:

ACCESS (A)

Areas of the building within reach (from floor level) of all building users. Includes areas such as gymnasiums, workshops, and storage areas where activities of the building users may result in disturbance of ACM not normally within reach from floor level.

ACCESS (B)

Frequently entered maintenance areas within reach of maintenance staff, without the need for a ladder. Includes: frequently entered pipe chases, tunnels and service areas or areas within reach from a fixed ladder or catwalk, e.g. tops of equipment, mezzanines.

ACCESS (C) EXPOSED

Areas of the building above 2.4 metres where use of a ladder is required to reach the ACM. Only refers to ACM that is exposed to view, from the floor or ladder, without the removal or opening of other building components such as ceiling tiles, or service access door or hatch. Does not include infrequently accessed service areas of the building.

ACCESS (C) CONCEALED

Areas of the building which require the removal of a building component, including lay-in ceilings and access panels into solid ceiling systems. Includes rarely entered crawl spaces, attic spaces, etc. Observations will be limited to the extent visible from the access points.

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 ACM. Evaluation of condition and extent of ACM is limited or impossible, depending on the surveyor's ability to visually examine materials in ACCESS D.

3. ACM DEBRIS

3.1 DEBRIS from Friable ACM

The presence of fallen ACM is noted separately from the presumed friable ACM source (sprayed fireproofing, thermal insulation, texture, decorative or acoustic finishes or mechanical insulation) and is referred to as **DEBRIS**.

3.2 DEBRIS from Damaged Non-Friable ACM

The presence of fallen ACM from damaged non-friable ACM is also reported separately from the non-friable ACM source. Only fallen non-friable ACM that has become friable is reported as **DEBRIS**.

The identification of the exact location or presence of **DEBRIS** on the top of ceiling tiles is limited by the number of observations made and the presence of building components such as ducts or full height walls

that obstruct observations. Workers are advised to be watchful for the presence of **DEBRIS** prior to accessing or working in proximity to mechanical insulation or above ceilings in areas of buildings with ACM regardless of the reported presence or absence of **DEBRIS**.

4. Action Matrix and Action Descriptions

The Asbestos Management Plan requires the following responses:

- Immediately clean-up **DEBRIS** that is likely to be disturbed.
- Remove, repair, or enclose friable ACM in **POOR** or **FAIR** condition whose continued deterioration will result in **DEBRIS** that is likely to be disturbed.

The following factors shall be considered in making site-specific recommendations for compliance with the existing applicable regulations or codes and the practical implementation of the Asbestos Management Plan:

1. ACM in **POOR** condition is not routinely repairable. If an abatement action is necessary, removal is the recommended action (enclosure is a viable option in unusual circumstances, e.g. where removal is difficult or costly and the asbestos-containing material can be thoroughly enclosed).

2. Mechanical insulation in **FAIR** condition will be repaired or removed based on the following general recommendations, applied on a case-by-case basis:
   - ACM insulation found in **FAIR** condition in ACCESS (B) or ACCESS (C) EXPOSED areas is to be repaired.
   - ACM mechanical insulation found in **FAIR** condition in ACCESS (B) and ACCESS (C) EXPOSED areas, where future damage to the ACM is likely to occur, is to be removed.

3. ACM in **GOOD** condition present in ACCESS (A) can be managed by surveillance, as long as it is not disturbed by future renovation, maintenance, or demolition. Proactive removal of the ACM in ACCESS (A) will be considered where damage is possible by on-going occupant activity (accidental or intentional).

4. Non-friable or manufactured products are considered in the action matrix as follows:
   - Non-friable and manufactured products reported in **POOR** condition, or friable **DEBRIS** resulting from the deterioration of non-friable ACM, are treated as friable materials and the appropriate action, and depending on accessibility is determined from the action matrix for friable ACM.
   - For non-friable or manufactured products reported in **GOOD** condition, Action 7 (surveillance) is recommended regardless of accessibility.

5. All asbestos-containing material from a particular area is to be removed where small quantities of asbestos are present, and removal will negate the need for the use of an Asbestos Management Program in that area.

The action matrix provided below establishes the recommended asbestos control action. The ACTIONS themselves are described in full following the table.

4.1 Action Matrix Tables

FRIABLE ACM				
ACCESS	**CONDITION**			**DEBRIS**
	GOOD	**FAIR**	**POOR**	
(A)	ACTION 5/7[1]	ACTION 5/6[2]	ACTION 3	ACTION 1
(B)	ACTION 7	ACTION 6/5[3]	ACTION 3	ACTION 1
(C) EXPOSED	ACTION 7	ACTION 6	ACTION 4	ACTION 2
(C) CONCEALED	ACTION 7	ACTION 7	ACTION 4	ACTION 2
(D)	ACTION 7	ACTION 7	ACTION 7	ACTION 7

[1] If material in **ACCESS (A)/GOOD** condition is not removed **ACTION 7** is required.

[2] If material in **ACCESS(A)/FAIR** condition is not removed **ACTION 6** is required.

[3] Remove ACM in **ACCESS (B)/FAIR** condition if ACM is likely to be disturbed.

4.2 Action Descriptions

ACTION 1 - Immediate Clean-Up of DEBRIS that is Likely to Be Disturbed

Access that is likely to cause a disturbance of the ACM **DEBRIS** is to be restricted and **clean up ACM DEBRIS is to be done immediately**. Use correct asbestos procedures. This action is required for compliance with regulatory requirements and good practice. The assessor should immediately notify the Asset or Property and Facility Manager, or Regional/Area Asbestos Management Coordinator of this condition.

ACTION 2 - Intermediate risk precautions for Entry into Areas with ACM DEBRIS

At locations where ACM **DEBRIS** can be isolated in lieu of removal or cleaned up, use appropriate means to limit entry to the area. Restrict access to the area to persons using intermediate risk asbestos precautions. The precautions will be required until the ACM **DEBRIS** has been cleaned up, and the source of the **DEBRIS** has been stabilized or removed.

ACTION 3 - ACM Removal Required for Compliance

Remove ACM for compliance with regulatory requirements and good practice. Utilize asbestos procedures appropriate to the scope of the removal work.

ACTION 4 - Access into areas where asbestos-containing material is present and likely to be disturbed by access requires intermediate risk precautions.

Intermediate risk asbestos precautions are to be used when entry or access into an area is likely to disturb the ACM. **ACTION 4** must be used until the ACM is re-moved (Use **ACTION 1** or **2** if **DEBRIS** is present). Intermediate risk or high-risk precautions should be used for removal (depending on extent of removal).

ACTION 5 - Proactive ACM Removal

Removal of ACM in lieu of repair may be considered, even if it is in **GOOD** condition at locations, where ACM is easily accessible, limited in quantity, and removal would be cost-effective.

ACTION 6 - ACM Repair

Repair ACM found in **FAIR** condition, and not likely to be damaged again or disturbed by normal use of the area or room. Upon completion of the re-pair work treat ACM as material **in GOOD** condition and implement **ACTION 7**. If ACM is likely to be damaged or disturbed during normal use of the area or room, **ACTION 5** is to be implemented.

ACTION 7 - Routine Surveillance

Institute routine surveillance of the ACM. Trained workers or contractors must use appropriate asbestos precautions (low, intermediate, or high) during disturbance of the remaining ACM.

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APPENDIX 1-3

Hazardous Building Materials Assessment
Building E0164, Employee Housing, House 03, British Columbia

ARCADIS Design & Consultancy for natural and built assets

Public Services and Procurement Canada

HAZARDOUS BUILDING MATERIALS ASSESSMENT

Building E0164, Employee Housing, House 03, British Columbia

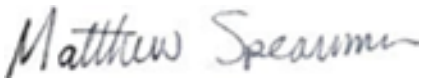
PSPC Project # R.112077.001

October 23, 2020

Arcadis Project No.: 30053059

HAZARDOUS BUILDING MATERIALS ASSESSMENT

Authored by:



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ACRONYMS AND ABBREVIATIONS

ACM	Asbestos-Containing Materials
Arcadis	Arcadis Canada Inc.
CLC	Canada Labour Code
COHSR	Canada Occupational Health and Safety Regulations
HPP	Hazard Prevention Program
LCB	Lead-Containing Paints
NIOSH	National Institute for Occupational Safety and Health
NJC	National Joint Council
OHS	Occupational Health and Safety
PCBs	Polychlorinated Biphenyls
PLM	Polarized Light Microscopy
PSPC	Public Services and Procurement Canada
TEM	Transmission Electron Microscopy
USEPA	United States Environmental Protection Agency

EXECUTIVE SUMMARY

Arcadis Canada Inc. (Arcadis) was retained by Public Services and Procurement Canada (PSPC, Client) to conduct a hazardous building materials assessment of Building E0164, House 03, located in British Columbia.

This project consisted of a limited pre-renovation assessment to identify suspect hazardous materials in areas that were excluded from the original survey.

The renovation scope was limited to the part of the building scheduled for renovation, which consisted of replacing exterior windows, doors and vinyl siding as well as replacing deck and stairs.

The hazardous building materials considered during this assessment included the following:

- Asbestos-containing materials (ACMs)
- Lead, including lead-containing paints (LCPs)
- Polychlorinated biphenyls (PCBs) in electrical equipment
- Suspect visible mould
- Mercury materials/products/equipment
- Ozone-depleting substances (ODSs) in heating, ventilation, and air conditioning (HVAC) equipment or fixed fire suppression systems
- Silica in building materials

Arcadis performed the assessment on July 8, 2020. The assessment was conducted by Matthew Spearman, Dipl T (Env), Field Technologist of Arcadis.

Summary of Findings

Asbestos: Asbestos-containing materials (ACM) were confirmed to be present as follows:

Material	Location(s)	Total Quantity	Condition (action)	Asbestos Type (%)
Black Weatherproofing	Exterior – on concrete foundation around building	~43 meters	Good (7)	4% Chrysotile
Black vapour barrier mastic*	Throughout interior wall cavities	34 meters	Good (7)	2% Chrysotile

*Arcadis February 13, 2020 HBMA Report. While present in the building it is not expected to be impacted the proposed renovations.

Lead: Lead is confirmed present in the following paints and or surface coatings:

Color (substrate)	Location(s)	Total Quantity	Condition	Concentration (ppm)
Beige (Metal Trim)*	Exterior – above concrete foundation, around building	43 linear meters	Good	950

*Arcadis February 13, 2020 HBMA Report

Polychlorinated Biphenyls (PCBs): No PCBs were observed in the assessed area.

Suspect Visible Mould: Suspect visible mould was identified on the vinyl siding on the North Face of the building.

Mercury: Mercury vapour was visually confirmed in a compact fluorescent light (CFL) bulb at the front entrance.

Ozone Depleting Substances (ODS): ODS were not observed in the assessed area.

Silica: Crystalline silica is a presumed component of the following materials throughout the building: poured concrete

Recommendations

The following is a summary of significant recommendations; refer to the body of the report for detailed recommendations.

1. Remove and properly dispose of asbestos-containing materials if disturbed by the planned renovation work.
2. Remove and dispose of mercury-containing items when taken out of service or if disturbed by the planned renovation work.
3. Follow appropriate safe work procedures when handling or disturbing asbestos, lead, silica and mould.
4. Prepare and update plans and performance specifications regarding hazardous material removal for the planned work. The specifications should include the scope of work, safe work practices, personal protective equipment, respiratory protection, and disposal of waste materials.
5. Provide this report and the detailed plans and specifications to the contractor prior to bidding or commencing work.
6. Retain a qualified consultant to specify, inspect and verify the successful removal of hazardous materials.
7. Update the asbestos inventory upon completion of the abatement and removal of asbestos-containing materials.

Findings of this report are subject to our standard Limitations, as outlined in Section 7.

This Executive Summary is subject to the same standard limitations as contained in the report and must be read in conjunction with the entire report.

1 INTRODUCTION

1.1 Purpose

Arcadis Canada Inc. (Arcadis) was retained by Public Services and Procurement Canada (PSPC, Client) to conduct a hazardous building materials assessment of Building E0164, House 03, located in British Columbia.

The project consisted of a limited pre-construction assessment based on the renovation scope. The objective of the pre-construction assessment was to identify hazardous building materials in preparation for building renovation.

The renovation scope was limited to the part of the building scheduled for renovation, which consisted of replacing exterior windows, doors and vinyl siding as well as replacing deck and stairs.

Arcadis performed the assessment on July 8, 2020. The assessment was conducted by Matthew Spearman, Dipl T (Env), Field Technologist of Arcadis.

1.2 Scope of Work

The scope of work for the project, as referenced in the Arcadis Workplan dated June 4, 2020, identifies the requirement to conduct a hazardous building material assessment within building E0164. Specifically, the scope of work included:

- Review of previous reports, construction specifications and drawings and identify any gaps related to hazardous building materials.
- Development of sampling strategy to address the identified gaps.
- Collect and submit representative suspect asbestos material and lead paint chip samples for analysis.
- Submit samples to accredited laboratories for analysis.
- Evaluation and interpretation of field findings and sample analytical results to develop conclusions and recommendations pertaining to hazardous building materials identified

For the purpose of this assessment, hazardous building materials re defined as follows:

- Asbestos-containing materials (ACMs)
- Lead, including lead-containing paints (LCPs)
- Polychlorinated biphenyls (PCBs) in electrical equipment
- Suspect visible mould
- Mercury materials/products/equipment
- Ozone-depleting substances (ODSs) in heating, ventilation, and air conditioning (HVAC) equipment or fixed fire suppression systems
- Silica in building materials

A general description of the building included in this assessment is provided in the table below:

Table 1. Building Description

Building Number (BU)	Building Name	Total Inside Gross m^2	Year Constructed	Building Description
E0164	House 03	203.5	1988	Two-story building with finished ground floor. Asphalt shingle roof and concrete foundation. Vinyl exterior siding. Drywall and texture coat interior walls. Texture coat ceilings. Carpet, poured concrete, wood laminate and vinyl sheet flooring. Heating is supplied by gas fired forced air furnace and electric baseboard.

2 BACKGROUND INFORMATION

Arcadis conducted a previous assessment of the building and the findings are presented in the following report:

- Hazardous Building Material Assessment, Building E0164, dated February 13, 2020, prepared by Arcadis Canada Inc.

2.1 Exclusions

The assessment was restricted to accessible locations of the buildings. Inaccessible areas were not investigated at the time of the assessment unless specifically impacted by the proposed renovations. Roofing or other material that may cause damage to the building envelope were not included unless specifically impacted by the proposed renovations and sampling would not compromise the building envelope integrity.

3 SURVEY METHODOLOGY

Sampling activities were conducted in accordance with Arcadis' Standard Operation Procedures which take into account current federal and provincial regulations pertaining to such work (i.e., sampling procedures, required number of samples and laboratory analytical procedures). Regulations are presented in Appendix D.

Representative bulk samples were collected of accessible suspect, PCB, lead, and asbestos in sufficient quantities for laboratory analysis. Samples were sealed in polyethylene zip-lock bags labeled with the sample number, suspect material description, and sample location. As part of sampling procedures, sampling tools were cleaned between sample collection events to avoid the potential for cross-contamination of samples.

All sample bags were compiled in order and placed into a single container accompanied with a chain of custody form outlining the project information, date, building location, number of samples, and sample description. Samples were submitted to the analytical laboratory in a sealed container via courier.

3.1 Asbestos-Containing Materials

A separate set of samples was collected of each type of homogenous material suspected to contain asbestos. A homogenous material is defined by the US EPA as material that is uniform in texture and appearance, was installed at one time, and is unlikely to consist of more than one type or formulation of material. The homogeneous materials are determined by visual examination, available information on the phases of the construction and prior renovations.

Bulk sampling protocols followed the ASTM E2356 Standard, which indicates requirements for the number of samples to collect for each homogeneous material. The table below provides an outline of the minimum number of samples to be collected from the ASTM E2356 Standard.

Table 2. Bulk Material Sample Quantities

Type of Material	Size of Area of Homogeneous Material	Minimum Number of Samples Collected
Any homogeneous material, including but not limited to fireproofing, drywall joint compound, ceiling tile stucco, acoustical and stipple finishes, and visually similar floor tiles	Less than 90 m^2 (<1,000 ft^2)	3
	90 m^2 or more, but less than 450 m^2 (1,000-5,000 ft^2)	5
	450 m^2 or more (>5,000 ft^2)	7

In some cases, manufactured products such as asbestos cement pipe were visually identified without sample confirmation.

Flooring mastic/adhesive are only sampled and analyzed if present on the underside of flooring samples (vinyl floor tile and vinyl sheet flooring) in sufficient quantity for laboratory analysis.

Attempts to distinguish and delineate asbestos-containing drywall compound from new non-asbestos drywall compound is often unachievable. Arcadis collected drywall joint compound samples from exterior walls, columns or other locations which are unlikely to have been renovated in an attempt to determine the presence of asbestos in the original drywall compound.

Arcadis submitted the bulk samples to a NVLAP accredited laboratory for analysis. The analysis is performed in accordance with Test Method EPA/600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials, July 1993.

EPA Method 600 states that materials characterized by interfering binder/matrix or low asbestos content may require additional gravimetric reduction sample treatment beyond routine polarized light microscopy (PLM) analysis (e.g. dissolution with hydrochloric acid, treatment with organic solvents or ashing in a muffle furnace or low temperature plasma asher to remove unwanted components).

Arcadis submitted one sample of each sample set (3) of vinyl floor tiles be analyzed by transmission electron microscopy (TEM) if the first two samples are reported negative by PLM.

The asbestos analysis was completed using a stop positive approach. Only one result of greater than the regulated criteria is required to determine that a material is asbestos-containing, but all samples must be analyzed to conclusively determine that a material is non-asbestos. The laboratory stopped analyzing samples from a homogeneous material once greater than the criteria was detected in any of the samples of that material. All samples of a homogeneous material were analyzed if no asbestos was detected. Where building materials are described in this report as non-asbestos, or described as containing no asbestos,

this is subject to the limitations of the analytical method used and should be understood to mean no asbestos was detected.

The classification, condition, and accessibility were assessed for the materials which could contain asbestos. To determine these factors, Arcadis followed the methodology outlined in the ASTM E356 Standard. The Standard provides definitions and criteria for the assessment of ACM. The classification, conditions, and accessibility information are provided in Appendix E.

Bulk samples of materials which could contain asbestos were collected and submitted to EMSL Canada Inc. (EMSL) for analysis of asbestos content. Asbestos-containing materials are defined as 0.5% or greater, or any amount if vermiculite.

3.2 Lead

Arcadis collected samples of distinctive paint finishes and surface coatings present in more than a limited application, where removal of the paint is possible. Arcadis collects samples by scraping the painted finish to include base and covering applications. 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. 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 were presumed to be the same, regardless of differing sub surface paints, if any.

The 2017 WorkSafeBC publication *Safe Work Practices for Handling Lead* (Lead Guideline) indicates the following:

> *Unlike for asbestos-containing material, WorkSafeBC does not numerically define what would be considered a lead-containing paint or coating. All suspected paints or coatings should be tested for lead because, depending on the nature of the work, even a small amount could pose a risk to workers. In order to determine which controls and personal protective equipment would be required for a particular job, a qualified person must consider this information as part of the risk assessment.*

- Improper removal of lead paint containing 600 mg/kg lead results in airborne lead concentrations that exceed half of the exposure limit
  - Exposure limit indicated in both the COHSR and BC Reg. 296/97 is 0.05 mg/m^3
  - Potential for exposure exceeding half of the occupational exposure limit would be the trigger for implementation of an exposure control plan.
- Lead concentrations as low as 90 mg/kg may present a risk to pregnant women and children
  - Any risk assessment should include for the presence of high risk individuals within the workplace

When reviewing the above, “high risk” individuals are not expected to be present in the workplace associated with this building during building material alteration activities (i.e., demolition) that would create significant disturbance to paint with such individuals present. As such, paints containing 600 ppm lead or more will be considered “lead-containing” for the purpose of this report, such that appropriate risk assessments can be completed for demolition planning. However, information regarding the lead content of all paints tested is provided herein, for reference and risk assessment should the consideration of high risk individuals be necessary, based on the requirements of a particular situation.

Although a concentration of 600 ppm lead has been used to define paint coatings as LCPs, it should be noted that this is related to painted surfaces and the determination of appropriate provisions to protect occupants and employees from exposure to elevated concentrations of lead during typical operations and maintenance or simple renovation. This does not include painted metal surfaces that are to be welded, burned or torch-cut.

Using an arc welder or oxyacetylene torch on steel that is coated with lead-containing paint can create hazardous lead fumes and is prohibited by section 12.115 of BC Reg. 296/97.

> Regulatory excerpt: **12.115 Coatings on metals**
>
> *A coating on metal which could emit harmful contaminants (such as lead, chromium, organic materials, or toxic combustion products) must be removed from the base metal, whenever practicable, before welding or cutting begins.*

In addition, the following information is provided in the Lead Guideline:

- Welding or torch cutting of paints or coatings on metal can create very high concentrations of airborne lead fumes. Torch cutting structural steel, coated with paint containing as little as 130 mg/kg (equivalent to ppm) lead, can release airborne levels of lead as high as 0.8 mg/m^3 (16 times the exposure limit).

Given this information and that the analytical detection limit for lead paint analysis is approximately 80– 90 ppm (not significantly different than 130 ppm, which, per above, may release airborne lead levels 16 times the exposure limit), any paint coating on a metal surface to be welded, burned or torch-cut must be removed prior to that action being undertaken, unless a project-specific or tasks-specific risk assessment and safe work practices are developed by a qualified person.

Paint and surface coatings are evaluated for condition. The criteria for condition evaluation pertaining to LCPs described herein are generally based on the United States Housing and Urban Development (HUD) 2012 *Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing*.

When evaluating the condition of LCPs, an attempt should be made to determine whether the deterioration is due to a moisture problem or some other existing building deficiency. **"Poor"** surfaces are considered to be a hazard and should be corrected. "**Fair"** surfaces should be repaired but are not yet considered to be a hazard; if not repaired, they should be monitored frequently. "**Good/intact"** surfaces should be monitored to ensure that they remain in a nonhazardous condition.

In addition, the presence of paint debris must be considered in evaluating condition. Given the variety of paint uses, there are many applications that can have a tendency for the paint to "wear" from the surface slowly, over an extended period of time. Conditions where paint has worn from a surface are worth noting for maintenance discussions (i.e., related to re-coating the surface should, for example, the coating provide weather protection), however, in the absence of loose paint chip debris/dust, such conditions would not represent a potential exposure situation related to lead.

The condition evaluation criteria for LCPs are summarized in the table below.

Table 3. Lead-Containing Paint Condition Categories

Type of Building Component[1]	Total Area of Deteriorated Paint on Each Component		
	Good/Intact	Fair[2]	Poor[3]
Exterior components with large surface areas.	Entire surface is intact.	Less than or equal to 10 square feet	More than 10 square feet
Interior components with large surface areas (walls, ceilings, floors, doors.	Entire surface is intact.	Less than or equal to 2 square feet	More than 2 square feet
Interior and exterior components with small surface areas (windowsills, baseboards, soffits, trim).	Entire surface is intact.	Less than or equal to 10% of the total surface area of the component.	More than 10% of the total surface area of the component

NOTES:

1. Building component in this table refers to each individual component or side of building, not the combined surface area of all similar components in a room (e.g., a wall with 1 square foot of deteriorated paint is in "fair" condition, even if the other three walls in a room are intact).
2. Surfaces in "fair" condition should be repaired and/or monitored but are not considered to be "lead-containing paint hazards".
3. Surfaces in "poor" condition are considered to be "lead-containing paint hazards" and should be addressed through abatement or interim controls.

Analysis for lead in paints or surface coatings was performed in accordance with EPA Method No. 3050B/Method No. 7420; flame atomic absorption at laboratory accredited by the American Industrial Hygiene Association (AIHA).

3.3 Polychlorinated Biphenyls (PCBs)

The presence or absence of fluorescent lights was documented during the course of our investigation to determine whether there were any of the T12 type. T12 fluorescent lamps, with a diameter of 1.5 inches, utilize transformer type magnetic ballasts, which may contain PCBs. The use of T12s has been discontinued and replaced with new high-efficiency 1-inch T8 lamps (and other types) which use electronic ballasts which do not contain PCBs.

Wet transformers were assessed for PCBs based on the age of the building, a review of maintenance records and examination of labels or nameplates on equipment, where present and accessible. The information is compared to known ban dates of PCBs and Environment Canada publications.

Dry type transformers are presumed to be free of dielectric fluids and hence non-PCB. Caulking's were not sampled for PCB content unless specifically impacted by the proposed renovation scope. The material is considered a PCB solid if PCB content is 50ppm or greater based on the threshold given in SOR/2008-273.

3.4 Suspect Visible Mould

Arcadis identified the presence of any suspect mould and/or moisture-impacted building materials by visual inspection during the course of our site investigation. Suspect mould is typically a coloured, textured substance or discolouration/staining on a building material surface which, based on our experience, may be mould growth. If any mould growth is concealed within wall, ceiling, or floor cavities, it is not addressed in this assessment. No mould sampling or moisture testing is performed unless directed by the Client. The adjective *suspect* is used where the presence of mould has not been confirmed by laboratory analysis.

3.5 Mercury

Building materials/products/equipment (e.g. thermostats, barometers, pressure gauges, light tubes), suspected to contain mercury were identified by visually inspection only. Dismantling of equipment suspected of containing mercury was not performed. Sampling of these materials for laboratory analysis of mercury content was not performed.

Mercury spills or damaged mercury-containing equipment was recorded where observed.

3.6 Ozone Depleting Substances (ODS)

Arcadis determined the potential presence of ODS (chlorofluorocarbons, hydrochlorofluorocarbons, hydrofluorocarbons, halons, etc.) in air conditioning units, chillers, commercial coolers, and fire suppression systems by visual inspection of manufactures' labels or plates, maintenance records, or logbooks, etc.

3.7 Silica

Arcadis identified building materials suspected of containing crystalline silica (e.g. concrete, cement, tile, brick, masonry, mortar) by knowledge of current and historic applications and visual inspection only. Arcadis did not perform sampling of these materials for laboratory analysis of crystalline silica content.

4 RESULTS

4.1 Asbestos

During the course of our assessment, representative bulk samples of material were collected by Arcadis staff. The samples were forwarded to EMSL in Burnaby, British Columbia (BC) for asbestos analyses. EMSL holds a current Certificate of Accreditation for Bulk Asbestos Fibre Analysis under the Voluntary Accreditation Program (NVLAP). Bulk sampling was performed in general accordance with the requirements specified in ASTM E2356 Standard, BC Reg. 296/97 and in the WorkSafe BC publication Safe Work Practices for Handling Asbestos.

Results of bulk sample analysis for asbestos content are provided in the table below. Samples that exceed the criteria are highlighted in yellow.

Site Photographs provided in Appendix A. Laboratory certificates of analysis have been provided in Appendix B. Floor plans indicating sample locations and room numbers are provided in Appendix C.

Table 4. Results of Bulk Sample Analysis for Asbestos

Sample Number	Sample Description	Sample Location	Asbestos Type %
S-01A	Building Paper	Exterior – North wall inside carport	None Detected
S-01B	Building Paper	Exterior – South Face	None Detected
S-01C	Building Paper	Exterior – East Face	None Detected
S-01D	Building Paper	Exterior – East Face	None Detected
S-01E	Building Paper	Exterior – West Face	None Detected
S-02A	White Window Caulking	Exterior – West window	None Detected
S-02B	White Window Caulking	Exterior – East Window	None Detected
S-02C	White Window Caulking	Exterior – East Window	None Detected
S-03A	Black Weatherproofing	Exterior – East Face	4% Chrysotile
S-03B	Black Weatherproofing	Exterior – East Face	Stop Positive
S-03C	Black Weatherproofing	Exterior – East Face	Stop Positive

The following building materials were common in the building: however, these materials do not contain asbestos and were not sampled during the survey:

- UPDATE AS NEEDED Vinyl siding; wood siding and trim, concrete, and Styrofoam insulation.

Asbestos-containing materials were confirmed present in the following table:

Table 5. Summary of Confirmed Asbestos-Containing Materials

Material	Location(s)	Total Quantity	Condition	Asbestos Type (%)
Black Weatherproofing	Exterior – on concrete foundation around building	~43 meters	Good (7)	4% Chrysotile
Black vapour barrier mastic*	Throughout interior wall cavities	34 meters	Good (7)	2% Chrysotile

*Arcadis February 13, 2020 HBMA Report. While present in the building it is not expected to be impacted the proposed renovations.

Presumed Materials

No presumed materials that may contain asbestos are suspected to be present in the way of planned work.

4.2 Lead

During the course of our site investigation, representative bulk samples of predominant paint types were collected by Arcadis staff. The samples were forwarded to EMSL for lead analyses. Results of bulk sample

analysis for lead content are provided in the table below. Results that exceed the criteria re highlighted in yellow.

The laboratory report is provided in Appendix B.

Table 6. Results of Analyses of Bulk Samples for Paint for Lead

Sample No.	Sample Location(s)	Sample Description	Lead Content (ppm)
L-01	Exterior – North Face	Grey paint on wood wall	<80
L-02	Exterior – South of building	Brown paint on metal gutter	<220
*	Exterior – above concrete foundation, around building	Beige paint on metal trim	950

*Arcadis February 13, 2020 HBMA Report

Lead was detected at a level above the definition of lead paint (600 ppm) in a sample from the Arcadis February 13, 2020 HBMA report. Where one colour of paint is indicated in the sample descriptions in the table above, only one layer of paint was observed. Where multiple colours are indicated in the sample description, multiple layers of paint were observed.

All paint applications were noted to be generally in good condition.

4.3 Polychlorinated Biphenyls (PCBs)

No PCBs were observed in the assessed area.

4.4 Suspect Visible Mould

Suspect visible mould growth was observed on the vinyl siding on the North face above the deck and stairs.

4.5 Mercury

Mercury vapor is present in one compact fluorescent light bulb at the front entrance.

4.6 Ozone Depleting Substances

ODS were not observed in the assessed area.

4.7 Silica

Crystalline silica is a presumed component of the following materials where present in the building:

- poured concrete

5 RECOMMENDATIONS

If future building renovation or demolition is required beyond the scope of this project, a detailed intrusive assessment must be conducted. The assessment should include destructive testing (i.e. coring and/or removal of building finishes and components), and sampling of materials not previously tested (i.e. roofing materials, mastics etc.).

All hazardous building materials were reported in good condition. All ACM observed were considered to fall under a recommended Action Level 7 (routine surveillance).

5.1 Building Renovation Work

The following specific recommendations are made regarding renovation involving the hazardous materials identified.

1. Prepare plans and update performance specifications for hazardous material removal required for the planned work. The specifications should include the scope of work, personal protective equipment, respiratory protection, and disposal of waste materials.
2. Provide this report and the detailed plans and specifications to the contractor prior to bidding or commencing work.
3. Retain a qualified consultant to specify, inspect and verify the successful removal of hazardous materials.
4. Update the asbestos inventory upon completion of the abatement and removal of asbestos-containing materials.

The following general recommendations are made regarding renovation involving the hazardous materials identified.

Asbestos

Remove all asbestos-containing materials (ACM) prior to renovation, alteration, maintenance, or demolition work or if ACM may be disturbed by the work.

If the identified ACM will not be removed prior to commencement of the work, disturbance of ACM must follow the appropriate asbestos precautions for the classification of work being performed.

Asbestos-containing materials must be disposed of at a landfill approved to accept asbestos waste.

Lead

Construction disturbance of lead in paint and coatings (or other materials) may result in over-exposure to lead dust or fumes. The need for work procedures, engineering controls and personal protective equipment will need to be assessed on a project-by-project basis and must comply with provincial standards or guidelines. Performing an exposure assessment during work that disturbs lead in paints and coatings may be able to alleviate the use of some of the precautions specified by these standards or guidelines.

Well adhered paints containing elevated levels of lead on metal substrates do not require leachable lead analysis as the materials can be recycled with the paint intact.

Suspect Visible Mould
Suspect visible mould growth was noted in areas affected by the planned work.. Use appropriate precautions and protect workers during removal using methods that comply with provincial guidelines.

Mercury
Do not break compact fluorescent light bulb. Recycle in accordance with local regulations.

Silica
Construction disturbance of silica-containing products may result in excessive exposures to airborne silica, especially if performed indoors and dry. Cutting, grinding, drilling or demolition of materials containing silica should be completed only with proper respiratory protection and other worker safety precautions that comply with provincial standards or guidelines.

6 REFERENCES

The following legislation and documents were referenced in completing the assessment and this report:

1. Occupational Health and Safety Regulation, B.C. Reg. 296/97, WorkSafe BC.
2. Safe Work Practices for Handling Asbestos, WorkSafe BC, 2017 Edition.
3. Hazardous Waste Regulation, B.C. Reg. 63/88, November 2017, BC Environmental Management Act.
4. Ozone Depleting Substances and Other Halocarbons Regulation, B.C. Reg. 317/2012 Environmental Management Act.
5. PCB Regulations, SOR/2008-273, Canadian Environmental Protection Act.
6. Lead-Containing Paint and Coatings, Preventing Exposure in the Construction Industry, WorkSafe BC, June 2017.
7. Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing, United States Housing and Urban Development (HUD) 2012.
8. Mould Guidelines for the Canadian Construction Industry, Standard Construction Document 2018, Canadian Construction Association.
9. Minister of Justice Canada Labour Code. R.S.C., 1985, c. L-2. March 2020.
10. Minister of Justice. 2018. Canada Occupational Health and Safety Regulations. SOR/86-304, June 2019.
11. Public Services and Procurement Canada Asbestos Management Standard. June 2019.
12. Transport Canada Consolidated Transport of Dangerous Goods Regulations including Amendment SOR/2019-101.
13. ASTM E2356 Standard Practice for Comprehensive Buildings Asbestos Surveys.
14. Government of Canada, Asbestos Management Plan, Version 2020-01, January 2020.

7 LIMITATIONS

This report, prepared for Public Services and Procurement Canada on behalf of Government of Canada, does not provide certification or warranty, expressed or implied, that the investigation conducted by Arcadis identified all hazardous materials associated with the subject building. The work undertaken by Arcadis was directed to provide information on the presence of hazardous materials in construction materials based on visual inspection of readily accessible areas of the subject building, and on the results of laboratory analysis of a limited number of bulk samples. The material in this report reflects Arcadis' best judgment in light of the information available at the time of the investigation, which was performed on July 8, 2020. This report is not intended to be used as a scope of work or technical specification for remediation of hazardous materials. Any use which any other party makes of the report, or reliance on, or decisions to be based on it, is the responsibility of such parties.

APPENDIX A

Site Photographs

Project Photographs

Public Services and Procurement Canada
Building E0164, House 03, British Columbia

Photo: 1

Date:
July 8, 2020

Description:
View of Employee Housing, Front

Photo: 2

Date:
July 8, 2020

Description:
View of Employee Housing, Rear

Project Photographs

Public Services and Procurement Canada
Building E0164, House 03, British Columbia

Photo: 3

Date:
July 8, 2020

Description:
Composite stairs. Non-lead grey paint on wood wall. Vinyl siding with suspect visible mould located on wall above wood.

Photo: 4

Date:
July 8, 2020

Description:
Asbestos-containing Black weatherproofing on concrete foundation, behind wood trim and Styrofoam. Lead containing metal trim located above.

APPENDIX B

Laboratory Certificates of Analysis

EMSL Canada Inc.
2333 18th Avenue NE, Unit 48, Calgary, AB T2E 8T6
Phone/Fax: (403) 879-1149 / (403) 879-1152
http://www.EMSL.com CalgaryLab@EMSL.com

EMSL Canada Or	652005045
CustomerID:	55ACAV42
CustomerPO:	30053059
ProjectID:	

Attn: **Jerry Botti**
ARCADIS Canada Inc.
308-1080 Mainland Street
Vancouver, BC V6B 2T4

Phone: (604) 632-9941
Fax:
Received: 7/20/2020 08:30 AM
Collected: 7/8/2020

Project: **30053059 / E0164 / House 03**

Test Report: Lead in Paint Chips by Flame AAS (SW 846 3050B/7000B)*

Client Sample Description	*Lab ID*	*Collected*	*Analyzed*	*Weight*	*Lead Concentration*
L-01	*652005045-0001*	7/8/2020	7/21/2020	0.2532 g	<80 ppm
	Site: EXTERIOR - GREY PAINT ON WOOD WALL				
L-02	*652005045-0002*	7/8/2020	7/21/2020	0.0894 g	<220 ppm
	Site: EXTERIOR - BROWN PAINT ON METAL GUTTER Insufficient sample to reach reporting limit.				

Client request: Remove address from project name.

Jefferson Salvador, Laboratory Manager
or other approved signatory

Report Amended: 10/22/2020 10:16:17 Replaces the Inital Report 07/24/2020 15:56:32. Reason Code: Client-Other (see report comment)

EMSL Canada Inc.

4506 Dawson Street Burnaby, BC V5C 4C1
Phone/Fax: (604) 757-3158 / (604) 757-4731
http://www.EMSL.com / vancouverlab@EMSL.com

EMSL Canada Order 692001632
Customer ID: 55ACAV42
Customer PO: 30053059
Project ID:

Attn: Jerry Botti
ARCADIS Canada Inc.
308-1080 Mainland Street
Vancouver, BC V6B 2T4

Phone: (604) 632-9941
Fax:
Collected: 7/ 8/2020
Received: 7/16/2020
Analyzed: 7/23/2020

Proj: 30053059 / E0164 / House 03

Test Report: Asbestos Analysis in Bulk Material for Occupational Health and Safety British Columbia Regulation 188/2011 via EPA 600/R-93/116 Method

Client Sample ID: S-01A ***Lab Sample ID:*** **692001632-0001**
Sample Description: EXTERIOR - NORTH/BUILDING PAPER

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	7/21/2020	Brown	85.0%	15.0%	None Detected	

Client Sample ID: S-01B ***Lab Sample ID:*** **692001632-0002**
Sample Description: EXTERIOR - SOUTH/BUILDING PAPER

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	7/21/2020	Brown	85.0%	15.0%	None Detected	

Client Sample ID: S-01C ***Lab Sample ID:*** **692001632-0003**
Sample Description: EXTERIOR - EAST/BUILDING PAPER

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	7/21/2020	Brown	85.0%	15.0%	None Detected	

Client Sample ID: S-01D ***Lab Sample ID:*** **692001632-0004**
Sample Description: EXTERIOR - EAST/BUILDING PAPER

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	7/21/2020	Brown	85.0%	15.0%	None Detected	

Client Sample ID: S-01E ***Lab Sample ID:*** **692001632-0005**
Sample Description: EXTERIOR - WEST/BUILDING PAPER

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	7/23/2020	Brown	85.0%	15.0%	None Detected	

Client Sample ID: S-02A ***Lab Sample ID:*** **692001632-0006**
Sample Description: EXTERIOR - WEST/WINDOW CAULKING

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	7/21/2020	White	0.0%	100.0%	None Detected	

Client Sample ID: S-02B ***Lab Sample ID:*** **692001632-0007**
Sample Description: EXTERIOR - EAST/WINDOW CAULKING

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	7/21/2020	White	0.0%	100.0%	None Detected	

EMSL Canada Inc.

4506 Dawson Street Burnaby, BC V5C 4C1
Phone/Fax: (604) 757-3158 / (604) 757-4731
http://www.EMSL.com / vancouverlab@EMSL.com

EMSL Canada Order 692001632
Customer ID: 55ACAV42
Customer PO: 30053059
Project ID:

Test Report: Asbestos Analysis in Bulk Material for Occupational Health and Safety British Columbia Regulation 188/2011 via EPA 600/R-93/116 Method

Client Sample ID: S-02C ***Lab Sample ID:*** **692001632-0008**

Sample Description: EXTERIOR - EAST/WINDOW CAULKING

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	7/23/2020	White	0.0%	100.0%	None Detected	

Client Sample ID: S-03A ***Lab Sample ID:*** **692001632-0009**

Sample Description: EXTERIOR - EAST/WEATHERPROOFING

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	7/21/2020	Black	0.0%	96.0%	**4% Chrysotile**	

Client Sample ID: S-03B ***Lab Sample ID:*** **692001632-0010**

Sample Description: EXTERIOR - EAST/WEATHERPROOFING

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	7/21/2020				Positive Stop (Not Analyzed)	

Client Sample ID: S-03C ***Lab Sample ID:*** **692001632-0011**

Sample Description: EXTERIOR - EAST/WEATHERPROOFING

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	7/21/2020				Positive Stop (Not Analyzed)	

Analyst(s):

Margaret Lee PLM (7)
Nicole Yeo PLM (2)

Reviewed and approved by:

Nicole Yeo, Laboratory Manager
or Other Approved Signatory

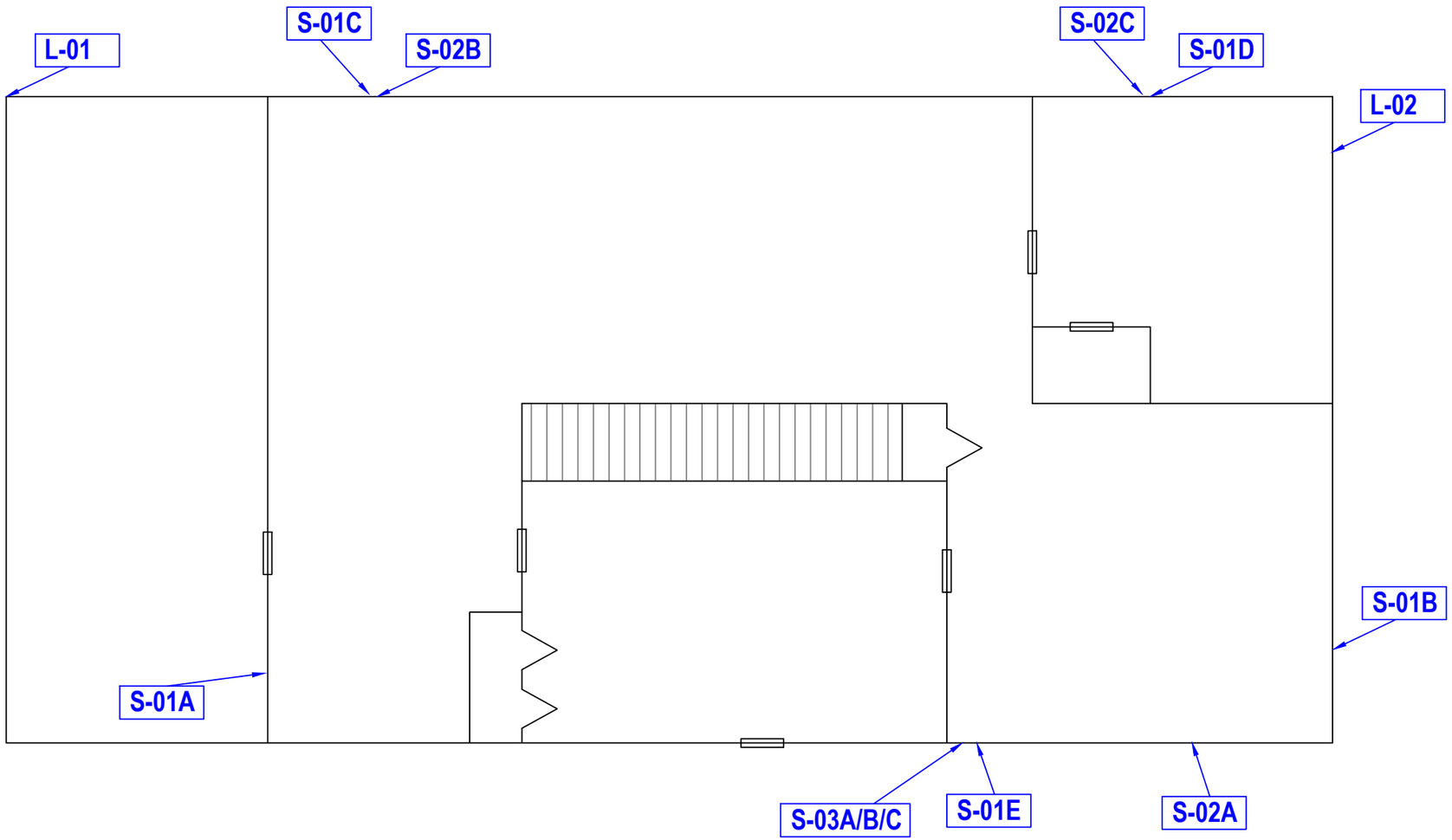
None Detected = <0.1%. EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations.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

Samples analyzed by EMSL Canada Inc. Burnaby, BC

Report amended: 10/21/202016:57:51 Replaces initial report from: 07/23/202011:39:49 Reason Code: Client-Change to Project

APPENDIX C

Floor Plans



LEGEND

S-XXX Bulk Asbestos Sample

L-XXX Bulk Lead Paint Sample

N.T.S

Title: **GOVERNMENT OF CANADA**
HAZARDOUS BUILDING MATERIAL ASSESSMENT - 2020

Project: BUILDING E0164 - HOUSE 03
FIRST FLOOR

Client: PUBLIC SERVICES AND PROCUREMENT CANADA

Project Number:	Drawn By:	Plot Size:	Date:
30053059	CB	11X17"	JULY 2020

ARCADIS

FIGURE 1

firstfloor G:\PROJECTS\30053059 - PSPC_RCMP Construction 2020\CAD\30053059-tuchodi.dwg

APPENDIX D

Regulations and Health Effects

Asbestos

Occupational Health and Safety (OHS) for federal employees is regulated by the Canada Labour Code (CLC) Part II. The *Canada Occupational Health and Safety Regulations (COHSR), Part X, Hazardous Substances* covers specific requirements related to the management and control of asbestos-containing materials (ACM). The COHSR, Part X, Hazardous Substances, states an employee shall be kept free from exposure to a concentration of airborne chrysotile asbestos in excess of 0.1 fibre/cm^3 or f/cc. There are also specific requirements for hazard prevention detailed in the Hazard Prevention Program (HPP) in the CLC.

For the purposes of this report, the following federal requirements will be followed, unless provincial requirements are more stringent. Federal legislation and policy referenced in this report includes:

- Canada Labour Code, March 2020;
- Canada Occupational Health and Safety Regulations Part X, Hazardous Substances; SOR/86-304, June 2019;
- Public Services and Procurement Canada Asbestos Management Standard, June 2019;
- Asbestos Management Plan, Government of Canada, Version 2020-01, January 2020; and,
- Transport Canada, Transport of Dangerous Goods Regulations

The management and requirements for the potential disturbance of asbestos in buildings is also regulated at the provincial level under the *British Columbia Occupational Health and Safety Regulations,296/97, and Safe Work Practices for Handling Asbestos, WorkSafeBC, 2017 Edition*.

The BC Occupational Health and Safety Regulations, 296/97 (BC Reg 296/97), require specific actions when asbestos is a potential health hazard in a workplace. Section 6.1 of the regulation defines an asbestos-containing material as follows:

"asbestos-containing material" means the following:

(a) a manufactured article or other material, other than vermiculite insulation, that would be determined to contain at least 0.5% asbestos if tested in accordance with one of the following methods:

(i) Asbestos, Chrysotile by XRD, Method 9000 (Issue 2, dated August 15, 1994) in the NIOSH Manual of Analytical Methods, published by the United States National Institute for Occupational Safety and Health, Centre for Disease Control;

(ii) Asbestos (bulk) by PLM, Method 9002 (Issue 2, dated August 15, 1994) in the NIOSH Manual of Analytical Methods, published by the United States National Institute for Occupational Safety and Health, Centre for Disease Control;

(iii) Test Method for the Determination of Asbestos in Bulk Building Materials (EPA/600/R-93/116, dated July 1993) published by the United States Environmental Protection Agency;

(b) vermiculite insulation that would be determined to contain any asbestos if tested in accordance with the Research Method for Sampling and Analysis of Fibrous Amphibole in Vermiculite Attic Insulation (EPA/600/R-04/004, dated January 2004) published by the United States Environmental Protection Agency;

The duties of employers, contractors, or owners include:

- identifying and labeling ACM that can potentially release asbestos fibres;
- keeping a current written record of all ACM present in the workplace;
- conducting regular surveillance and maintenance of asbestos materials to prevent fibre release;
- developing a written exposure control plan if workers may be exposed to harmful levels of asbestos;
- conducting work in a way that prevents the release of asbestos fibres as much as possible;
- notifying, informing, and training workers; and,
- notifying Occupational Health and Safety (OHS) at least 48 hours before beginning an asbestos-abatement.

Disturbance of asbestos during construction and demolition is regulated under section 20.112 of BC Reg 296/97.

The 2017 WorkSafeBC publication Safe Work Practices for Handling Asbestos (Asbestos Guide) is used by Occupational Health and Safety officers as a guide when reviewing abatement work practices and employer codes of practice, and generally meets the requirements of the COHSR.

The Asbestos Guide also provides significant additional background information pertaining to asbestos, along with details on health effects and other applicable legislation within the province of British Columbia (e.g., the federal Hazardous Products Act, the BC Building Code and waste disposal regulations).

Disposal of asbestos waste is governed by the British Columbia Hazardous Waste Regulation (BC Reg. 63/88). The Federal Transportation of Dangerous Goods Regulation and BC Reg. 63/88 set out the requirements for the proper transport of asbestos waste in British Columbia. In general, and for transportation and disposal, the waste must be placed in a double sealed container, properly labeled, free of cuts, tears or punctures and disposed of at a licensed waste station which has been properly notified of the presence of asbestos waste.

Health effects

Undisturbed asbestos within building materials poses no health risks. Asbestos poses a risk when building materials containing asbestos are impacted, or disturbed, thereby releasing the asbestos fibres into the air

Asbestos-related diseases are caused when suspended airborne asbestos fibres are inhaled and the fibres settle into various regions of the lungs and remain for extended periods. Once embedded in the lungs the asbestos fibres cause scarring within the lung tissue, ultimately leading to impaired lung function (asbestosis) and/or various cancers (lung cancer; mesothelioma). These asbestos-related diseases are irreversible and fatal. The risk of lung-related cancers is increased in individuals who smoke.

These asbestos-related diseases most often occur in individuals who have been exposed to high concentrations of airborne asbestos over a long period of time, though mesothelioma has been found in individuals with short-term exposures. Symptoms or the development of these asbestos-related diseases usually occur 10 to 25 years after exposure

Lead

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 (2005) to 90 ppm (2010).

With respect to potential lead exposures associated with disturbance to surfaces coated with lead-containing products, the 2017 WorkSafeBC manual titled Lead-Containing Paint and Coatings: Preventing Exposure in the Construction Industry, indicates the following:

- Improper removal of lead paint containing 600 mg/kg lead results in airborne lead concentrations that exceed half of the exposure limit
    - This potential for exposure exceeding half of the occupational exposure limit would be the trigger for implementation of an exposure control plan.
- Lead concentrations as low as 90 mg/kg may present a risk to pregnant women and children
    - Any risk assessment should include for the presence of high risk individuals within the workplace

The disposal of lead-containing paint is regulated under the Federal *Transportation of Dangerous Goods Act* and by the British Columbia Ministry of Environment. All lead-based paints and associated nonmetal substrate (concrete, plaster, wood, etc.) must undergo Toxicity Characteristic Leachate Properties (TCLP) metals testing to determine disposal procedures. Upon the completion of the test, the total concentration of metals in the waste extract must be compared to Schedule 4, Table 1 of the Hazardous Waste Regulation.

The Federal Transportation of Dangerous Goods Regulation and BC Reg. 63/88 set out the requirements for the proper transport of lead waste in British Columbia.

Health Effects

Elemental lead and inorganic lead compounds are absorbed through ingestion or inhalation and can incorporate into the bone marrow, nerve tissue, brain, and kidneys. In children, symptoms of lead poisoning can include headaches, irritability, abdominal pain, vomiting, anemia, weight loss, poor attention span, noticeable learning difficulty, slowed speech development, and hyperactivity. In adults, symptoms of lead poisoning can include pain, numbness or tingling of the extremities, muscular weakness, headache, abdominal pain, memory loss, unsteady gait, pale skin, weight loss, vomiting, irritability, and anemia. Although adults are susceptible to the toxic effects of lead, children are at high risk due to the nature of a child's activities that involve the introduction of non-food items into their bodies.

Excessive airborne lead and surface contamination can be transferred to employees' hands and may results in lead ingestion. Therefore, work practices intended to minimize surface lead concentrations, such as frequent cleaning of work surfaces should be included in an overall lead exposure control plan

PCB

As of September 5, 2008, under subsection 93(1) of the *Canadian Environmental Protection Act,* (CEPA), Federal PCB regulations were published by the Canada Gazette Part II (SOR/2008-273) that imposed specific deadlines for the elimination of all PCBs in concentrations at or above 50 milligrams/kilogram (mg/kg). This regulation required the elimination of all PCBs and PCB-containing materials currently in-use and in storage and limited the period of time PCB materials could 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.

In British Columbia, PCB equipment becomes PCB wastes as soon as it is removed from service. This is the case even if the intent is to treat, recycle, or reuse the equipment.

When PCB wastes are stored in British Columbia, the full requirements of BC Reg. 63/88 apply to:

- 1.0 kg or more of pure PCB
- 100 L or more of any liquid containing more than 50 ppm of PCB
- 100 kg or more of any material other than a liquid, contaminated with more than 50 ppm of PCB

These amounts are the total of all amounts at a single location owned or controlled by the same person. They include PCB equipment. BC Reg. 63/88 also provides packaging requirements for storage, labeling requirements, waste destruction requirements, and references SOR/2008-273, indicating:

The Federal Transportation of Dangerous Goods Regulation sets out the requirements for the proper transport of PCB waste across provincial boundaries.

In British Columbia, a manifest issued by the Ministry of Environment (or equivalent federal document) must be used for hazardous wastes shipped from sites in British Columbia. A manifest must be used to transport:

- 5 kg or more of PCB solids
- 5 L or more of PCB liquids
- An amount of a PCB solid or PCB liquid containing more than 500 g of PCB within BC
- 500 g or more of solids, liquids, or mixtures of these containing 50 mg/kg of PCB outside of BC

Health effects

PCBs are insoluble in water; however, they readily dissolve in fats and other organic compounds. It is these attributes and fat-solubility that allow PCBs to persist in the environment and bio-accumulate in humans and animals. Exposure to PCBs can affect the immune system, reproductive system, nervous system, and endocrine system. In humans, PCBs are potentially cancer-causing.

Mould

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, occupational health and safety regulations typically require employers to take every precaution reasonable in the circumstances for the protection of workers.

The WorkSafeBC Guideline for Part 4 of BC Reg. 296/97 discusses the application of the Regulation to workplaces with mould showing on exposed or hidden surfaces, or where mould may be a factor in complaints regarding indoor air quality. The guideline provides information for investigating indoor air quality complaints with respect to mould contamination, including information on sampling for the

presence of moulds in buildings. Information is also provided on possible health effects and for cleanup personnel involved in the remediation of buildings damaged by water and mould.

Health Effects

There are a number of documented cases of health problems related to exposure to indoor fungi.

Both high-level, short-term exposures and lower-level, long-term exposures can result in illness. The most common symptoms from exposure to mould in indoor environments are runny nose, eye irritation, cough, congestion, aggravation of asthma, headache, flu-like symptoms, fatigue, and skin rash. People with suppressed immune systems may be susceptible to fungal infections as a result of exposure to indoor moulds.

People who are exposed to mould growth on building materials will not necessarily exhibit adverse health effects. However, the mould must still be removed. Humans are at risk from indoor mould when fungal spores, fragments or metabolites are released into the air and inhaled or physically contacted (dermal exposure).

Not everyone experiences allergic reaction; the susceptibility to exposure varies with the individual's genetic predisposition, age, state of health, and concurrent exposures. For these reasons, and because the measurement of exposure is not standardized and biological markers of exposure to fungi are largely unknown, it is not possible to establish "safe" or "unsafe" levels of exposure. However, federal, and provincial policies have been written to minimize mould exposure and the elimination of mould indoors.

Mercury

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 disposal should be through a scrap dealer (elemental mercury), recycling firm for mercury vapour and returned to the manufacturer for light tubes and fixtures. Disposal of mercury waste is governed by BC Reg. 63/88.

The Federal Transportation of Dangerous Goods Regulation and BC Reg. 63/88 set out the requirements for the proper transport of mercury waste in British Columbia.

Health Effects

Routes of exposure for mercury and mercury compounds include inhalation, ingestion, skin and/or eye contact. 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.

Elemental (metallic) mercury most often causes health effects through inhalation of its vapour, which can be absorbed through the lungs. This kind of exposure can result when elemental mercury is spilled (or products that contain elemental mercury break) and the mercury is exposed to the air. Vapour concentrations can vary especially in warm or poorly-ventilated indoor spaces where the airborne concentration can exceed the permissible exposure limit (provincially set).

Chronic mercury "poisoning" can be caused by long-term exposure to low airborne concentrations (or low levels) of mercury. Symptoms or effects of mercury exposure include: tremors, emotional changes,

neuromuscular effects, mental changes/disturbances, digestive disturbances, headaches, insomnia, and changes in nervous response.

Silica

Regulations pertaining to silica are provided in BC Reg. 296/97. Included are general provisions (minimizing release; keeping worksite clear of unnecessary accumulations; ensuring methods for decontamination prevent generation of airborne silica), provisions for "restricted areas" (where there is a reasonable chance that the airborne concentration of silica exceeds or may exceed the occupational exposure limit), provisions for use in abrasive blasting, and provisions for health assessments for workers exposed to silica.

Health Effects

Crystalline silica dust particles, which are small enough to be inhaled into the lungs (respirable size), can cause a number of health problems. As with asbestos, silica within building materials poses no threat to human health if left undisturbed.

Exposure to crystalline silica airborne dust my cause scaring of the lungs with coughing and shortness of breath—also known as "silicosis", a form of disabling, progressive, and sometimes fatal pulmonary fibrosis.

Ozone Depleting Substances (ODS)

ODSs are regulated in British Columbia by the British Columbia *Waste Management Act*—Ozone Depleting Substances and Other Halocarbons Regulation (BC Reg. 387/99 as amended by BC Reg. 317/2012).

On federal land, aboriginal land and federal works, buildings and undertakings, the Federal Halocarbon Regulation 2003 (SOR/2003-289, including associated amendments) 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.

If ODS-containing materials are to be removed and disposed of, all ODSs must be handled, recycled, stored, and/or disposed of in accordance with the requirements of BC Reg. 63/88.

The Federal Transportation of Dangerous Goods Regulation and BC Reg. 63/88 set out the requirements for the proper transport of ODS waste in British Columbia.

Health Effects

Health effects are not typically related to exposure to ODSs directly, but to the consequences of ODS release to the atmosphere, subsequent degradation of the earth's ozone layer, and implications associated with increased UVB light exposure.

APPENDIX E

Classification, Condition and Accessibility

1.1 Spray Applied Fireproofing, Insulation and Texture Finishes

To evaluate the condition of ACM spray applied as fireproofing, thermal insulation, or texture, decorative or acoustic finishes, the following criteria are applied:

GOOD

Surface of material shows no significant signs of damage, deterioration, or delamination. Up to 1 percent visible damage to surface is allowed within range of **GOOD**. Evaluation of sprayed fireproofing requires the surveyor to be familiar with the irregular surface texture typical of sprayed asbestos products. **GOOD** condition includes un-encapsulated 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 1 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 survey or re-assessment form.

NOTE: **FAIR** condition is not utilized in the evaluation of the 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 are advised to be watchful for ACM **DEBRIS** prior to accessing or working above ceilings in areas of buildings with ACM regardless of the reported condition.

1.2 Mechanical Insulation

The evaluation of the condition of mechanical insulation (on boilers, breaching, ductwork, piping, tanks, equipment etc.) utilizes the following criteria:

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 penetrating 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. It is not possible to observe the full length of mechanical insulation from all angles.

1.3 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 should be treated as a friable product.

2. Evaluation of Accessibility

The accessibility of building materials known or suspected of being ACM is rated according to the following criteria:

ACCESS (A)

Areas of the building within reach (from floor level) of all building users. Includes areas such as gymnasiums, workshops, and storage areas where activities of the building users may result in disturbance of ACM not normally within reach from floor level.

ACCESS (B)

Frequently entered maintenance areas within reach of maintenance staff, without the need for a ladder. Includes: frequently entered pipe chases, tunnels and service areas or areas within reach from a fixed ladder or catwalk, e.g. tops of equipment, mezzanines.

ACCESS (C) EXPOSED

Areas of the building above 2.4 metres where use of a ladder is required to reach the ACM. Only refers to ACM that is exposed to view, from the floor or ladder, without the removal or opening of other building components such as ceiling tiles, or service access door or hatch. Does not include infrequently accessed service areas of the building.

ACCESS (C) CONCEALED

Areas of the building which require the removal of a building component, including lay-in ceilings and access panels into solid ceiling systems. Includes rarely entered crawl spaces, attic spaces, etc. Observations will be limited to the extent visible from the access points.

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 ACM. Evaluation of condition and extent of ACM is limited or impossible, depending on the surveyor's ability to visually examine materials in ACCESS D.

3. ACM DEBRIS

3.1 DEBRIS from Friable ACM

The presence of fallen ACM is noted separately from the presumed friable ACM source (sprayed fireproofing, thermal insulation, texture, decorative or acoustic finishes or mechanical insulation) and is referred to as **DEBRIS**.

3.2 DEBRIS from Damaged Non-Friable ACM

The presence of fallen ACM from damaged non-friable ACM is also reported separately from the non-friable ACM source. Only fallen non-friable ACM that has become friable is reported as **DEBRIS**.

The identification of the exact location or presence of **DEBRIS** on the top of ceiling tiles is limited by the number of observations made and the presence of building components such as ducts or full height walls

that obstruct observations. Workers are advised to be watchful for the presence of **DEBRIS** prior to accessing or working in proximity to mechanical insulation or above ceilings in areas of buildings with ACM regardless of the reported presence or absence of **DEBRIS**.

4. Action Matrix and Action Descriptions

The Asbestos Management Plan requires the following responses:

- Immediately clean-up **DEBRIS** that is likely to be disturbed.
- Remove, repair, or enclose friable ACM in **POOR** or **FAIR** condition whose continued deterioration will result in **DEBRIS** that is likely to be disturbed.

The following factors shall be considered in making site-specific recommendations for compliance with the existing applicable regulations or codes and the practical implementation of the Asbestos Management Plan:

1. ACM in **POOR** condition is not routinely repairable. If an abatement action is necessary, removal is the recommended action (enclosure is a viable option in unusual circumstances, e.g. where removal is difficult or costly and the asbestos-containing material can be thoroughly enclosed).

2. Mechanical insulation in **FAIR** condition will be repaired or removed based on the following general recommendations, applied on a case-by-case basis:
   - ACM insulation found in **FAIR** condition in ACCESS (B) or ACCESS (C) EXPOSED areas is to be repaired.
   - ACM mechanical insulation found in **FAIR** condition in ACCESS (B) and ACCESS (C) EXPOSED areas, where future damage to the ACM is likely to occur, is to be removed.

3. ACM in **GOOD** condition present in ACCESS (A) can be managed by surveillance, as long as it is not disturbed by future renovation, maintenance, or demolition. Proactive removal of the ACM in ACCESS (A) will be considered where damage is possible by on-going occupant activity (accidental or intentional).

4. Non-friable or manufactured products are considered in the action matrix as follows:
   - Non-friable and manufactured products reported in **POOR** condition, or friable **DEBRIS** resulting from the deterioration of non-friable ACM, are treated as friable materials and the appropriate action, and depending on accessibility is determined from the action matrix for friable ACM.
   - For non-friable or manufactured products reported in **GOOD** condition, Action 7 (surveillance) is recommended regardless of accessibility.

5. All asbestos-containing material from a particular area is to be removed where small quantities of asbestos are present, and removal will negate the need for the use of an Asbestos Management Program in that area.

The action matrix provided below establishes the recommended asbestos control action. The ACTIONS themselves are described in full following the table.

4.1 Action Matrix Tables

FRIABLE ACM				
ACCESS	**CONDITION**			**DEBRIS**
	GOOD	**FAIR**	**POOR**	
(A)	ACTION 5/7[1]	ACTION 5/6[2]	ACTION 3	ACTION 1
(B)	ACTION 7	ACTION 6/5[3]	ACTION 3	ACTION 1
(C) EXPOSED	ACTION 7	ACTION 6	ACTION 4	ACTION 2
(C) CONCEALED	ACTION 7	ACTION 7	ACTION 4	ACTION 2
(D)	ACTION 7	ACTION 7	ACTION 7	ACTION 7

[1] If material in **ACCESS (A)/GOOD** condition is not removed **ACTION 7** is required.

[2] If material in **ACCESS(A)/FAIR** condition is not removed **ACTION 6** is required.

[3] Remove ACM in **ACCESS (B)/FAIR** condition if ACM is likely to be disturbed.

4.2 Action Descriptions

ACTION 1 - Immediate Clean-Up of DEBRIS that is Likely to Be Disturbed

Access that is likely to cause a disturbance of the ACM **DEBRIS** is to be restricted and **clean up ACM DEBRIS is to be done immediately**. Use correct asbestos procedures. This action is required for compliance with regulatory requirements and good practice. The assessor should immediately notify the Asset or Property and Facility Manager, or Regional/Area Asbestos Management Coordinator of this condition.

ACTION 2 - Intermediate risk precautions for Entry into Areas with ACM DEBRIS

At locations where ACM **DEBRIS** can be isolated in lieu of removal or cleaned up, use appropriate means to limit entry to the area. Restrict access to the area to persons using intermediate risk asbestos precautions. The precautions will be required until the ACM **DEBRIS** has been cleaned up, and the source of the **DEBRIS** has been stabilized or removed.

ACTION 3 - ACM Removal Required for Compliance

Remove ACM for compliance with regulatory requirements and good practice. Utilize asbestos procedures appropriate to the scope of the removal work.

ACTION 4 - Access into areas where asbestos-containing material is present and likely to be disturbed by access requires intermediate risk precautions.

Intermediate risk asbestos precautions are to be used when entry or access into an area is likely to disturb the ACM. **ACTION 4** must be used until the ACM is re-moved (Use **ACTION 1** or **2** if **DEBRIS** is present). Intermediate risk or high-risk precautions should be used for removal (depending on extent of removal).

ACTION 5 - Proactive ACM Removal

Removal of ACM in lieu of repair may be considered, even if it is in **GOOD** condition at locations, where ACM is easily accessible, limited in quantity, and removal would be cost-effective.

ACTION 6 - ACM Repair

Repair ACM found in **FAIR** condition, and not likely to be damaged again or disturbed by normal use of the area or room. Upon completion of the re-pair work treat ACM as material **in GOOD** condition and implement **ACTION 7**. If ACM is likely to be damaged or disturbed during normal use of the area or room, **ACTION 5** is to be implemented.

ACTION 7 - Routine Surveillance

Institute routine surveillance of the ACM. Trained workers or contractors must use appropriate asbestos precautions (low, intermediate, or high) during disturbance of the remaining ACM.

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APPENDIX 1-4

Hazardous Building Materials Assessment
Building E0174, Employee Housing, House 04, British Columbia

ARCADIS Design & Consultancy for natural and built assets

Public Services and Procurement Canada

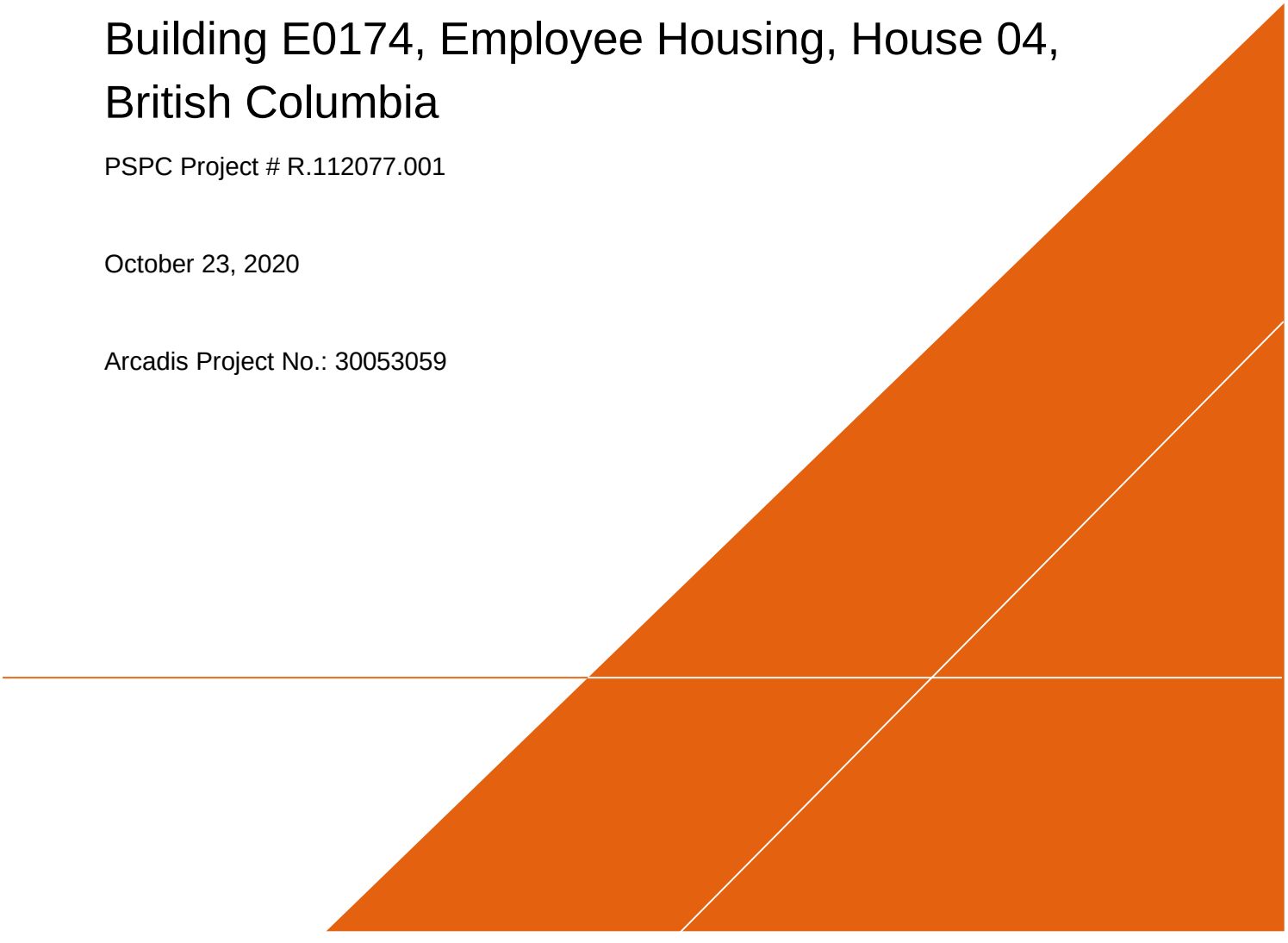
HAZARDOUS BUILDING MATERIALS ASSESSMENT

Building E0174, Employee Housing, House 04, British Columbia

PSPC Project # R.112077.001

October 23, 2020

Arcadis Project No.: 30053059



HAZARDOUS BUILDING MATERIALS ASSESSMENT

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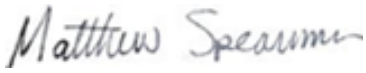

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ACRONYMS AND ABBREVIATIONS

ACM	Asbestos-Containing Materials
Arcadis	Arcadis Canada Inc.
CLC	Canada Labour Code
COHSR	Canada Occupational Health and Safety Regulations
HPP	Hazard Prevention Program
LCB	Lead-Containing Paints
NIOSH	National Institute for Occupational Safety and Health
NJC	National Joint Council
OHS	Occupational Health and Safety
PCBs	Polychlorinated Biphenyls
PLM	Polarized Light Microscopy
PSPC	Public Services and Procurement Canada
TEM	Transmission Electron Microscopy
USEPA	United States Environmental Protection Agency

EXECUTIVE SUMMARY

Arcadis Canada Inc. (Arcadis) was retained by Public Services and Procurement Canada (PSPC, Client) to conduct a hazardous building materials assessment of Building E0174, House 04, located in British Columbia.

This project consisted of a limited pre-renovation assessment to identify suspect hazardous materials in areas that were excluded from the original survey.

The renovation scope was limited to the part of the building scheduled for renovation, which consisted of replacing exterior windows, doors and vinyl siding as well as replacing deck and stairs.

The hazardous building materials considered during this assessment included the following:

- Asbestos-containing materials (ACMs)
- Lead, including lead-containing paints (LCPs)
- Polychlorinated biphenyls (PCBs) in electrical equipment
- Suspect visible mould
- Mercury materials/products/equipment
- Ozone-depleting substances (ODSs) in heating, ventilation, and air conditioning (HVAC) equipment or fixed fire suppression systems
- Silica in building materials

Arcadis performed the assessment on July 8, 2020. The assessment was conducted by Matthew Spearman, Dipl T (Env), Field Technologist of Arcadis.

Summary of Findings

Asbestos: Asbestos-containing materials (ACM) were confirmed to be present as follows:

Material	Location(s)	Total Quantity	Condition (action)	Asbestos Type (%)
Black weatherproofing	Exterior – on concrete foundation around building	~48 meters	Good (7)	3% Chrysotile

Lead: Lead is not confirmed present in the assessed area.

Polychlorinated Biphenyls (PCBs): No PCBs were observed in the assessed area.

Suspect Visible Mould: No suspect visible mould was observed in the assessed area.

Mercury: No mercury vapour was visually confirmed in the assessed area.

Ozone Depleting Substances (ODS): ODS were not observed in the assessed area

Silica: Crystalline silica is a presumed component of the following materials in the assessed area: poured concrete

Recommendations

The following is a summary of significant recommendations; refer to the body of the report for detailed recommendations.

1. Remove and properly dispose of asbestos-containing materials if disturbed by the planned renovation work.
2. Follow appropriate safe work procedures when handling or disturbing asbestos and silica.
3. Prepare and plans and performance specifications regarding hazardous material removal for the planned work. The specifications should include the scope of work, safe work practices, personal protective equipment, respiratory protection, and disposal of waste materials.
4. Provide this report and the detailed plans and specifications to the contractor prior to bidding or commencing work.
5. Retain a qualified consultant to specify, inspect and verify the successful removal of hazardous materials.
6. Update the asbestos inventory upon completion of the abatement and removal of asbestos-containing materials.

Findings of this report are subject to our standard Limitations, as outlined in Section 7.

This Executive Summary is subject to the same standard limitations as contained in the report and must be read in conjunction with the entire report.

1 INTRODUCTION

1.1 Purpose

Arcadis Canada Inc. (Arcadis) was retained by Public Services and Procurement Canada (PSPC, Client) to conduct a hazardous building materials assessment of Building E0174, House 04, located in British Columbia.

This project consisted of a limited pre-renovation assessment to identify suspect hazardous materials or areas that were excluded from the original survey.

The renovation scope was limited to the part of the building scheduled for renovation, which consisted of replacing exterior windows, doors and vinyl siding as well as replacing deck and stairs.

Arcadis performed the assessment on July 8, 2020. The assessment was conducted by Matthew Spearman, Dipl T (Env), Field Technologist of Arcadis.

1.2 Scope of Work

The scope of work for the project, as referenced in the Arcadis Workplan dated June 4, 2020 , identifies the requirement to conduct a hazardous building material assessment within building E0174. Specifically, the scope of work included:

- Review of previous reports, construction specifications and drawings and identify any gaps related to hazardous building materials.
- Development of sampling strategy to address the identified gaps.
- Collect and submit representative suspect asbestos material and lead paint chip samples for analysis.
- Submit samples to accredited laboratories for analysis.
- Evaluation and interpretation of field findings and sample analytical results to develop conclusions and recommendations pertaining to hazardous building materials identified

For the purpose of this assessment, hazardous building materials re defined as follows:

- Asbestos-containing materials (ACMs)
- Lead, including lead-containing paints (LCPs)
- Polychlorinated biphenyls (PCBs) in electrical equipment
- Suspect visible mould
- Mercury materials/products/equipment
- Ozone-depleting substances (ODSs) in heating, ventilation, and air conditioning (HVAC) equipment or fixed fire suppression systems
- Silica in building materials

A general description of the building included in this assessment is provided in the table below:

Table 1. Building Description

Building Number (BU)	Building Name	Total Inside Gross m^2	Year Constructed	Building Description
E0174	House 04	208.70	1987	Two-story building with asphalt shingle roof and concrete foundation. Vinyl siding exterior. Drywall and ceramic interior walls. Drywall, texture coat, lay-in ceiling tile and plywood ceilings. Carpet, plywood, poured concrete, wood laminate and vinyl sheet flooring. Heating is supplied by gas fired forced air furnace and electric baseboard heaters.

2 BACKGROUND INFORMATION

Arcadis conducted previous assessments of the building and the findings are presented in the following reports:

- Asbestos-Containing Materials Survey, Building E1074, dated March 24, 2019, prepared by Arcadis Canada Inc. And,
- Hazardous Building Material Assessment, Building E0174, dated February 3, 2020, prepared by Arcadis Canada Inc.

2.1 Exclusions

The assessment was restricted to accessible locations of the building. Roofing or other material that may cause damage to the building envelope were not included unless specifically impacted by the proposed renovations and sampling would not compromise the building envelope integrity.

3 SURVEY METHODOLOGY

Sampling activities were conducted in accordance with Arcadis' Standard Operation Procedures which take into account current federal and provincial regulations pertaining to such work (i.e., sampling procedures, required number of samples and laboratory analytical procedures). Regulations are presented in Appendix D.

Representative bulk samples were collected of accessible suspect, PCB, lead, and asbestos in sufficient quantities for laboratory analysis. Samples were sealed in polyethylene zip-lock bags labeled with the sample number, suspect material description, and sample location. As part of sampling procedures, sampling tools were cleaned between sample collection events to avoid the potential for cross-contamination of samples.

All sample bags were compiled in order and placed into a single container accompanied with a chain of custody form outlining the project information, date, building location, number of samples, and sample description. Samples were submitted to the analytical laboratory in a sealed container via courier.

3.1 Asbestos-Containing Materials

A separate set of samples was collected of each type of homogenous material suspected to contain asbestos. A homogenous material is defined by the US EPA as material that is uniform in texture and appearance, was installed at one time, and is unlikely to consist of more than one type or formulation of material. The homogeneous materials are determined by visual examination, available information on the phases of the construction and prior renovations.

Bulk sampling protocols followed the ASTM E2356 Standard, which indicates requirements for the number of samples to collect for each homogeneous material. The table below provides an outline of the minimum number of samples to be collected from the ASTM E2356 Standard.

Table 2. Bulk Material Sample Quantities

Type of Material	Size of Area of Homogeneous Material	Minimum Number of Samples Collected
Any homogeneous material, including but not limited to fireproofing, drywall joint compound, ceiling tile stucco, acoustical and stipple finishes, and visually similar floor tiles	Less than 90 m^2 (<1,000 ft^2)	3
	90 m^2 or more, but less than 450 m^2 (1,000-5,000 ft^2)	5
	450 m^2 or more (>5,000 ft^2)	7

In some cases, manufactured products such as asbestos cement pipe were visually identified without sample confirmation.

Flooring mastic/adhesive are only sampled and analyzed if present on the underside of flooring samples (vinyl floor tile and vinyl sheet flooring) in sufficient quantity for laboratory analysis.

Attempts to distinguish and delineate asbestos-containing drywall compound from new non-asbestos drywall compound is often unachievable. Arcadis collected drywall joint compound samples from exterior walls, columns or other locations which are unlikely to have been renovated in an attempt to determine the presence of asbestos in the original drywall compound.

Arcadis submitted the bulk samples to a NVLAP accredited laboratory for analysis. The analysis is performed in accordance with Test Method EPA/600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials, July 1993.

EPA Method 600 states that materials characterized by interfering binder/matrix or low asbestos content may require additional gravimetric reduction sample treatment beyond routine polarized light microscopy (PLM) analysis (e.g. dissolution with hydrochloric acid, treatment with organic solvents or ashing in a muffle furnace or low temperature plasma asher to remove unwanted components).

Arcadis submitted one sample of each sample set (3) of vinyl floor tiles be analyzed by transmission electron microscopy (TEM) if the first two samples are reported negative by PLM.

The asbestos analysis was completed using a stop positive approach. Only one result of greater than the regulated criteria is required to determine that a material is asbestos-containing, but all samples must be analyzed to conclusively determine that a material is non-asbestos. The laboratory stopped analyzing samples from a homogeneous material once greater than the criteria was detected in any of the samples of that material. All samples of a homogeneous material were analyzed if no asbestos was detected. Where building materials are described in this report as non-asbestos, or described as containing no asbestos,

this is subject to the limitations of the analytical method used and should be understood to mean no asbestos was detected.

The classification, condition, and accessibility were assessed for the materials which could contain asbestos. To determine these factors, Arcadis followed the methodology outlined in the ASTM E356 Standard. The Standard provides definitions and criteria for the assessment of ACM. The classification, conditions, and accessibility information are provided in Appendix E.

Bulk samples of materials which could contain asbestos were collected and submitted to EMSL Canada Inc. (EMSL) for analysis of asbestos content. Asbestos-containing materials are defined as 0.5% or greater, or any amount if vermiculite.

3.2 Lead

Arcadis collected samples of distinctive paint finishes and surface coatings present in more than a limited application, where removal of the paint is possible. Arcadis collects samples by scraping the painted finish to include base and covering applications. 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. 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 were presumed to be the same, regardless of differing sub surface paints, if any.

The 2017 WorkSafeBC publication *Safe Work Practices for Handling Lead* (Lead Guideline) indicates the following:

> *Unlike for asbestos-containing material, WorkSafeBC does not numerically define what would be considered a lead-containing paint or coating. All suspected paints or coatings should be tested for lead because, depending on the nature of the work, even a small amount could pose a risk to workers. In order to determine which controls and personal protective equipment would be required for a particular job, a qualified person must consider this information as part of the risk assessment.*

- Improper removal of lead paint containing 600 mg/kg lead results in airborne lead concentrations that exceed half of the exposure limit
  - Exposure limit indicated in both the COHSR and BC Reg. 296/97 is 0.05 mg/m^3
  - Potential for exposure exceeding half of the occupational exposure limit would be the trigger for implementation of an exposure control plan.
- Lead concentrations as low as 90 mg/kg may present a risk to pregnant women and children
  - Any risk assessment should include for the presence of high risk individuals within the workplace

When reviewing the above, “high risk” individuals are not expected to be present in the workplace associated with this building during building material alteration activities (i.e., demolition) that would create significant disturbance to paint with such individuals present. As such, paints containing 600 ppm lead or more will be considered “lead-containing” for the purpose of this report, such that appropriate risk assessments can be completed for demolition planning. However, information regarding the lead content of all paints tested is provided herein, for reference and risk assessment should the consideration of high risk individuals be necessary, based on the requirements of a particular situation.

Although a concentration of 600 ppm lead has been used to define paint coatings as LCPs, it should be noted that this is related to painted surfaces and the determination of appropriate provisions to protect occupants and employees from exposure to elevated concentrations of lead during typical operations and maintenance or simple renovation. This does not include painted metal surfaces that are to be welded, burned or torch-cut.

Using an arc welder or oxyacetylene torch on steel that is coated with lead-containing paint can create hazardous lead fumes and is prohibited by section 12.115 of BC Reg. 296/97.

> Regulatory excerpt: **12.115 Coatings on metals**
>
> *A coating on metal which could emit harmful contaminants (such as lead, chromium, organic materials, or toxic combustion products) must be removed from the base metal, whenever practicable, before welding or cutting begins.*

In addition, the following information is provided in the Lead Guideline:

- Welding or torch cutting of paints or coatings on metal can create very high concentrations of airborne lead fumes. Torch cutting structural steel, coated with paint containing as little as 130 mg/kg (equivalent to ppm) lead, can release airborne levels of lead as high as 0.8 mg/m^3 (16 times the exposure limit).

Given this information and that the analytical detection limit for lead paint analysis is approximately 80– 90 ppm (not significantly different than 130 ppm, which, per above, may release airborne lead levels 16 times the exposure limit), any paint coating on a metal surface to be welded, burned or torch-cut must be removed prior to that action being undertaken, unless a project-specific or tasks-specific risk assessment and safe work practices are developed by a qualified person.

Paint and surface coatings are evaluated for condition. The criteria for condition evaluation pertaining to LCPs described herein are generally based on the United States Housing and Urban Development (HUD) 2012 *Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing*.

When evaluating the condition of LCPs, an attempt should be made to determine whether the deterioration is due to a moisture problem or some other existing building deficiency. **"Poor"** surfaces are considered to be a hazard and should be corrected. "**Fair"** surfaces should be repaired but are not yet considered to be a hazard; if not repaired, they should be monitored frequently. "**Good/intact"** surfaces should be monitored to ensure that they remain in a nonhazardous condition.

In addition, the presence of paint debris must be considered in evaluating condition. Given the variety of paint uses, there are many applications that can have a tendency for the paint to "wear" from the surface slowly, over an extended period of time. Conditions where paint has worn from a surface are worth noting for maintenance discussions (i.e., related to re-coating the surface should, for example, the coating provide weather protection), however, in the absence of loose paint chip debris/dust, such conditions would not represent a potential exposure situation related to lead.

The condition evaluation criteria for LCPs are summarized in the table below.

Table 3. Lead-Containing Paint Condition Categories

Type of Building Component[1]	Total Area of Deteriorated Paint on Each Component		
	Good/Intact	Fair[2]	Poor[3]
Exterior components with large surface areas.	Entire surface is intact.	Less than or equal to 10 square feet	More than 10 square feet
Interior components with large surface areas (walls, ceilings, floors, doors.	Entire surface is intact.	Less than or equal to 2 square feet	More than 2 square feet
Interior and exterior components with small surface areas (windowsills, baseboards, soffits, trim).	Entire surface is intact.	Less than or equal to 10% of the total surface area of the component.	More than 10% of the total surface area of the component

NOTES:

1. Building component in this table refers to each individual component or side of building, not the combined surface area of all similar components in a room (e.g., a wall with 1 square foot of deteriorated paint is in "fair" condition, even if the other three walls in a room are intact).
2. Surfaces in "fair" condition should be repaired and/or monitored but are not considered to be "lead-containing paint hazards".
3. Surfaces in "poor" condition are considered to be "lead-containing paint hazards" and should be addressed through abatement or interim controls.

Analysis for lead in paints or surface coatings was performed in accordance with EPA Method No. 3050B/Method No. 7420; flame atomic absorption at laboratory accredited by the American Industrial Hygiene Association (AIHA).

3.3 Polychlorinated Biphenyls (PCBs)

The presence or absence of fluorescent lights was documented during the course of our investigation to determine whether there were any of the T12 type. T12 fluorescent lamps, with a diameter of 1.5 inches, utilize transformer type magnetic ballasts, which may contain PCBs. The use of T12s has been discontinued and replaced with new high-efficiency 1-inch T8 lamps (and other types) which use electronic ballasts which do not contain PCBs.

Wet transformers were assessed for PCBs based on the age of the building, a review of maintenance records and examination of labels or nameplates on equipment, where present and accessible. The information is compared to known ban dates of PCBs and Environment Canada publications.

Dry type transformers are presumed to be free of dielectric fluids and hence non-PCB. Caulking's were not sampled for PCB content unless specifically impacted by the proposed renovation scope. The material is considered a PCB solid if PCB content is 50ppm or greater based on the threshold given in SOR/2008-273.

3.4 Suspect Visible Mould

Arcadis identified the presence of any suspect mould and/or moisture-impacted building materials by visual inspection during the course of our site investigation. Suspect mould is typically a coloured, textured substance or discolouration/staining on a building material surface which, based on our experience, may be mould growth. If any mould growth is concealed within wall, ceiling, or floor cavities, it is not addressed in this assessment. No mould sampling or moisture testing is performed unless directed by the Client. The adjective *suspect* is used where the presence of mould has not been confirmed by laboratory analysis.

3.5 Mercury

Building materials/products/equipment (e.g. thermostats, barometers, pressure gauges, light tubes), suspected to contain mercury were identified by visually inspection only. Dismantling of equipment suspected of containing mercury was not performed. Sampling of these materials for laboratory analysis of mercury content was not performed.

Mercury spills or damaged mercury-containing equipment was recorded where observed.

3.6 Ozone Depleting Substances (ODS)

Arcadis determined the potential presence of ODS (chlorofluorocarbons, hydrochlorofluorocarbons, hydrofluorocarbons, halons, etc.) in air conditioning units, chillers, commercial coolers, and fire suppression systems by visual inspection of manufactures' labels or plates, maintenance records, or logbooks, etc.

3.7 Silica

Arcadis identified building materials suspected of containing crystalline silica (e.g. concrete, cement, tile, brick, masonry, mortar) by knowledge of current and historic applications and visual inspection only. Arcadis did not perform sampling of these materials for laboratory analysis of crystalline silica content.

4 RESULTS

4.1 Asbestos

During the course of our assessment, representative bulk samples of material were collected by Arcadis staff. The samples were forwarded to EMSL in Burnaby, British Columbia (BC) for asbestos analyses. EMSL holds a current Certificate of Accreditation for Bulk Asbestos Fibre Analysis under the Voluntary Accreditation Program (NVLAP). Bulk sampling was performed in general accordance with the requirements specified in ASTM E2356 Standard, BC Reg. 296/97 and in the WorkSafe BC publication Safe Work Practices for Handling Asbestos.

Results of bulk sample analysis for asbestos content are provided in the table below. Samples that exceed the criteria are highlighted in yellow.

Site Photographs provided in Appendix A. Laboratory certificates of analysis have been provided in Appendix B. Floor plans indicating sample locations and room numbers are provided in Appendix C.

Table 4. Results of Bulk Sample Analysis for Asbestos

Sample Number	Sample Description	Sample Location	Asbestos Type %
S-01A	Building Paper	Exterior – North Face	None Detected
S-01B	Building Paper	Exterior – North Face	None Detected
S-01C	Building Paper	Exterior – East Face	None Detected
S-01D	Building Paper	Exterior – West Face	None Detected
S-01E	Building Paper	Exterior – South Face	None Detected
S-02A	Black Weatherproofing	Exterior – South Face, concrete foundation	3% Chrysotile
S-02B	Black Weatherproofing	Exterior – South Face, concrete foundation	Stop Positive
S-02C	Black Weatherproofing	Exterior – East Face, concrete foundation	Stop Positive

The following building materials were common in the building: however, these materials do not contain asbestos and were not sampled during the survey:

- Vinyl siding, wood, and concrete.

Asbestos-containing materials were confirmed present in the following table:

Table 5. Summary of Confirmed Asbestos-Containing Materials

Material	Location(s)	Total Quantity	Condition	Asbestos Type (%)
Black weatherproofing	Exterior – on concrete foundation around building	~48 meters	Good (7)	3% Chrysotile

No asbestos was identified in the previous assessment reports.

Presumed Materials

No presumed materials that may contain asbestos are suspected to be present in the way of planned work.

4.2 Lead

During the course of our site investigation, representative bulk samples of predominant paint types were collected by Arcadis staff. The samples were forwarded to EMSL for lead analyses. Results of bulk sample analysis for lead content are provided in the table below. Results that exceed the criteria re highlighted in yellow.

The laboratory report is provided in Appendix B.

Table 6. Results of Analyses of Bulk Samples for Paint for Lead

Sample No.	Sample Location(s)	Sample Description	Lead Content (ppm)
L-01	Exterior – West Face	White paint on metal gutter	<170

Lead was not detected at a level above the definition of lead paint (600 ppm) in any samples in the assessed area. Where one colour of paint is indicated in the sample descriptions in the table above, only one layer of paint was observed. Where multiple colours are indicated in the sample description, multiple layers of paint were observed.

All paint applications were noted to be generally in good condition. Lead identified on interior surfaces in the February 2020 report is not expected to be impacted by the exterior renovations.

4.3 Polychlorinated Biphenyls (PCBs)

PCBs were not observed in the assessed area.

4.4 Suspect Visible Mould

Suspect visible mould was not observed in the assessed area.

4.5 Mercury

Mercury-containing items were not found in the assessed area.

4.6 Ozone Depleting Substances

ODS were not observed in the assessed area.

4.7 Silica

Crystalline silica is a presumed component of the following materials where present in the assessed area:

- poured concrete

5 RECOMMENDATIONS

If future building renovation or demolition is required beyond the scope of this project, a detailed intrusive assessment must be conducted. The assessment should include destructive testing (i.e. coring and/or removal of building finishes and components), and sampling of materials not previously tested (i.e. roofing materials).

All hazardous building materials were reported in good condition. All ACM observed were considered to fall under a recommended Action Level 7 (routine surveillance).

5.1 Building Renovation Work

The following specific recommendations are made regarding renovation involving the hazardous materials identified.

1. Prepare plans and performance specifications for hazardous material removal required for the planned work. The specifications should include the scope of work, personal protective equipment, respiratory protection, and disposal of waste materials.
2. Provide this report and the detailed plans and specifications to the contractor prior to bidding or commencing work.
3. Retain a qualified consultant to specify, inspect and verify the successful removal of hazardous materials.
4. Update the asbestos inventory upon completion of the abatement and removal of asbestos-containing materials.

The following general recommendations are made regarding renovation involving the hazardous materials identified.

Asbestos

Remove all asbestos-containing materials (ACM) using “Minimum Asbestos Abatement Precautions” prior to renovation, alteration, maintenance, or demolition work or if ACM may be disturbed by the work.

If the identified ACM will not be removed prior to commencement of the work, disturbance of ACM must follow the appropriate asbestos precautions for the classification of work being performed.

Asbestos-containing materials must be disposed of at a landfill approved to accept asbestos waste.

Suspect Visible Mould

No mould was observed; if mould is uncovered inside wall cavities during hand demolition, use appropriate precautions and protect workers using methods that comply with provincial guidelines.

Silica

Construction disturbance of silica-containing products may result in excessive exposures to airborne silica, especially if performed indoors and dry. Cutting, grinding, drilling or demolition of materials containing silica should be completed only with proper respiratory protection and other worker safety precautions that comply with provincial standards or guidelines.

6 REFERENCES

The following legislation and documents were referenced in completing the assessment and this report:

1. Occupational Health and Safety Regulation, B.C. Reg. 296/97, WorkSafe BC.
2. Safe Work Practices for Handling Asbestos, WorkSafe BC, 2017 Edition.
3. Hazardous Waste Regulation, B.C. Reg. 63/88, November 2017, BC Environmental Management Act.
4. Ozone Depleting Substances and Other Halocarbons Regulation, B.C. Reg. 317/2012 Environmental Management Act.
5. PCB Regulations, SOR/2008-273, Canadian Environmental Protection Act.
6. Lead-Containing Paint and Coatings, Preventing Exposure in the Construction Industry, WorkSafe BC, June 2017.
7. Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing, United States Housing and Urban Development (HUD) 2012.
8. Mould Guidelines for the Canadian Construction Industry, Standard Construction Document 2018, Canadian Construction Association.
9. Minister of Justice Canada Labour Code. R.S.C., 1985, c. L-2. March 2020.
10. Minister of Justice. 2018. Canada Occupational Health and Safety Regulations. SOR/86-304, June 2019.
11. Public Services and Procurement Canada Asbestos Management Standard. June 2019.
12. Transport Canada Consolidated Transport of Dangerous Goods Regulations including Amendment SOR/2019-101.
13. ASTM E2356 Standard Practice for Comprehensive Buildings Asbestos Surveys.
14. Government of Canada, Asbestos Management Plan, Version 2020-01, January 2020.

7 LIMITATIONS

This report, prepared for Public Services and Procurement Canada on behalf of Government of Canada, does not provide certification or warranty, expressed or implied, that the investigation conducted by Arcadis identified all hazardous materials associated with the subject building. The work undertaken by Arcadis was directed to provide information on the presence of hazardous materials in construction materials based on visual inspection of readily accessible areas of the subject building, and on the results of laboratory analysis of a limited number of bulk samples. The material in this report reflects Arcadis' best judgment in light of the information available at the time of the investigation, which was performed on July 8, 2020. This report is not intended to be used as a scope of work or technical specification for remediation of hazardous materials. Any use which any other party makes of the report, or reliance on, or decisions to be based on it, is the responsibility of such parties.

APPENDIX A

Site Photographs

Project Photographs

Public Services and Procurement Canada
Building E0174, House 04, British Columbia

Photo: 1

Date:
July 8, 2020

Description:
View of building.
Front Entrance.

Photo: 2

Date:
July 8, 2020

Description:
View of Building,
Rear.

Project Photographs

Public Services and Procurement Canada
Building E0174, House 04, British Columbia

Photo: 3

Date:
July 8, 2020

Description:
View of building. West Face.

Photo: 4

Date:
July 8, 2020

Description:
Asbestos-containing weatherproofing on concrete foundation at front entrance.

APPENDIX B

Laboratory Certificates of Analysis

EMSL Canada Inc.
2333 18th Avenue NE, Unit 48, Calgary, AB T2E 8T6
Phone/Fax: (403) 879-1149 / (403) 879-1152
http://www.EMSL.com CalgaryLab@EMSL.com

EMSL Canada Or	652005047
CustomerID:	55ACAV42
CustomerPO:	30053059
ProjectID:	

Attn: **Jerry Botti**
ARCADIS Canada Inc.
308-1080 Mainland Street
Vancouver, BC V6B 2T4

Phone: (604) 632-9941
Fax:
Received: 7/20/2020 08:30 AM
Collected: 7/8/2020

Project: **30053059 / E0174 / House 04**

Test Report: Lead in Paint Chips by Flame AAS (SW 846 3050B/7000B)*

Client Sample Description	*Lab ID*	*Collected*	*Analyzed*	*Weight*	*Lead Concentration*
L-01	*652005047-0001*	7/8/2020	7/21/2020	0.1203 g	<170 ppm
	Site: EXTERIOR - WHITE PAINT ON METAL GUTTER Insufficient sample to reach reporting limit.				

Client request: Remove address from project name.

Jefferson Salvador, Laboratory Manager
or other approved signatory

Report Amended: 10/22/2020 10:17:54 Replaces the Inital Report 07/24/2020 15:50:14. Reason Code: Client-Other (see report comment)

EMSL Canada Inc.

4506 Dawson Street Burnaby, BC V5C 4C1
Phone/Fax: (604) 757-3158 / (604) 757-4731
http://www.EMSL.com / vancouverlab@EMSL.com

EMSL Canada Order 692001636
Customer ID: 55ACAV42
Customer PO: 30053059
Project ID:

Attn: Jerry Botti
ARCADIS Canada Inc.
308-1080 Mainland Street
Vancouver, BC V6B 2T4

Phone: (604) 632-9941
Fax:
Collected: 7/ 8/2020
Received: 7/16/2020
Analyzed: 7/21/2020

Proj: 30053059 / E0174 / House 04

Test Report: Asbestos Analysis in Bulk Material for Occupational Health and Safety British Columbia Regulation 188/2011 via EPA 600/R-93/116 Method

Client Sample ID: S-01A ***Lab Sample ID:*** **692001636-0001**
Sample Description: EXTERIOR - NORTH/BUILDING PAPER

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	7/21/2020	Black	60.0%	40.0%	None Detected	

Client Sample ID: S-01B ***Lab Sample ID:*** **692001636-0002**
Sample Description: EXTERIOR - NORTH/BUILDING PAPER

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	7/21/2020	Black	60.0%	40.0%	None Detected	

Client Sample ID: S-01C ***Lab Sample ID:*** **692001636-0003**
Sample Description: EXTERIOR - EAST/BUILDING PAPER

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	7/21/2020	Black	60.0%	40.0%	None Detected	

Client Sample ID: S-01D ***Lab Sample ID:*** **692001636-0004**
Sample Description: EXTERIOR - WEST/BUILDING PAPER

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	7/21/2020	Brown	85.0%	15.0%	None Detected	

Client Sample ID: S-01E ***Lab Sample ID:*** **692001636-0005**
Sample Description: EXTERIOR - SOUTH/BUILDING PAPER

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	7/21/2020	Brown	85.0%	15.0%	None Detected	

Client Sample ID: S-02A ***Lab Sample ID:*** **692001636-0006**
Sample Description: EXTERIOR - SOUTH/WEATHERPROOFING

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	7/21/2020	Black	0.0%	97.0%	**3% Chrysotile**	

Client Sample ID: S-02B ***Lab Sample ID:*** **692001636-0007**
Sample Description: EXTERIOR - SOUTH/WEATHERPROOFING

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	7/21/2020				Positive Stop (Not Analyzed)	

EMSL Canada Inc.

4506 Dawson Street Burnaby, BC V5C 4C1
Phone/Fax: (604) 757-3158 / (604) 757-4731
http://www.EMSL.com / vancouverlab@EMSL.com

EMSL Canada Order 692001636
Customer ID: 55ACAV42
Customer PO: 30053059
Project ID:

Test Report: Asbestos Analysis in Bulk Material for Occupational Health and Safety British Columbia Regulation 188/2011 via EPA 600/R-93/116 Method

Client Sample ID: S-02C ***Lab Sample ID:*** **692001636-0008**

Sample Description: EXTERIOR - EAST/WEATHERPROOFING

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	7/21/2020				Positive Stop (Not Analyzed)	

Analyst(s):

Chloe Huang PLM (4)
Margaret Lee PLM (2)

Reviewed and approved by:

Nicole Yeo, Laboratory Manager
or Other Approved Signatory

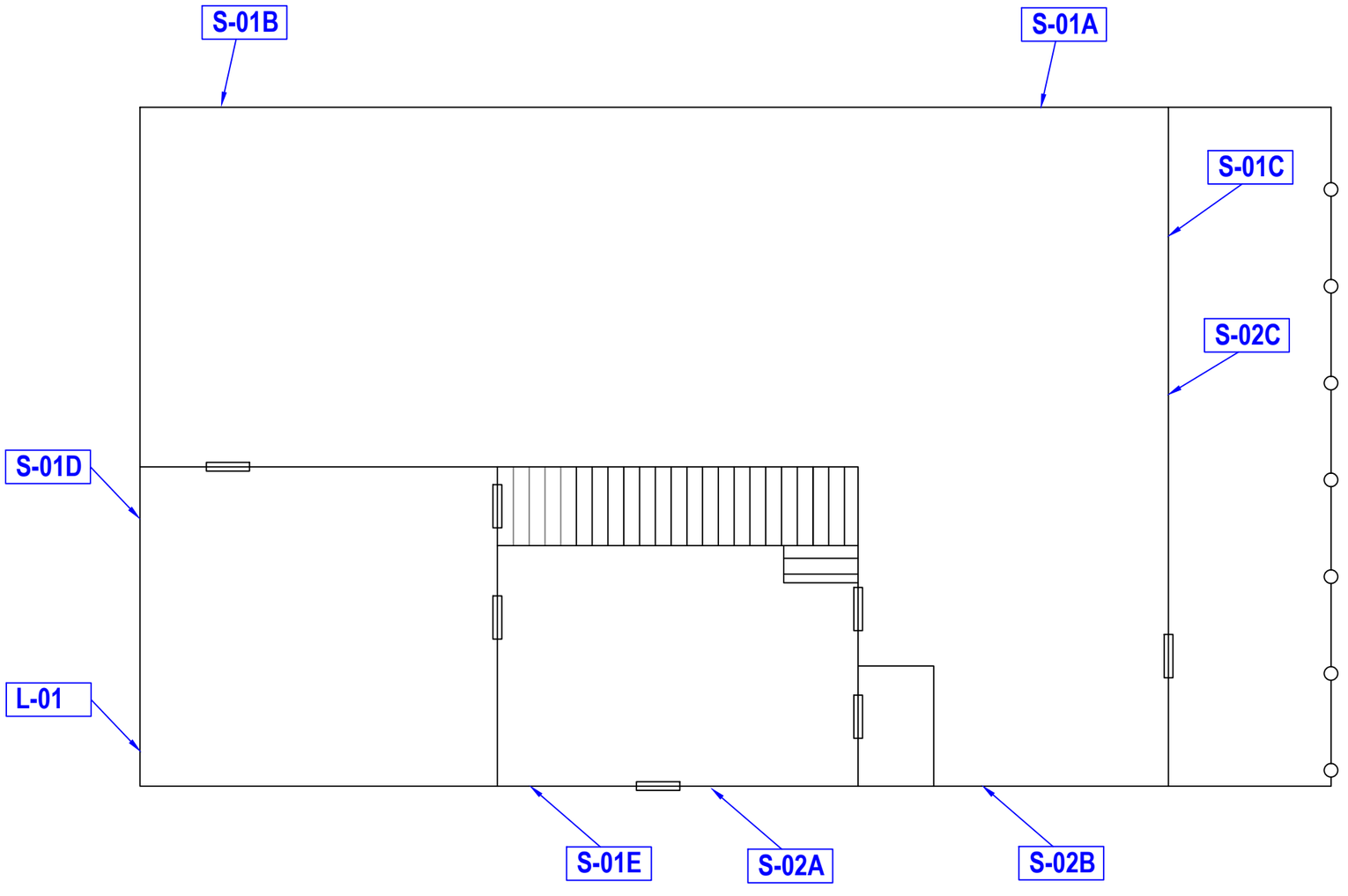
None Detected = <0.1%. EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations.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

Samples analyzed by EMSL Canada Inc. Burnaby, BC

Report amended: 10/21/202016:58:31 Replaces initial report from: 07/23/202011:45:15 Reason Code: Client-Change to Project

APPENDIX C

Floor Plans



LEGEND

S-XXX Bulk Asbestos Sample

L-XXX Bulk Lead Paint Sample

N.T.S

Title: **GOVERNMENT OF CANADA**
HAZARDOUS BUILDING MATERIAL ASSESSMENT - 2020

Project: BUILDING E0174 - HOUSE 04
FIRST FLOOR

Client: PUBLIC SERVICES AND PROCUREMENT CANADA

Project Number:	Drawn By:	Plot Size:	Date:
30053059	CB	11X17"	JULY 2020

ARCADIS

FIGURE 1

Basement G:\PROJECTS\30053059 - PSPC_RCMP Construction 2020\CAD\30053059-chruchill.dwg

APPENDIX D

Regulations and Health Effects

Asbestos

Occupational Health and Safety (OHS) for federal employees is regulated by the Canada Labour Code (CLC) Part II. The *Canada Occupational Health and Safety Regulations (COHSR), Part X, Hazardous Substances* covers specific requirements related to the management and control of asbestos-containing materials (ACM). The COHSR, Part X, Hazardous Substances, states an employee shall be kept free from exposure to a concentration of airborne chrysotile asbestos in excess of 0.1 fibre/cm^3 or f/cc. There are also specific requirements for hazard prevention detailed in the Hazard Prevention Program (HPP) in the CLC.

For the purposes of this report, the following federal requirements will be followed, unless provincial requirements are more stringent. Federal legislation and policy referenced in this report includes:

- Canada Labour Code, March 2020;
- Canada Occupational Health and Safety Regulations Part X, Hazardous Substances; SOR/86-304, June 2019;
- Public Services and Procurement Canada Asbestos Management Standard, June 2019;
- Asbestos Management Plan, Government of Canada, Version 2020-01, January 2020; and,
- Transport Canada, Transport of Dangerous Goods Regulations

The management and requirements for the potential disturbance of asbestos in buildings is also regulated at the provincial level under the *British Columbia Occupational Health and Safety Regulations,296/97, and Safe Work Practices for Handling Asbestos, WorkSafeBC, 2017 Edition*.

The BC Occupational Health and Safety Regulations, 296/97 (BC Reg 296/97), require specific actions when asbestos is a potential health hazard in a workplace. Section 6.1 of the regulation defines an asbestos-containing material as follows:

"asbestos-containing material" means the following:

(a) a manufactured article or other material, other than vermiculite insulation, that would be determined to contain at least 0.5% asbestos if tested in accordance with one of the following methods:

(i) Asbestos, Chrysotile by XRD, Method 9000 (Issue 2, dated August 15, 1994) in the NIOSH Manual of Analytical Methods, published by the United States National Institute for Occupational Safety and Health, Centre for Disease Control;

(ii) Asbestos (bulk) by PLM, Method 9002 (Issue 2, dated August 15, 1994) in the NIOSH Manual of Analytical Methods, published by the United States National Institute for Occupational Safety and Health, Centre for Disease Control;

(iii) Test Method for the Determination of Asbestos in Bulk Building Materials (EPA/600/R-93/116, dated July 1993) published by the United States Environmental Protection Agency;

(b) vermiculite insulation that would be determined to contain any asbestos if tested in accordance with the Research Method for Sampling and Analysis of Fibrous Amphibole in Vermiculite Attic Insulation (EPA/600/R-04/004, dated January 2004) published by the United States Environmental Protection Agency;

The duties of employers, contractors, or owners include:

- identifying and labeling ACM that can potentially release asbestos fibres;
- keeping a current written record of all ACM present in the workplace;
- conducting regular surveillance and maintenance of asbestos materials to prevent fibre release;
- developing a written exposure control plan if workers may be exposed to harmful levels of asbestos;
- conducting work in a way that prevents the release of asbestos fibres as much as possible;
- notifying, informing, and training workers; and,
- notifying Occupational Health and Safety (OHS) at least 48 hours before beginning an asbestos-abatement.

Disturbance of asbestos during construction and demolition is regulated under section 20.112 of BC Reg 296/97.

The 2017 WorkSafeBC publication Safe Work Practices for Handling Asbestos (Asbestos Guide) is used by Occupational Health and Safety officers as a guide when reviewing abatement work practices and employer codes of practice, and generally meets the requirements of the COHSR.

The Asbestos Guide also provides significant additional background information pertaining to asbestos, along with details on health effects and other applicable legislation within the province of British Columbia (e.g., the federal Hazardous Products Act, the BC Building Code and waste disposal regulations).

Disposal of asbestos waste is governed by the British Columbia Hazardous Waste Regulation (BC Reg. 63/88). The Federal Transportation of Dangerous Goods Regulation and BC Reg. 63/88 set out the requirements for the proper transport of asbestos waste in British Columbia. In general, and for transportation and disposal, the waste must be placed in a double sealed container, properly labeled, free of cuts, tears or punctures and disposed of at a licensed waste station which has been properly notified of the presence of asbestos waste.

Health effects

Undisturbed asbestos within building materials poses no health risks. Asbestos poses a risk when building materials containing asbestos are impacted, or disturbed, thereby releasing the asbestos fibres into the air

Asbestos-related diseases are caused when suspended airborne asbestos fibres are inhaled and the fibres settle into various regions of the lungs and remain for extended periods. Once embedded in the lungs the asbestos fibres cause scarring within the lung tissue, ultimately leading to impaired lung function (asbestosis) and/or various cancers (lung cancer; mesothelioma). These asbestos-related diseases are irreversible and fatal. The risk of lung-related cancers is increased in individuals who smoke.

These asbestos-related diseases most often occur in individuals who have been exposed to high concentrations of airborne asbestos over a long period of time, though mesothelioma has been found in individuals with short-term exposures. Symptoms or the development of these asbestos-related diseases usually occur 10 to 25 years after exposure

Lead

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 (2005) to 90 ppm (2010).

With respect to potential lead exposures associated with disturbance to surfaces coated with lead-containing products, the 2017 WorkSafeBC manual titled Lead-Containing Paint and Coatings: Preventing Exposure in the Construction Industry, indicates the following:

- Improper removal of lead paint containing 600 mg/kg lead results in airborne lead concentrations that exceed half of the exposure limit
    - This potential for exposure exceeding half of the occupational exposure limit would be the trigger for implementation of an exposure control plan.
- Lead concentrations as low as 90 mg/kg may present a risk to pregnant women and children
    - Any risk assessment should include for the presence of high risk individuals within the workplace

The disposal of lead-containing paint is regulated under the Federal *Transportation of Dangerous Goods Act* and by the British Columbia Ministry of Environment. All lead-based paints and associated nonmetal substrate (concrete, plaster, wood, etc.) must undergo Toxicity Characteristic Leachate Properties (TCLP) metals testing to determine disposal procedures. Upon the completion of the test, the total concentration of metals in the waste extract must be compared to Schedule 4, Table 1 of the Hazardous Waste Regulation.

The Federal Transportation of Dangerous Goods Regulation and BC Reg. 63/88 set out the requirements for the proper transport of lead waste in British Columbia.

Health Effects

Elemental lead and inorganic lead compounds are absorbed through ingestion or inhalation and can incorporate into the bone marrow, nerve tissue, brain, and kidneys. In children, symptoms of lead poisoning can include headaches, irritability, abdominal pain, vomiting, anemia, weight loss, poor attention span, noticeable learning difficulty, slowed speech development, and hyperactivity. In adults, symptoms of lead poisoning can include pain, numbness or tingling of the extremities, muscular weakness, headache, abdominal pain, memory loss, unsteady gait, pale skin, weight loss, vomiting, irritability, and anemia. Although adults are susceptible to the toxic effects of lead, children are at high risk due to the nature of a child's activities that involve the introduction of non-food items into their bodies.

Excessive airborne lead and surface contamination can be transferred to employees' hands and may results in lead ingestion. Therefore, work practices intended to minimize surface lead concentrations, such as frequent cleaning of work surfaces should be included in an overall lead exposure control plan

PCB

As of September 5, 2008, under subsection 93(1) of the *Canadian Environmental Protection Act,* (CEPA), Federal PCB regulations were published by the Canada Gazette Part II (SOR/2008-273) that imposed specific deadlines for the elimination of all PCBs in concentrations at or above 50 milligrams/kilogram (mg/kg). This regulation required the elimination of all PCBs and PCB-containing materials currently in-use and in storage and limited the period of time PCB materials could 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.

In British Columbia, PCB equipment becomes PCB wastes as soon as it is removed from service. This is the case even if the intent is to treat, recycle, or reuse the equipment.

When PCB wastes are stored in British Columbia, the full requirements of BC Reg. 63/88 apply to:

- 1.0 kg or more of pure PCB
- 100 L or more of any liquid containing more than 50 ppm of PCB
- 100 kg or more of any material other than a liquid, contaminated with more than 50 ppm of PCB

These amounts are the total of all amounts at a single location owned or controlled by the same person. They include PCB equipment. BC Reg. 63/88 also provides packaging requirements for storage, labeling requirements, waste destruction requirements, and references SOR/2008-273, indicating:

The Federal Transportation of Dangerous Goods Regulation sets out the requirements for the proper transport of PCB waste across provincial boundaries.

In British Columbia, a manifest issued by the Ministry of Environment (or equivalent federal document) must be used for hazardous wastes shipped from sites in British Columbia. A manifest must be used to transport:

- 5 kg or more of PCB solids
- 5 L or more of PCB liquids
- An amount of a PCB solid or PCB liquid containing more than 500 g of PCB within BC
- 500 g or more of solids, liquids, or mixtures of these containing 50 mg/kg of PCB outside of BC

Health effects

PCBs are insoluble in water; however, they readily dissolve in fats and other organic compounds. It is these attributes and fat-solubility that allow PCBs to persist in the environment and bio-accumulate in humans and animals. Exposure to PCBs can affect the immune system, reproductive system, nervous system, and endocrine system. In humans, PCBs are potentially cancer-causing.

Mould

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, occupational health and safety regulations typically require employers to take every precaution reasonable in the circumstances for the protection of workers.

The WorkSafeBC Guideline for Part 4 of BC Reg. 296/97 discusses the application of the Regulation to workplaces with mould showing on exposed or hidden surfaces, or where mould may be a factor in complaints regarding indoor air quality. The guideline provides information for investigating indoor air quality complaints with respect to mould contamination, including information on sampling for the

presence of moulds in buildings. Information is also provided on possible health effects and for cleanup personnel involved in the remediation of buildings damaged by water and mould.

Health Effects

There are a number of documented cases of health problems related to exposure to indoor fungi.

Both high-level, short-term exposures and lower-level, long-term exposures can result in illness. The most common symptoms from exposure to mould in indoor environments are runny nose, eye irritation, cough, congestion, aggravation of asthma, headache, flu-like symptoms, fatigue, and skin rash. People with suppressed immune systems may be susceptible to fungal infections as a result of exposure to indoor moulds.

People who are exposed to mould growth on building materials will not necessarily exhibit adverse health effects. However, the mould must still be removed. Humans are at risk from indoor mould when fungal spores, fragments or metabolites are released into the air and inhaled or physically contacted (dermal exposure).

Not everyone experiences allergic reaction; the susceptibility to exposure varies with the individual's genetic predisposition, age, state of health, and concurrent exposures. For these reasons, and because the measurement of exposure is not standardized and biological markers of exposure to fungi are largely unknown, it is not possible to establish "safe" or "unsafe" levels of exposure. However, federal, and provincial policies have been written to minimize mould exposure and the elimination of mould indoors.

Mercury

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 disposal should be through a scrap dealer (elemental mercury), recycling firm for mercury vapour and returned to the manufacturer for light tubes and fixtures. Disposal of mercury waste is governed by BC Reg. 63/88.

The Federal Transportation of Dangerous Goods Regulation and BC Reg. 63/88 set out the requirements for the proper transport of mercury waste in British Columbia.

Health Effects

Routes of exposure for mercury and mercury compounds include inhalation, ingestion, skin and/or eye contact. 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.

Elemental (metallic) mercury most often causes health effects through inhalation of its vapour, which can be absorbed through the lungs. This kind of exposure can result when elemental mercury is spilled (or products that contain elemental mercury break) and the mercury is exposed to the air. Vapour concentrations can vary especially in warm or poorly-ventilated indoor spaces where the airborne concentration can exceed the permissible exposure limit (provincially set).

Chronic mercury "poisoning" can be caused by long-term exposure to low airborne concentrations (or low levels) of mercury. Symptoms or effects of mercury exposure include: tremors, emotional changes,

neuromuscular effects, mental changes/disturbances, digestive disturbances, headaches, insomnia, and changes in nervous response.

Silica

Regulations pertaining to silica are provided in BC Reg. 296/97. Included are general provisions (minimizing release; keeping worksite clear of unnecessary accumulations; ensuring methods for decontamination prevent generation of airborne silica), provisions for "restricted areas" (where there is a reasonable chance that the airborne concentration of silica exceeds or may exceed the occupational exposure limit), provisions for use in abrasive blasting, and provisions for health assessments for workers exposed to silica.

Health Effects

Crystalline silica dust particles, which are small enough to be inhaled into the lungs (respirable size), can cause a number of health problems. As with asbestos, silica within building materials poses no threat to human health if left undisturbed.

Exposure to crystalline silica airborne dust my cause scaring of the lungs with coughing and shortness of breath—also known as "silicosis", a form of disabling, progressive, and sometimes fatal pulmonary fibrosis.

Ozone Depleting Substances (ODS)

ODSs are regulated in British Columbia by the British Columbia *Waste Management Act*—Ozone Depleting Substances and Other Halocarbons Regulation (BC Reg. 387/99 as amended by BC Reg. 317/2012).

On federal land, aboriginal land and federal works, buildings and undertakings, the Federal Halocarbon Regulation 2003 (SOR/2003-289, including associated amendments) 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.

If ODS-containing materials are to be removed and disposed of, all ODSs must be handled, recycled, stored, and/or disposed of in accordance with the requirements of BC Reg. 63/88.

The Federal Transportation of Dangerous Goods Regulation and BC Reg. 63/88 set out the requirements for the proper transport of ODS waste in British Columbia.

Health Effects

Health effects are not typically related to exposure to ODSs directly, but to the consequences of ODS release to the atmosphere, subsequent degradation of the earth's ozone layer, and implications associated with increased UVB light exposure.

APPENDIX E

Classification, Condition and Accessibility

1.1 Spray Applied Fireproofing, Insulation and Texture Finishes

To evaluate the condition of ACM spray applied as fireproofing, thermal insulation, or texture, decorative or acoustic finishes, the following criteria are applied:

GOOD

Surface of material shows no significant signs of damage, deterioration, or delamination. Up to 1 percent visible damage to surface is allowed within range of **GOOD**. Evaluation of sprayed fireproofing requires the surveyor to be familiar with the irregular surface texture typical of sprayed asbestos products. **GOOD** condition includes un-encapsulated 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 1 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 survey or re-assessment form.

NOTE: **FAIR** condition is not utilized in the evaluation of the 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 are advised to be watchful for ACM **DEBRIS** prior to accessing or working above ceilings in areas of buildings with ACM regardless of the reported condition.

1.2 Mechanical Insulation

The evaluation of the condition of mechanical insulation (on boilers, breaching, ductwork, piping, tanks, equipment etc.) utilizes the following criteria:

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 penetrating 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. It is not possible to observe the full length of mechanical insulation from all angles.

1.3 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 should be treated as a friable product.

2. Evaluation of Accessibility

The accessibility of building materials known or suspected of being ACM is rated according to the following criteria:

ACCESS (A)

Areas of the building within reach (from floor level) of all building users. Includes areas such as gymnasiums, workshops, and storage areas where activities of the building users may result in disturbance of ACM not normally within reach from floor level.

ACCESS (B)

Frequently entered maintenance areas within reach of maintenance staff, without the need for a ladder. Includes: frequently entered pipe chases, tunnels and service areas or areas within reach from a fixed ladder or catwalk, e.g. tops of equipment, mezzanines.

ACCESS (C) EXPOSED

Areas of the building above 2.4 metres where use of a ladder is required to reach the ACM. Only refers to ACM that is exposed to view, from the floor or ladder, without the removal or opening of other building components such as ceiling tiles, or service access door or hatch. Does not include infrequently accessed service areas of the building.

ACCESS (C) CONCEALED

Areas of the building which require the removal of a building component, including lay-in ceilings and access panels into solid ceiling systems. Includes rarely entered crawl spaces, attic spaces, etc. Observations will be limited to the extent visible from the access points.

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 ACM. Evaluation of condition and extent of ACM is limited or impossible, depending on the surveyor's ability to visually examine materials in ACCESS D.

3. ACM DEBRIS

3.1 DEBRIS from Friable ACM

The presence of fallen ACM is noted separately from the presumed friable ACM source (sprayed fireproofing, thermal insulation, texture, decorative or acoustic finishes or mechanical insulation) and is referred to as **DEBRIS**.

3.2 DEBRIS from Damaged Non-Friable ACM

The presence of fallen ACM from damaged non-friable ACM is also reported separately from the non-friable ACM source. Only fallen non-friable ACM that has become friable is reported as **DEBRIS**.

The identification of the exact location or presence of **DEBRIS** on the top of ceiling tiles is limited by the number of observations made and the presence of building components such as ducts or full height walls

that obstruct observations. Workers are advised to be watchful for the presence of **DEBRIS** prior to accessing or working in proximity to mechanical insulation or above ceilings in areas of buildings with ACM regardless of the reported presence or absence of **DEBRIS**.

4. Action Matrix and Action Descriptions

The Asbestos Management Plan requires the following responses:

- Immediately clean-up **DEBRIS** that is likely to be disturbed.
- Remove, repair, or enclose friable ACM in **POOR** or **FAIR** condition whose continued deterioration will result in **DEBRIS** that is likely to be disturbed.

The following factors shall be considered in making site-specific recommendations for compliance with the existing applicable regulations or codes and the practical implementation of the Asbestos Management Plan:

1. ACM in **POOR** condition is not routinely repairable. If an abatement action is necessary, removal is the recommended action (enclosure is a viable option in unusual circumstances, e.g. where removal is difficult or costly and the asbestos-containing material can be thoroughly enclosed).

2. Mechanical insulation in **FAIR** condition will be repaired or removed based on the following general recommendations, applied on a case-by-case basis:
   - ACM insulation found in **FAIR** condition in ACCESS (B) or ACCESS (C) EXPOSED areas is to be repaired.
   - ACM mechanical insulation found in **FAIR** condition in ACCESS (B) and ACCESS (C) EXPOSED areas, where future damage to the ACM is likely to occur, is to be removed.

3. ACM in **GOOD** condition present in ACCESS (A) can be managed by surveillance, as long as it is not disturbed by future renovation, maintenance, or demolition. Proactive removal of the ACM in ACCESS (A) will be considered where damage is possible by on-going occupant activity (accidental or intentional).

4. Non-friable or manufactured products are considered in the action matrix as follows:
   - Non-friable and manufactured products reported in **POOR** condition, or friable **DEBRIS** resulting from the deterioration of non-friable ACM, are treated as friable materials and the appropriate action, and depending on accessibility is determined from the action matrix for friable ACM.
   - For non-friable or manufactured products reported in **GOOD** condition, Action 7 (surveillance) is recommended regardless of accessibility.

5. All asbestos-containing material from a particular area is to be removed where small quantities of asbestos are present, and removal will negate the need for the use of an Asbestos Management Program in that area.

The action matrix provided below establishes the recommended asbestos control action. The ACTIONS themselves are described in full following the table.

4.1 Action Matrix Tables

FRIABLE ACM				
ACCESS	**CONDITION**			**DEBRIS**
	GOOD	**FAIR**	**POOR**	
(A)	ACTION 5/7[1]	ACTION 5/6[2]	ACTION 3	ACTION 1
(B)	ACTION 7	ACTION 6/5[3]	ACTION 3	ACTION 1
(C) EXPOSED	ACTION 7	ACTION 6	ACTION 4	ACTION 2
(C) CONCEALED	ACTION 7	ACTION 7	ACTION 4	ACTION 2
(D)	ACTION 7	ACTION 7	ACTION 7	ACTION 7

[1] If material in **ACCESS (A)/GOOD** condition is not removed **ACTION 7** is required.

[2] If material in **ACCESS(A)/FAIR** condition is not removed **ACTION 6** is required.

[3] Remove ACM in **ACCESS (B)/FAIR** condition if ACM is likely to be disturbed.

4.2 Action Descriptions

ACTION 1 - Immediate Clean-Up of DEBRIS that is Likely to Be Disturbed

Access that is likely to cause a disturbance of the ACM **DEBRIS** is to be restricted and **clean up ACM DEBRIS is to be done immediately**. Use correct asbestos procedures. This action is required for compliance with regulatory requirements and good practice. The assessor should immediately notify the Asset or Property and Facility Manager, or Regional/Area Asbestos Management Coordinator of this condition.

ACTION 2 - Intermediate risk precautions for Entry into Areas with ACM DEBRIS

At locations where ACM **DEBRIS** can be isolated in lieu of removal or cleaned up, use appropriate means to limit entry to the area. Restrict access to the area to persons using intermediate risk asbestos precautions. The precautions will be required until the ACM **DEBRIS** has been cleaned up, and the source of the **DEBRIS** has been stabilized or removed.

ACTION 3 - ACM Removal Required for Compliance

Remove ACM for compliance with regulatory requirements and good practice. Utilize asbestos procedures appropriate to the scope of the removal work.

ACTION 4 - Access into areas where asbestos-containing material is present and likely to be disturbed by access requires intermediate risk precautions.

Intermediate risk asbestos precautions are to be used when entry or access into an area is likely to disturb the ACM. **ACTION 4** must be used until the ACM is re-moved (Use **ACTION 1** or **2** if **DEBRIS** is present). Intermediate risk or high-risk precautions should be used for removal (depending on extent of removal).

ACTION 5 - Proactive ACM Removal

Removal of ACM in lieu of repair may be considered, even if it is in **GOOD** condition at locations, where ACM is easily accessible, limited in quantity, and removal would be cost-effective.

ACTION 6 - ACM Repair

Repair ACM found in **FAIR** condition, and not likely to be damaged again or disturbed by normal use of the area or room. Upon completion of the re-pair work treat ACM as material **in GOOD** condition and implement **ACTION 7**. If ACM is likely to be damaged or disturbed during normal use of the area or room, **ACTION 5** is to be implemented.

ACTION 7 - Routine Surveillance

Institute routine surveillance of the ACM. Trained workers or contractors must use appropriate asbestos precautions (low, intermediate, or high) during disturbance of the remaining ACM.

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APPENDIX 1-5

Hazardous Building Materials Assessment
Building E0159, House 05, British Columbia

ARCADIS Design & Consultancy for natural and built assets

Public Services and Procurement Canada

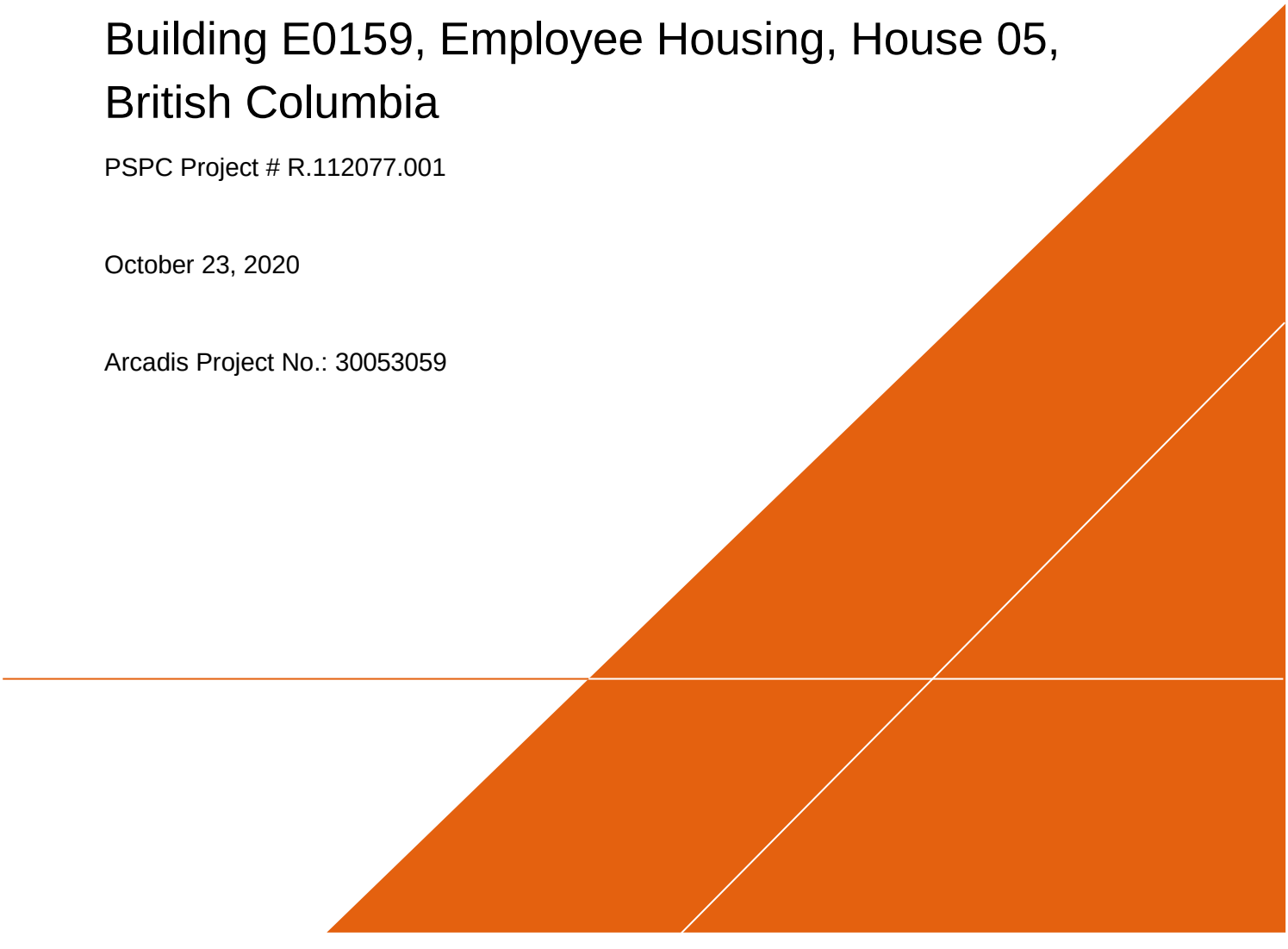
HAZARDOUS BUILDING MATERIALS ASSESSMENT

Building E0159, Employee Housing, House 05, British Columbia

PSPC Project # R.112077.001

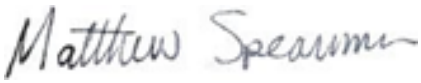
October 23, 2020

Arcadis Project No.: 30053059



HAZARDOUS BUILDING MATERIAL ASSESSMENT

Authored by:



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ACRONYMS AND ABBREVIATIONS

ACM	Asbestos-Containing Materials
Arcadis	Arcadis Canada Inc.
CLC	Canada Labour Code
COHSR	Canada Occupational Health and Safety Regulations
HPP	Hazard Prevention Program
LCB	Lead-Containing Paints
NIOSH	National Institute for Occupational Safety and Health
NJC	National Joint Council
OHS	Occupational Health and Safety
PCBs	Polychlorinated Biphenyls
PLM	Polarized Light Microscopy
PSPC	Public Services and Procurement Canada
TEM	Transmission Electron Microscopy
USEPA	United States Environmental Protection Agency

EXECUTIVE SUMMARY

Arcadis Canada Inc. (Arcadis) was retained by Public Services and Procurement Canada (PSPC, Client) to conduct a hazardous building material assessment of Building E0159, House 05, located in British Columbia. The project consisted of a pre-construction assessment based on the provided renovation scope. The objective of the pre-construction assessment was to identify hazardous building materials in preparation for building renovation.

The renovation scope was limited to the part of the building scheduled for renovation, which consisted of replacing exterior windows, doors, vinyl siding, deck and stairs.

The hazardous building materials considered during this assessment included the following:

- Asbestos-containing materials (ACMs)
- Lead, including lead-containing paints (LCPs)
- Polychlorinated biphenyls (PCBs) in electrical equipment
- Suspect visible mould
- Mercury materials/products/equipment
- Ozone-depleting substances (ODSs) in heating, ventilation, and air conditioning (HVAC) equipment or fixed fire suppression systems
- Silica in building materials

Arcadis performed the assessment on July 9, 2020. The assessment was conducted by Matthew Spearman, Dipl T (Env), Field Technologist of Arcadis.

Summary of Findings

Asbestos: Asbestos-containing materials (ACM) were confirmed to be present as follows:

Material	Location(s)	Total Quantity	Condition (action)	Asbestos Type (%)
Black Window Sealant*	Exterior – at front Entrance	2 windows	Good (7)	5% Chrysotile

*Arcadis February 3, 2020 HBMA Report

Lead: Lead is confirmed present in the following paint:

Color (substrate)	Location(s)	Total Quantity	Condition	Concentration (ppm)
White (Metal trim)	Exterior – around building, above concrete foundation	~49 meters	Good	880

Polychlorinated Biphenyls (PCBs): No PCBs were observed in the assessed area.

Suspect Visible Mould: Suspect visible mould was observed on the vinyl siding located in the Northeast corner, above the stairs to the deck.

Mercury: Mercury vapour was not observed in the assessed area.

Ozone Depleting Substances (ODS): ODS were not observed in the assessed area.

Silica: Crystalline silica is a presumed component of the following materials in the assessed area: poured concrete.

Recommendations

The following is a summary of significant recommendations; refer to the body of the report for detailed recommendations.

1. Remove and properly dispose of asbestos-containing materials if disturbed by the planned renovation work.
2. Follow appropriate safe work procedures when handling or disturbing asbestos, lead, silica and mould.
3. Prepare and update plans and performance specifications regarding hazardous material removal for the planned work. The specifications should include the scope of work, safe work practices, personal protective equipment, respiratory protection, and disposal of waste materials.
4. Provide this report and the detailed plans and specifications to the contractor prior to bidding or commencing work.
5. Retain a qualified consultant to specify, inspect and verify the successful removal of hazardous materials.
6. Update the asbestos inventory upon completion of the abatement and removal of asbestos-containing materials.

Findings of this report are subject to our standard Limitations, as outlined in Section 7.

This Executive Summary is subject to the same standard limitations as contained in the report and must be read in conjunction with the entire report.

1 INTRODUCTION

1.1 Purpose

Arcadis Canada Inc. (Arcadis) was retained by Public Services and Procurement Canada (PSPC, Client) to conduct a hazardous building material assessment of Building E0159, House 05, located in British Columbia. The project consisted of a limited pre-construction assessment based on the renovation scope. The objective of the pre-construction assessment was to identify hazardous building materials in preparation for building renovation.

The renovation scope was limited to the part of the building scheduled for renovation, which consisted of replacing exterior windows, doors, vinyl siding, deck and stairs.

Arcadis performed the assessment on July 9, 2020. The assessment was conducted by Matthew Spearman, Dipl T (Env), Field Technologist of Arcadis.

1.2 Scope of Work

The scope of work for the project, as referenced in the Arcadis Workplan dated June 4, 2020, identifies the requirement to conduct a hazardous building material assessment within building E0159. Specifically, the scope of work included:

- Review of previous reports, construction specifications and drawings and identify any gaps related to hazardous building materials.
- Development of sampling strategy to address the identified gaps.
- Collect and submit representative suspect asbestos material and lead paint chip samples for analysis.
- Submit samples to accredited laboratories for analysis.
- Evaluation and interpretation of field findings and sample analytical results to develop conclusions and recommendations pertaining to hazardous building materials identified

For the purpose of this assessment, hazardous building materials re defined as follows:

- Asbestos-containing materials (ACMs)
- Lead, including lead-containing paints (LCPs)
- Polychlorinated biphenyls (PCBs) in electrical equipment
- Suspect visible mould
- Mercury materials/products/equipment
- Ozone-depleting substances (ODSs) in heating, ventilation, and air conditioning (HVAC) equipment or fixed fire suppression systems
- Silica in building materials

A general description of the building included in this assessment is provided in the table below:

Table 1. Building Description

Building Number (BU)	Building Name	Total Inside Gross m^2	Year Constructed	Building Description
E0159	House 05	210.90	1988	Two-story building with asphalt shingle roof and concrete foundation. Vinyl exterior siding. Drywall and texture coat interior walls. Texture coat ceilings. Carpet, poured concrete, wood laminate and vinyl sheet flooring. Heating is supplied by gas fired forced air furnace and electric baseboard.

2 BACKGROUND INFORMATION

Arcadis conducted a previous assessment of the building and the findings are presented in the following reports:

- Asbestos-Containing Materials Survey, Building E0159, dated March 24, 2019, prepared by Arcadis Canada Inc. and,
- Hazardous Building Material Assessment, Building E0159, dated February 3, 2020, prepared by Arcadis Canada Inc.

2.1 Exclusions

The assessment was restricted to accessible locations of the building. Roofing or other material that may cause damage to the building envelope were not included unless specifically impacted by the proposed renovations and sampling would not compromise the building envelope integrity.

3 SURVEY METHODOLOGY

Sampling activities were conducted in accordance with Arcadis' Standard Operation Procedures which take into account current federal and provincial regulations pertaining to such work (i.e., sampling procedures, required number of samples and laboratory analytical procedures). Regulations are presented in Appendix D.

Representative bulk samples were collected of accessible suspect, PCB, lead, and asbestos in sufficient quantities for laboratory analysis. Samples were sealed in polyethylene zip-lock bags labeled with the sample number, suspect material description, and sample location. As part of sampling procedures, sampling tools were cleaned between sample collection events to avoid the potential for cross-contamination of samples.

All sample bags were compiled in order and placed into a single container accompanied with a chain of custody form outlining the project information, date, building location, number of samples, and sample description. Samples were submitted to the analytical laboratory in a sealed container via courier.

3.1 Asbestos-Containing Materials

A separate set of samples was collected of each type of homogenous material suspected to contain asbestos. A homogenous material is defined by the US EPA as material that is uniform in texture and appearance, was installed at one time, and is unlikely to consist of more than one type or formulation of material. The homogeneous materials are determined by visual examination, available information on the phases of the construction and prior renovations.

Bulk sampling protocols followed the ASTM E2356 Standard, which indicates requirements for the number of samples to collect for each homogeneous material. The table below provides an outline of the minimum number of samples to be collected from the ASTM E2356 Standard.

Table 2. Bulk Material Sample Quantities

Type of Material	Size of Area of Homogeneous Material	Minimum Number of Samples Collected
Any homogeneous material, including but not limited to fireproofing, drywall joint compound, ceiling tile stucco, acoustical and stipple finishes, and visually similar floor tiles	Less than 90 m^2 (<1,000 ft^2)	3
	90 m^2 or more, but less than 450 m^2 (1,000-5,000 ft^2)	5
	450 m^2 or more (>5,000 ft^2)	7

In some cases, manufactured products such as asbestos cement pipe were visually identified without sample confirmation.

Flooring mastic/adhesive are only sampled and analyzed if present on the underside of flooring samples (vinyl floor tile and vinyl sheet flooring) in sufficient quantity for laboratory analysis.

Attempts to distinguish and delineate asbestos-containing drywall compound from new non-asbestos drywall compound is often unachievable. Arcadis collected drywall joint compound samples from exterior walls, columns or other locations which are unlikely to have been renovated in an attempt to determine the presence of asbestos in the original drywall compound.

Arcadis submitted the bulk samples to a NVLAP accredited laboratory for analysis. The analysis is performed in accordance with Test Method EPA/600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials, July 1993.

EPA Method 600 states that materials characterized by interfering binder/matrix or low asbestos content may require additional gravimetric reduction sample treatment beyond routine polarized light microscopy (PLM) analysis (e.g. dissolution with hydrochloric acid, treatment with organic solvents or ashing in a muffle furnace or low temperature plasma asher to remove unwanted components).

Arcadis submitted one sample of each sample set (3) of vinyl floor tiles be analyzed by transmission electron microscopy (TEM) if the first two samples are reported negative by PLM.

The asbestos analysis was completed using a stop positive approach. Only one result of greater than the regulated criteria is required to determine that a material is asbestos-containing, but all samples must be analyzed to conclusively determine that a material is non-asbestos. The laboratory stopped analyzing samples from a homogeneous material once greater than the criteria was detected in any of the samples of that material. All samples of a homogeneous material were analyzed if no asbestos was detected. Where building materials are described in this report as non-asbestos, or described as containing no asbestos,

this is subject to the limitations of the analytical method used and should be understood to mean no asbestos was detected.

The classification, condition, and accessibility were assessed for the materials which could contain asbestos. To determine these factors, Arcadis followed the methodology outlined in the ASTM E356 Standard. The Standard provides definitions and criteria for the assessment of ACM. The classification, conditions, and accessibility information are provided in Appendix E.

Bulk samples of materials which could contain asbestos were collected and submitted to EMSL Canada Inc. (EMSL) for analysis of asbestos content. Asbestos-containing materials are defined as 0.5% or greater, or any amount if vermiculite.

3.2 Lead

Arcadis collected samples of distinctive paint finishes and surface coatings present in more than a limited application, where removal of the paint is possible. Arcadis collects samples by scraping the painted finish to include base and covering applications. 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. 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 were presumed to be the same, regardless of differing sub surface paints, if any.

The 2017 WorkSafeBC publication *Safe Work Practices for Handling Lead* (Lead Guideline) indicates the following:

> *Unlike for asbestos-containing material, WorkSafeBC does not numerically define what would be considered a lead-containing paint or coating. All suspected paints or coatings should be tested for lead because, depending on the nature of the work, even a small amount could pose a risk to workers. In order to determine which controls and personal protective equipment would be required for a particular job, a qualified person must consider this information as part of the risk assessment.*

- Improper removal of lead paint containing 600 mg/kg lead results in airborne lead concentrations that exceed half of the exposure limit

  Exposure limit indicated in both the COHSR and BC Reg. 296/97 is 0.05 mg/m^3

  Potential for exposure exceeding half of the occupational exposure limit would be the trigger for implementation of an exposure control plan.
- Lead concentrations as low as 90 mg/kg may present a risk to pregnant women and children

  Any risk assessment should include for the presence of high risk individuals within the workplace

When reviewing the above, “high risk” individuals are not expected to be present in the workplace associated with this building during building material alteration activities (i.e., demolition) that would create significant disturbance to paint with such individuals present. As such, paints containing 600 ppm lead or more will be considered “lead-containing” for the purpose of this report, such that appropriate risk assessments can be completed for demolition planning. However, information regarding the lead content of all paints tested is provided herein, for reference and risk assessment should the consideration of high risk individuals be necessary, based on the requirements of a particular situation.

Although a concentration of 600 ppm lead has been used to define paint coatings as LCPs, it should be noted that this is related to painted surfaces and the determination of appropriate provisions to protect occupants and employees from exposure to elevated concentrations of lead during typical operations and maintenance or simple renovation. This does not include painted metal surfaces that are to be welded, burned or torch-cut.

Using an arc welder or oxyacetylene torch on steel that is coated with lead-containing paint can create hazardous lead fumes and is prohibited by section 12.115 of BC Reg. 296/97.

> Regulatory excerpt: **12.115 Coatings on metals**
>
> *A coating on metal which could emit harmful contaminants (such as lead, chromium, organic materials, or toxic combustion products) must be removed from the base metal, whenever practicable, before welding or cutting begins.*

In addition, the following information is provided in the Lead Guideline:

- Welding or torch cutting of paints or coatings on metal can create very high concentrations of airborne lead fumes. Torch cutting structural steel, coated with paint containing as little as 130 mg/kg (equivalent to ppm) lead, can release airborne levels of lead as high as 0.8 mg/m^3 (16 times the exposure limit).

Given this information and that the analytical detection limit for lead paint analysis is approximately 80– 90 ppm (not significantly different than 130 ppm, which, per above, may release airborne lead levels 16 times the exposure limit), any paint coating on a metal surface to be welded, burned or torch-cut must be removed prior to that action being undertaken, unless a project-specific or tasks-specific risk assessment and safe work practices are developed by a qualified person.

Paint and surface coatings are evaluated for condition. The criteria for condition evaluation pertaining to LCPs described herein are generally based on the United States Housing and Urban Development (HUD) 2012 *Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing*.

When evaluating the condition of LCPs, an attempt should be made to determine whether the deterioration is due to a moisture problem or some other existing building deficiency. **"Poor"** surfaces are considered to be a hazard and should be corrected. "**Fair"** surfaces should be repaired but are not yet considered to be a hazard; if not repaired, they should be monitored frequently. "**Good/intact"** surfaces should be monitored to ensure that they remain in a nonhazardous condition.

In addition, the presence of paint debris must be considered in evaluating condition. Given the variety of paint uses, there are many applications that can have a tendency for the paint to "wear" from the surface slowly, over an extended period of time. Conditions where paint has worn from a surface are worth noting for maintenance discussions (i.e., related to re-coating the surface should, for example, the coating provide weather protection), however, in the absence of loose paint chip debris/dust, such conditions would not represent a potential exposure situation related to lead.

The condition evaluation criteria for LCPs are summarized in the table below.

Table 3. Lead-Containing Paint Condition Categories

Type of Building Component[1]	Total Area of Deteriorated Paint on Each Component		
	Good/Intact	Fair[2]	Poor[3]
Exterior components with large surface areas.	Entire surface is intact.	Less than or equal to 10 square feet	More than 10 square feet
Interior components with large surface areas (walls, ceilings, floors, doors.	Entire surface is intact.	Less than or equal to 2 square feet	More than 2 square feet
Interior and exterior components with small surface areas (windowsills, baseboards, soffits, trim).	Entire surface is intact.	Less than or equal to 10% of the total surface area of the component.	More than 10% of the total surface area of the component

NOTES:

1. Building component in this table refers to each individual component or side of building, not the combined surface area of all similar components in a room (e.g., a wall with 1 square foot of deteriorated paint is in "fair" condition, even if the other three walls in a room are intact).
2. Surfaces in "fair" condition should be repaired and/or monitored but are not considered to be "lead-containing paint hazards".
3. Surfaces in "poor" condition are considered to be "lead-containing paint hazards" and should be addressed through abatement or interim controls.

Analysis for lead in paints or surface coatings was performed in accordance with EPA Method No. 3050B/Method No. 7420; flame atomic absorption at laboratory accredited by the American Industrial Hygiene Association (AIHA).

3.3 Polychlorinated Biphenyls (PCBs)

The presence or absence of fluorescent lights was documented during the course of our investigation to determine whether there were any of the T12 type. T12 fluorescent lamps, with a diameter of 1.5 inches, utilize transformer type magnetic ballasts, which may contain PCBs. The use of T12s has been discontinued and replaced with new high-efficiency 1-inch T8 lamps (and other types) which use electronic ballasts which do not contain PCBs.

Wet transformers were assessed for PCBs based on the age of the building, a review of maintenance records and examination of labels or nameplates on equipment, where present and accessible. The information is compared to known ban dates of PCBs and Environment Canada publications.

Dry type transformers are presumed to be free of dielectric fluids and hence non-PCB. Caulking's were not sampled for PCB content unless specifically impacted by the proposed renovation scope. The material is considered a PCB solid if PCB content is 50ppm or greater based on the threshold given in SOR/2008-273.

3.4 Suspect Visible Mould

Arcadis identified the presence of any suspect mould and/or moisture-impacted building materials by visual inspection during the course of our site investigation. Suspect mould is typically a coloured, textured substance or discolouration/staining on a building material surface which, based on our experience, may be mould growth. If any mould growth is concealed within wall, ceiling, or floor cavities, it is not addressed in this assessment. No mould sampling or moisture testing is performed unless directed by the Client. The adjective *suspect* is used where the presence of mould has not been confirmed by laboratory analysis.

3.5 Mercury

Building materials/products/equipment (e.g. thermostats, barometers, pressure gauges, light tubes), suspected to contain mercury were identified by visually inspection only. Dismantling of equipment suspected of containing mercury was not performed. Sampling of these materials for laboratory analysis of mercury content was not performed.

Mercury spills or damaged mercury-containing equipment was recorded where observed.

3.6 Ozone Depleting Substances (ODS)

Arcadis determined the potential presence of ODS (chlorofluorocarbons, hydrochlorofluorocarbons, hydrofluorocarbons, halons, etc.) in air conditioning units, chillers, commercial coolers, and fire suppression systems by visual inspection of manufactures' labels or plates, maintenance records, or logbooks, etc.

3.7 Silica

Arcadis identified building materials suspected of containing crystalline silica (e.g. concrete, cement, tile, brick, masonry, mortar) by knowledge of current and historic applications and visual inspection only. Arcadis did not perform sampling of these materials for laboratory analysis of crystalline silica content.

4 RESULTS

4.1 Asbestos

During the course of our assessment, representative bulk samples of material were collected by Arcadis staff. The samples were forwarded to EMSL in Burnaby, British Columbia (BC) for asbestos analyses. EMSL holds a current Certificate of Accreditation for Bulk Asbestos Fibre Analysis under the Voluntary Accreditation Program (NVLAP). Bulk sampling was performed in general accordance with the requirements specified in ASTM E2356 Standard, BC Reg. 296/97 and in the WorkSafe BC publication Safe Work Practices for Handling Asbestos.

Results of bulk sample analysis for asbestos content are provided in the table below. Samples that exceed the criteria are highlighted in yellow.

Site Photographs provided in Appendix A. Laboratory certificates of analysis have been provided in Appendix B. Floor plans indicating sample locations and room numbers are provided in Appendix C.

Table 4. Results of Bulk Sample Analysis for Asbestos

Sample Number	Sample Description	Sample Location	Asbestos Type %
S-01A	Building Paper	Exterior – West Face	None Detected
S-01B	Building Paper	Exterior – West Face	None Detected
S-01C	Building Paper	Exterior – North Face	None Detected
S-01D	Building Paper	Exterior – South Face	None Detected
S-01E	Building Paper	Exterior – South Face	None Detected

The following building materials were common in the building: however, these materials do not contain asbestos and were not sampled during the survey:

- Vinyl siding, wood paneling, and concrete.

Asbestos-containing materials were confirmed present in the following table:

Table 5. Summary of Confirmed Asbestos-Containing Materials

Material	Location(s)	Total Quantity	Condition	Asbestos Type (%)
Black Window Sealant*	Exterior – at front Entrance	2 windows	Good (7)	5% Chrysotile

*Arcadis February 3, 2020 HBMA Report

Presumed Materials

No presumed materials that may contain asbestos are suspected to be present in the way of planned work.

4.2 Lead

During the course of our site investigation, representative bulk samples of predominant paint types were collected by Arcadis staff. The samples were forwarded to EMSL for lead analyses. Results of bulk sample analysis for lead content are provided in the table below. Results that exceed the criteria re highlighted in yellow.

The laboratory report is provided in Appendix B.

Table 6. Results of Analyses of Bulk Samples for Paint for Lead

Sample No.	Sample Location(s)	Sample Description	Lead Content (ppm)
L-01	Exterior – around building, above concrete foundation	White paint on metal trim	880
L-02	Exterior – around building perimeter	Brown paint on metal gutter	<290

L-03	Exterior – Stairs to deck	Grey paint on wood	<80
L-04	Exterior – Wall beneath stairs	White paint on wood	<80

Lead was detected at a level above the definition of lead paint (600 ppm) in sample L-01. Where one colour of paint is indicated in the sample descriptions in the table above, only one layer of paint was observed. Where multiple colours are indicated in the sample description, multiple layers of paint were observed.

All paint applications were noted to be generally in good condition. Lead paint was not identified in the February 2020 Arcadis report

4.3 Polychlorinated Biphenyls (PCBs)

PCBs were not observed in the assessed area.

4.4 Suspect Visible Mould

Suspect visible mould growth was observed on vinyl siding located on the Northeast corner, above the stairs to the deck.

4.5 Mercury

Mercury vapor was not observed in the assessed area.

4.6 Ozone Depleting Substances

ODS was not observed in the assessed area.

4.7 Silica

Crystalline silica is a presumed component of the following materials where present in the assessed area:

- poured concrete

5 RECOMMENDATIONS

If future building renovation or demolition is required beyond the scope of this project, a detailed intrusive assessment must be conducted. The assessment should include destructive testing (i.e. coring and/or removal of building finishes and components), and sampling of materials not previously tested (i.e. roofing materials).

All hazardous building materials were reported in good condition. All ACM observed were considered to fall under a recommended Action Level 7 (routine surveillance).

5.1 Building Renovation Work

The following specific recommendations are made regarding renovation involving the hazardous materials identified.

1. Prepare plans and update performance specifications for hazardous material removal required for the planned work. The specifications should include the scope of work, personal protective equipment, respiratory protection, and disposal of waste materials.
2. Provide this report and the detailed plans and specifications to the contractor prior to bidding or commencing work.
3. Retain a qualified consultant to specify, inspect and verify the successful removal of hazardous materials.
4. Update the asbestos inventory upon completion of the abatement and removal of asbestos-containing materials.

The following general recommendations are made regarding renovation involving the hazardous materials identified.

Asbestos

Remove all asbestos-containing materials (ACM) prior to renovation, alteration, maintenance, or demolition work or if ACM may be disturbed by the work.

If the identified ACM will not be removed prior to commencement of the work, disturbance of ACM must follow the appropriate asbestos precautions for the classification of work being performed.

Asbestos-containing materials must be disposed of at a landfill approved to accept asbestos waste.

Lead

Construction disturbance of lead in paint and coatings (or other materials) may result in over-exposure to lead dust or fumes. The need for work procedures, engineering controls and personal protective equipment will need to be assessed on a project-by-project basis and must comply with provincial standards or guidelines. Performing an exposure assessment during work that disturbs lead in paints and coatings may be able to alleviate the use of some of the precautions specified by these standards or guidelines.

Well adhered paints containing elevated levels of lead on metal substrates do not require leachable lead analysis as the materials can be recycled with the paint intact.

Suspect Visible Mould

Suspect visible mould growth was noted in areas affected by the planned work. Use appropriate precautions and protect workers during removal using methods that comply with provincial guidelines.

Silica

Construction disturbance of silica-containing products may result in excessive exposures to airborne silica, especially if performed indoors and dry. Cutting, grinding, drilling or demolition of materials containing silica should be completed only with proper respiratory protection and other worker safety precautions that comply with provincial standards or guidelines.

6 REFERENCES

The following legislation and documents were referenced in completing the assessment and this report:

1. Occupational Health and Safety Regulation, B.C. Reg. 296/97, WorkSafe BC.
2. Safe Work Practices for Handling Asbestos, WorkSafe BC, 2017 Edition.
3. Hazardous Waste Regulation, B.C. Reg. 63/88, November 2017, BC Environmental Management Act.
4. Ozone Depleting Substances and Other Halocarbons Regulation, B.C. Reg. 317/2012 Environmental Management Act.
5. PCB Regulations, SOR/2008-273, Canadian Environmental Protection Act.
6. Lead-Containing Paint and Coatings, Preventing Exposure in the Construction Industry, WorkSafe BC, June 2017.
7. Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing, United States Housing and Urban Development (HUD) 2012.
8. Mould Guidelines for the Canadian Construction Industry, Standard Construction Document 2018, Canadian Construction Association.
9. Minister of Justice Canada Labour Code. R.S.C., 1985, c. L-2. March 2020.
10. Minister of Justice. 2018. Canada Occupational Health and Safety Regulations. SOR/86-304, June 2019.
11. Public Services and Procurement Canada Asbestos Management Standard. June 2019.
12. Transport Canada Consolidated Transport of Dangerous Goods Regulations including Amendment SOR/2019-101.
13. ASTM E2356 Standard Practice for Comprehensive Buildings Asbestos Surveys.
14. Government of Canada, Asbestos Management Plan, Version 2020-01, January 2020.

7 LIMITATIONS

This report, prepared for Public Services and Procurement Canada on behalf of Government of Canada, does not provide certification or warranty, expressed or implied, that the investigation conducted by Arcadis identified all hazardous materials associated with the subject building. The work undertaken by Arcadis was directed to provide information on the presence of hazardous materials in construction materials based on visual inspection of readily accessible areas of the subject building, and on the results of laboratory analysis of a limited number of bulk samples. The material in this report reflects Arcadis' best judgment in light of the information available at the time of the investigation, which was performed on July 9, 2020 This report is not intended to be used as a scope of work or technical specification for remediation of hazardous materials. Any use which any other party makes of the report, or reliance on, or decisions to be based on it, is the responsibility of such parties.

APPENDIX A

Site Photographs

Project Photographs

Public Services and Procurement Canada
Building E0159, House 05, British Columbia

Photo: 1

Date:
July 9, 2020

Description:
View of Employee Housing, Front

Photo: 2

Date:
July 9, 2020

Description:
View of Employee Housing, Rear. Viewing from Northwest

Project Photographs

Public Services and Procurement Canada
Building E0159, House 05, British Columbia

Photo: 3

Date:
July 9, 2020

Description:
View of Employee Housing, Front. Viewing from Northeast

Photo: 4

Date:
July 9, 2020

Description:
Suspect visible mould is visible on the vinyl siding at the Northwest corner of the building.

Project Photographs

Public Services and Procurement Canada
Building E0159, House 05, British Columbia

Photo: 5

Date:
July 9, 2020

Description:
Composite stairs. Non-lead grey paint on the side of the wood stairs.

Photo: 6

Date:
July 9, 2020

Description:
Lead containing white paint on metal trim located at the base of the building, beneath the vinyl siding and above the wood trim on the foundation.

APPENDIX B

Laboratory Certificates of Analysis

EMSL Canada Inc.
2333 18th Avenue NE, Unit 48, Calgary, AB T2E 8T6
Phone/Fax: (403) 879-1149 / (403) 879-1152
http://www.EMSL.com CalgaryLab@EMSL.com

EMSL Canada Or	652005048
CustomerID:	55ACAV42
CustomerPO:	30053059
ProjectID:	

Attn: **Jerry Botti**
ARCADIS Canada Inc.
308-1080 Mainland Street
Vancouver, BC V6B 2T4

Phone: (604) 632-9941
Fax:
Received: 7/20/2020 08:30 AM
Collected: 7/9/2020

Project: **30053059 / E0159 / House 05**

Test Report: Lead in Paint Chips by Flame AAS (SW 846 3050B/7000B)*

Client Sample Description	*Lab ID*	*Collected*	*Analyzed*	*Weight*	*Lead Concentration*
L-01	*652005048-0001*	7/9/2020	7/21/2020	0.2510 g	880 ppm
	Site: EXTERIOR - WHITE PAINT ON METAL TRIM				
L-02	*652005048-0002*	7/9/2020	7/21/2020	0.0681 g	<290 ppm
	Site: EXTERIOR - BROWN PAINT ON METAL GUTTER Insufficient sample to reach reporting limit.				
L-03	*652005048-0003*	7/9/2020	7/21/2020	0.2520 g	<80 ppm
	Site: EXTERIOR - GREY PAINT ON WOOD STAIRS				
L-04	*652005048-0004*	7/9/2020	7/21/2020	0.2524 g	<80 ppm
	Site: EXTERIOR - WHITE PAINT ON WOOD WALL				

Client request: Remove address from project name.

Jefferson Salvador, Laboratory Manager
or other approved signatory

Report Amended: 10/22/2020 10:12:46 Replaces the Inital Report 07/24/2020 15:47:20. Reason Code: Client-Other (see report comment)

EMSL Canada Inc.

4506 Dawson Street Burnaby, BC V5C 4C1
Phone/Fax: (604) 757-3158 / (604) 757-4731
http://www.EMSL.com / vancouverlab@EMSL.com

EMSL Canada Order 692001623
Customer ID: 55ACAV42
Customer PO: 30053059
Project ID:

Attn: Jerry Botti
ARCADIS Canada Inc.
308-1080 Mainland Street
Vancouver, BC V6B 2T4

Phone: (604) 632-9941
Fax:
Collected: 7/ 9/2020
Received: 7/16/2020
Analyzed: 7/22/2020

Proj: 30053059 / E0159 / House 05

Test Report: Asbestos Analysis in Bulk Material for Occupational Health and Safety British Columbia Regulation 188/2011 via EPA 600/R-93/116 Method

Client Sample ID: S-01A ***Lab Sample ID:*** **692001623-0001**
Sample Description: EXTERIOR - WEST/BUILDING PAPER

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	7/22/2020	Brown	85.0%	15.0%	None Detected	

Client Sample ID: S-01B ***Lab Sample ID:*** **692001623-0002**
Sample Description: EXTERIOR - WEST/BUILDING PAPER

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	7/22/2020	Brown	85.0%	15.0%	None Detected	

Client Sample ID: S-01C ***Lab Sample ID:*** **692001623-0003**
Sample Description: EXTERIOR - NORTH/BUILDING PAPER

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	7/22/2020	Brown	85.0%	15.0%	None Detected	

Client Sample ID: S-01D ***Lab Sample ID:*** **692001623-0004**
Sample Description: EXTERIOR - SOUTH/BUILDING PAPER

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	7/22/2020	Brown	85.0%	15.0%	None Detected	

Client Sample ID: S-01E ***Lab Sample ID:*** **692001623-0005**
Sample Description: EXTERIOR - SOUTH/BUILDING PAPER

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	7/22/2020	Black	60.0%	40.0%	None Detected	

EMSL Canada Inc.

4506 Dawson Street Burnaby, BC V5C 4C1
Phone/Fax: (604) 757-3158 / (604) 757-4731
http://www.EMSL.com / vancouverlab@EMSL.com

EMSL Canada Order 692001623
Customer ID: 55ACAV42
Customer PO: 30053059
Project ID:

Test Report: Asbestos Analysis in Bulk Material for Occupational Health and Safety British Columbia Regulation 188/2011 via EPA 600/R-93/116 Method

Analyst(s):

Chloe Huang	PLM (1)
Margaret Lee	PLM (4)

Reviewed and approved by:

Nicole Yeo, Laboratory Manager
or Other Approved Signatory

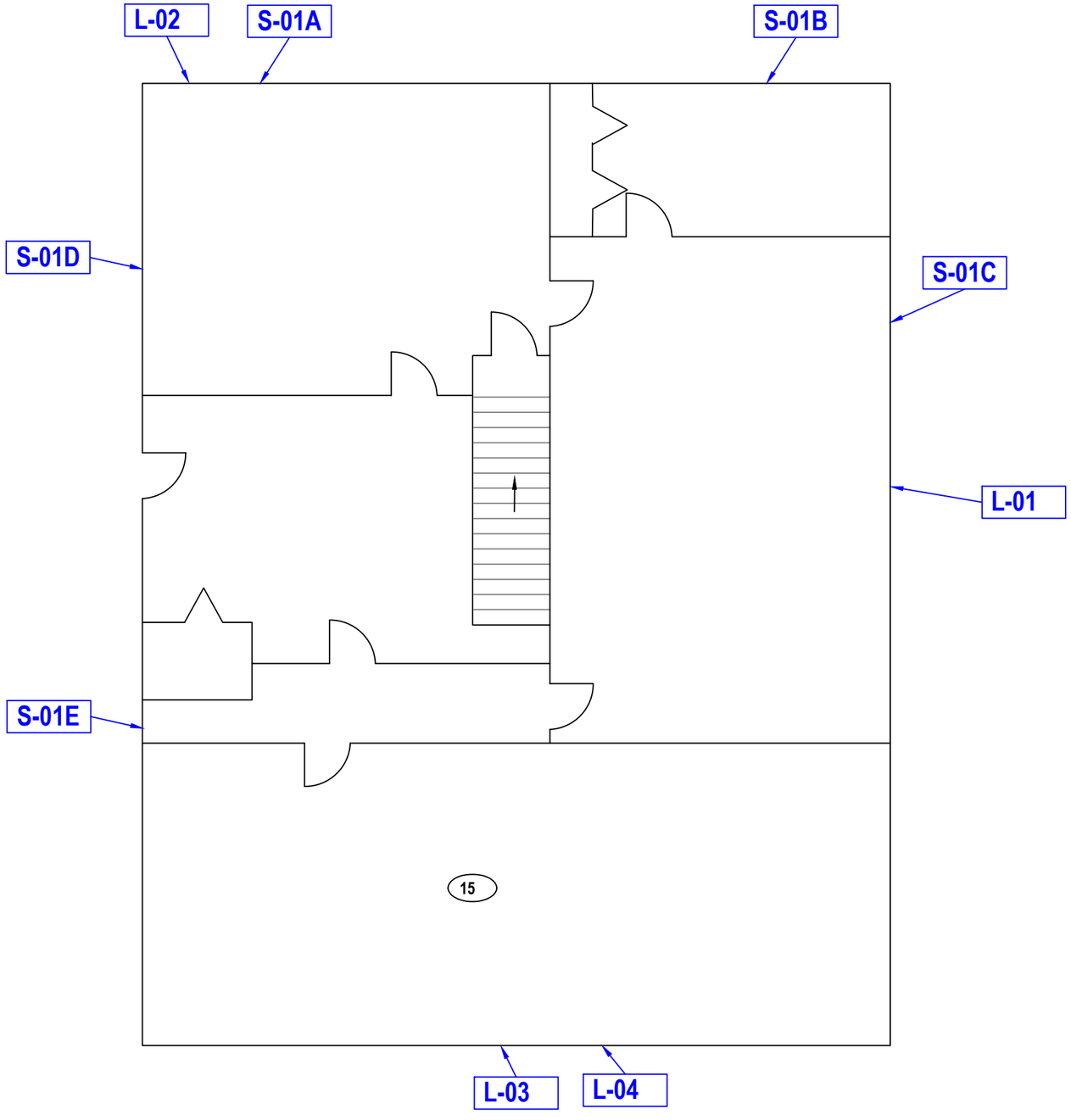
None Detected = <0.1%. EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations.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

Samples analyzed by EMSL Canada Inc. Burnaby, BC

Report amended: 10/21/202016:56:50 Replaces initial report from: 07/23/202011:42:29 Reason Code: Client-Change to Project

APPENDIX C

Floor Plans



LEGEND

S-XXX Bulk Asbestos Sample

L-XXX Bulk Lead Paint Sample

N.T.S

Title: **GOVERNMENT OF CANADA**
HAZARDOUS BUILDING MATERIAL ASSESSMENT - 2020

Project: BUILDING E0159 - HOUSE 05
FIRST FLOOR

Client: PUBLIC SERVICES AND PROCUREMENT CANADA

Project Number:	Drawn By:	Plot Size:	Date:
30053059	CB	11X17"	JULY 2020

ARCADIS

FIGURE 1

firstfloor G:\PROJECTS\30053059 - PSPC_RCMP Construction 2020\CAD\30053059-Maxhamish2.dwg

APPENDIX D

Regulations and Health Effects

Asbestos

Occupational Health and Safety (OHS) for federal employees is regulated by the Canada Labour Code (CLC) Part II. The *Canada Occupational Health and Safety Regulations (COHSR), Part X, Hazardous Substances* covers specific requirements related to the management and control of asbestos-containing materials (ACM). The COHSR, Part X, Hazardous Substances, states an employee shall be kept free from exposure to a concentration of airborne chrysotile asbestos in excess of 0.1 fibre/cm^3 or f/cc. There are also specific requirements for hazard prevention detailed in the Hazard Prevention Program (HPP) in the CLC.

For the purposes of this report, the following federal requirements will be followed, unless provincial requirements are more stringent. Federal legislation and policy referenced in this report includes:

- Canada Labour Code, March 2020;
- Canada Occupational Health and Safety Regulations Part X, Hazardous Substances; SOR/86-304, June 2019;
- Public Services and Procurement Canada Asbestos Management Standard, June 2019;
- Asbestos Management Plan, Government of Canada, Version 2020-01, January 2020; and,
- Transport Canada, Transport of Dangerous Goods Regulations

The management and requirements for the potential disturbance of asbestos in buildings is also regulated at the provincial level under the *British Columbia Occupational Health and Safety Regulations,296/97, and Safe Work Practices for Handling Asbestos, WorkSafeBC, 2017 Edition*.

The BC Occupational Health and Safety Regulations, 296/97 (BC Reg 296/97), require specific actions when asbestos is a potential health hazard in a workplace. Section 6.1 of the regulation defines an asbestos-containing material as follows:

"asbestos-containing material" means the following:

(a) a manufactured article or other material, other than vermiculite insulation, that would be determined to contain at least 0.5% asbestos if tested in accordance with one of the following methods:

(i) Asbestos, Chrysotile by XRD, Method 9000 (Issue 2, dated August 15, 1994) in the NIOSH Manual of Analytical Methods, published by the United States National Institute for Occupational Safety and Health, Centre for Disease Control;

(ii) Asbestos (bulk) by PLM, Method 9002 (Issue 2, dated August 15, 1994) in the NIOSH Manual of Analytical Methods, published by the United States National Institute for Occupational Safety and Health, Centre for Disease Control;

(iii) Test Method for the Determination of Asbestos in Bulk Building Materials (EPA/600/R-93/116, dated July 1993) published by the United States Environmental Protection Agency;

(b) vermiculite insulation that would be determined to contain any asbestos if tested in accordance with the Research Method for Sampling and Analysis of Fibrous Amphibole in Vermiculite Attic Insulation (EPA/600/R-04/004, dated January 2004) published by the United States Environmental Protection Agency;

The duties of employers, contractors, or owners include:

- identifying and labeling ACM that can potentially release asbestos fibres;
- keeping a current written record of all ACM present in the workplace;
- conducting regular surveillance and maintenance of asbestos materials to prevent fibre release;
- developing a written exposure control plan if workers may be exposed to harmful levels of asbestos;
- conducting work in a way that prevents the release of asbestos fibres as much as possible;
- notifying, informing, and training workers; and,
- notifying Occupational Health and Safety (OHS) at least 48 hours before beginning an asbestos-abatement.

Disturbance of asbestos during construction and demolition is regulated under section 20.112 of BC Reg 296/97.

The 2017 WorkSafeBC publication Safe Work Practices for Handling Asbestos (Asbestos Guide) is used by Occupational Health and Safety officers as a guide when reviewing abatement work practices and employer codes of practice, and generally meets the requirements of the COHSR.

The Asbestos Guide also provides significant additional background information pertaining to asbestos, along with details on health effects and other applicable legislation within the province of British Columbia (e.g., the federal Hazardous Products Act, the BC Building Code and waste disposal regulations).

Disposal of asbestos waste is governed by the British Columbia Hazardous Waste Regulation (BC Reg. 63/88). The Federal Transportation of Dangerous Goods Regulation and BC Reg. 63/88 set out the requirements for the proper transport of asbestos waste in British Columbia. In general, and for transportation and disposal, the waste must be placed in a double sealed container, properly labeled, free of cuts, tears or punctures and disposed of at a licensed waste station which has been properly notified of the presence of asbestos waste.

Health effects

Undisturbed asbestos within building materials poses no health risks. Asbestos poses a risk when building materials containing asbestos are impacted, or disturbed, thereby releasing the asbestos fibres into the air

Asbestos-related diseases are caused when suspended airborne asbestos fibres are inhaled and the fibres settle into various regions of the lungs and remain for extended periods. Once embedded in the lungs the asbestos fibres cause scarring within the lung tissue, ultimately leading to impaired lung function (asbestosis) and/or various cancers (lung cancer; mesothelioma). These asbestos-related diseases are irreversible and fatal. The risk of lung-related cancers is increased in individuals who smoke.

These asbestos-related diseases most often occur in individuals who have been exposed to high concentrations of airborne asbestos over a long period of time, though mesothelioma has been found in individuals with short-term exposures. Symptoms or the development of these asbestos-related diseases usually occur 10 to 25 years after exposure

Lead

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 (2005) to 90 ppm (2010).

With respect to potential lead exposures associated with disturbance to surfaces coated with lead-containing products, the 2017 WorkSafeBC manual titled Lead-Containing Paint and Coatings: Preventing Exposure in the Construction Industry, indicates the following:

- Improper removal of lead paint containing 600 mg/kg lead results in airborne lead concentrations that exceed half of the exposure limit
    - This potential for exposure exceeding half of the occupational exposure limit would be the trigger for implementation of an exposure control plan.
- Lead concentrations as low as 90 mg/kg may present a risk to pregnant women and children
    - Any risk assessment should include for the presence of high risk individuals within the workplace

The disposal of lead-containing paint is regulated under the Federal *Transportation of Dangerous Goods Act* and by the British Columbia Ministry of Environment. All lead-based paints and associated nonmetal substrate (concrete, plaster, wood, etc.) must undergo Toxicity Characteristic Leachate Properties (TCLP) metals testing to determine disposal procedures. Upon the completion of the test, the total concentration of metals in the waste extract must be compared to Schedule 4, Table 1 of the Hazardous Waste Regulation.

The Federal Transportation of Dangerous Goods Regulation and BC Reg. 63/88 set out the requirements for the proper transport of lead waste in British Columbia.

Health Effects

Elemental lead and inorganic lead compounds are absorbed through ingestion or inhalation and can incorporate into the bone marrow, nerve tissue, brain, and kidneys. In children, symptoms of lead poisoning can include headaches, irritability, abdominal pain, vomiting, anemia, weight loss, poor attention span, noticeable learning difficulty, slowed speech development, and hyperactivity. In adults, symptoms of lead poisoning can include pain, numbness or tingling of the extremities, muscular weakness, headache, abdominal pain, memory loss, unsteady gait, pale skin, weight loss, vomiting, irritability, and anemia. Although adults are susceptible to the toxic effects of lead, children are at high risk due to the nature of a child's activities that involve the introduction of non-food items into their bodies.

Excessive airborne lead and surface contamination can be transferred to employees' hands and may results in lead ingestion. Therefore, work practices intended to minimize surface lead concentrations, such as frequent cleaning of work surfaces should be included in an overall lead exposure control plan

PCB

As of September 5, 2008, under subsection 93(1) of the *Canadian Environmental Protection Act,* (CEPA), Federal PCB regulations were published by the Canada Gazette Part II (SOR/2008-273) that imposed specific deadlines for the elimination of all PCBs in concentrations at or above 50 milligrams/kilogram (mg/kg). This regulation required the elimination of all PCBs and PCB-containing materials currently in-use and in storage and limited the period of time PCB materials could 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.

In British Columbia, PCB equipment becomes PCB wastes as soon as it is removed from service. This is the case even if the intent is to treat, recycle, or reuse the equipment.

When PCB wastes are stored in British Columbia, the full requirements of BC Reg. 63/88 apply to:

- 1.0 kg or more of pure PCB
- 100 L or more of any liquid containing more than 50 ppm of PCB
- 100 kg or more of any material other than a liquid, contaminated with more than 50 ppm of PCB

These amounts are the total of all amounts at a single location owned or controlled by the same person. They include PCB equipment. BC Reg. 63/88 also provides packaging requirements for storage, labeling requirements, waste destruction requirements, and references SOR/2008-273, indicating:

The Federal Transportation of Dangerous Goods Regulation sets out the requirements for the proper transport of PCB waste across provincial boundaries.

In British Columbia, a manifest issued by the Ministry of Environment (or equivalent federal document) must be used for hazardous wastes shipped from sites in British Columbia. A manifest must be used to transport:

- 5 kg or more of PCB solids
- 5 L or more of PCB liquids
- An amount of a PCB solid or PCB liquid containing more than 500 g of PCB within BC
- 500 g or more of solids, liquids, or mixtures of these containing 50 mg/kg of PCB outside of BC

Health effects

PCBs are insoluble in water; however, they readily dissolve in fats and other organic compounds. It is these attributes and fat-solubility that allow PCBs to persist in the environment and bio-accumulate in humans and animals. Exposure to PCBs can affect the immune system, reproductive system, nervous system, and endocrine system. In humans, PCBs are potentially cancer-causing.

Mould

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, occupational health and safety regulations typically require employers to take every precaution reasonable in the circumstances for the protection of workers.

The WorkSafeBC Guideline for Part 4 of BC Reg. 296/97 discusses the application of the Regulation to workplaces with mould showing on exposed or hidden surfaces, or where mould may be a factor in complaints regarding indoor air quality. The guideline provides information for investigating indoor air quality complaints with respect to mould contamination, including information on sampling for the

presence of moulds in buildings. Information is also provided on possible health effects and for cleanup personnel involved in the remediation of buildings damaged by water and mould.

Health Effects

There are a number of documented cases of health problems related to exposure to indoor fungi.

Both high-level, short-term exposures and lower-level, long-term exposures can result in illness. The most common symptoms from exposure to mould in indoor environments are runny nose, eye irritation, cough, congestion, aggravation of asthma, headache, flu-like symptoms, fatigue, and skin rash. People with suppressed immune systems may be susceptible to fungal infections as a result of exposure to indoor moulds.

People who are exposed to mould growth on building materials will not necessarily exhibit adverse health effects. However, the mould must still be removed. Humans are at risk from indoor mould when fungal spores, fragments or metabolites are released into the air and inhaled or physically contacted (dermal exposure).

Not everyone experiences allergic reaction; the susceptibility to exposure varies with the individual's genetic predisposition, age, state of health, and concurrent exposures. For these reasons, and because the measurement of exposure is not standardized and biological markers of exposure to fungi are largely unknown, it is not possible to establish "safe" or "unsafe" levels of exposure. However, federal, and provincial policies have been written to minimize mould exposure and the elimination of mould indoors.

Mercury

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 disposal should be through a scrap dealer (elemental mercury), recycling firm for mercury vapour and returned to the manufacturer for light tubes and fixtures. Disposal of mercury waste is governed by BC Reg. 63/88.

The Federal Transportation of Dangerous Goods Regulation and BC Reg. 63/88 set out the requirements for the proper transport of mercury waste in British Columbia.

Health Effects

Routes of exposure for mercury and mercury compounds include inhalation, ingestion, skin and/or eye contact. 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.

Elemental (metallic) mercury most often causes health effects through inhalation of its vapour, which can be absorbed through the lungs. This kind of exposure can result when elemental mercury is spilled (or products that contain elemental mercury break) and the mercury is exposed to the air. Vapour concentrations can vary especially in warm or poorly-ventilated indoor spaces where the airborne concentration can exceed the permissible exposure limit (provincially set).

Chronic mercury "poisoning" can be caused by long-term exposure to low airborne concentrations (or low levels) of mercury. Symptoms or effects of mercury exposure include: tremors, emotional changes,

neuromuscular effects, mental changes/disturbances, digestive disturbances, headaches, insomnia, and changes in nervous response.

Silica

Regulations pertaining to silica are provided in BC Reg. 296/97. Included are general provisions (minimizing release; keeping worksite clear of unnecessary accumulations; ensuring methods for decontamination prevent generation of airborne silica), provisions for "restricted areas" (where there is a reasonable chance that the airborne concentration of silica exceeds or may exceed the occupational exposure limit), provisions for use in abrasive blasting, and provisions for health assessments for workers exposed to silica.

Health Effects

Crystalline silica dust particles, which are small enough to be inhaled into the lungs (respirable size), can cause a number of health problems. As with asbestos, silica within building materials poses no threat to human health if left undisturbed.

Exposure to crystalline silica airborne dust my cause scaring of the lungs with coughing and shortness of breath—also known as "silicosis", a form of disabling, progressive, and sometimes fatal pulmonary fibrosis.

Ozone Depleting Substances (ODS)

ODSs are regulated in British Columbia by the British Columbia *Waste Management Act*—Ozone Depleting Substances and Other Halocarbons Regulation (BC Reg. 387/99 as amended by BC Reg. 317/2012).

On federal land, aboriginal land and federal works, buildings and undertakings, the Federal Halocarbon Regulation 2003 (SOR/2003-289, including associated amendments) 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.

If ODS-containing materials are to be removed and disposed of, all ODSs must be handled, recycled, stored, and/or disposed of in accordance with the requirements of BC Reg. 63/88.

The Federal Transportation of Dangerous Goods Regulation and BC Reg. 63/88 set out the requirements for the proper transport of ODS waste in British Columbia.

Health Effects

Health effects are not typically related to exposure to ODSs directly, but to the consequences of ODS release to the atmosphere, subsequent degradation of the earth's ozone layer, and implications associated with increased UVB light exposure.

APPENDIX E

Classification, Condition and Accessibility

1.1 Spray Applied Fireproofing, Insulation and Texture Finishes

To evaluate the condition of ACM spray applied as fireproofing, thermal insulation, or texture, decorative or acoustic finishes, the following criteria are applied:

GOOD

Surface of material shows no significant signs of damage, deterioration, or delamination. Up to 1 percent visible damage to surface is allowed within range of **GOOD**. Evaluation of sprayed fireproofing requires the surveyor to be familiar with the irregular surface texture typical of sprayed asbestos products. **GOOD** condition includes un-encapsulated 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 1 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 survey or re-assessment form.

NOTE: **FAIR** condition is not utilized in the evaluation of the 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 are advised to be watchful for ACM **DEBRIS** prior to accessing or working above ceilings in areas of buildings with ACM regardless of the reported condition.

1.2 Mechanical Insulation

The evaluation of the condition of mechanical insulation (on boilers, breaching, ductwork, piping, tanks, equipment etc.) utilizes the following criteria:

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 penetrating 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. It is not possible to observe the full length of mechanical insulation from all angles.

1.3 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 should be treated as a friable product.

2. Evaluation of Accessibility

The accessibility of building materials known or suspected of being ACM is rated according to the following criteria:

ACCESS (A)

Areas of the building within reach (from floor level) of all building users. Includes areas such as gymnasiums, workshops, and storage areas where activities of the building users may result in disturbance of ACM not normally within reach from floor level.

ACCESS (B)

Frequently entered maintenance areas within reach of maintenance staff, without the need for a ladder. Includes: frequently entered pipe chases, tunnels and service areas or areas within reach from a fixed ladder or catwalk, e.g. tops of equipment, mezzanines.

ACCESS (C) EXPOSED

Areas of the building above 2.4 metres where use of a ladder is required to reach the ACM. Only refers to ACM that is exposed to view, from the floor or ladder, without the removal or opening of other building components such as ceiling tiles, or service access door or hatch. Does not include infrequently accessed service areas of the building.

ACCESS (C) CONCEALED

Areas of the building which require the removal of a building component, including lay-in ceilings and access panels into solid ceiling systems. Includes rarely entered crawl spaces, attic spaces, etc. Observations will be limited to the extent visible from the access points.

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 ACM. Evaluation of condition and extent of ACM is limited or impossible, depending on the surveyor's ability to visually examine materials in ACCESS D.

3. ACM DEBRIS

3.1 DEBRIS from Friable ACM

The presence of fallen ACM is noted separately from the presumed friable ACM source (sprayed fireproofing, thermal insulation, texture, decorative or acoustic finishes or mechanical insulation) and is referred to as **DEBRIS**.

3.2 DEBRIS from Damaged Non-Friable ACM

The presence of fallen ACM from damaged non-friable ACM is also reported separately from the non-friable ACM source. Only fallen non-friable ACM that has become friable is reported as **DEBRIS**.

The identification of the exact location or presence of **DEBRIS** on the top of ceiling tiles is limited by the number of observations made and the presence of building components such as ducts or full height walls

that obstruct observations. Workers are advised to be watchful for the presence of **DEBRIS** prior to accessing or working in proximity to mechanical insulation or above ceilings in areas of buildings with ACM regardless of the reported presence or absence of **DEBRIS**.

4. Action Matrix and Action Descriptions

The Asbestos Management Plan requires the following responses:

- Immediately clean-up **DEBRIS** that is likely to be disturbed.
- Remove, repair, or enclose friable ACM in **POOR** or **FAIR** condition whose continued deterioration will result in **DEBRIS** that is likely to be disturbed.

The following factors shall be considered in making site-specific recommendations for compliance with the existing applicable regulations or codes and the practical implementation of the Asbestos Management Plan:

1. ACM in **POOR** condition is not routinely repairable. If an abatement action is necessary, removal is the recommended action (enclosure is a viable option in unusual circumstances, e.g. where removal is difficult or costly and the asbestos-containing material can be thoroughly enclosed).

2. Mechanical insulation in **FAIR** condition will be repaired or removed based on the following general recommendations, applied on a case-by-case basis:
   - ACM insulation found in **FAIR** condition in ACCESS (B) or ACCESS (C) EXPOSED areas is to be repaired.
   - ACM mechanical insulation found in **FAIR** condition in ACCESS (B) and ACCESS (C) EXPOSED areas, where future damage to the ACM is likely to occur, is to be removed.

3. ACM in **GOOD** condition present in ACCESS (A) can be managed by surveillance, as long as it is not disturbed by future renovation, maintenance, or demolition. Proactive removal of the ACM in ACCESS (A) will be considered where damage is possible by on-going occupant activity (accidental or intentional).

4. Non-friable or manufactured products are considered in the action matrix as follows:
   - Non-friable and manufactured products reported in **POOR** condition, or friable **DEBRIS** resulting from the deterioration of non-friable ACM, are treated as friable materials and the appropriate action, and depending on accessibility is determined from the action matrix for friable ACM.
   - For non-friable or manufactured products reported in **GOOD** condition, Action 7 (surveillance) is recommended regardless of accessibility.

5. All asbestos-containing material from a particular area is to be removed where small quantities of asbestos are present, and removal will negate the need for the use of an Asbestos Management Program in that area.

The action matrix provided below establishes the recommended asbestos control action. The ACTIONS themselves are described in full following the table.

4.1 Action Matrix Tables

FRIABLE ACM				
ACCESS	**CONDITION**			**DEBRIS**
	GOOD	**FAIR**	**POOR**	
(A)	ACTION 5/7[1]	ACTION 5/6[2]	ACTION 3	ACTION 1
(B)	ACTION 7	ACTION 6/5[3]	ACTION 3	ACTION 1
(C) EXPOSED	ACTION 7	ACTION 6	ACTION 4	ACTION 2
(C) CONCEALED	ACTION 7	ACTION 7	ACTION 4	ACTION 2
(D)	ACTION 7	ACTION 7	ACTION 7	ACTION 7

[1] If material in **ACCESS (A)/GOOD** condition is not removed **ACTION 7** is required.

[2] If material in **ACCESS(A)/FAIR** condition is not removed **ACTION 6** is required.

[3] Remove ACM in **ACCESS (B)/FAIR** condition if ACM is likely to be disturbed.

4.2 Action Descriptions

ACTION 1 - Immediate Clean-Up of DEBRIS that is Likely to Be Disturbed

Access that is likely to cause a disturbance of the ACM **DEBRIS** is to be restricted and **clean up ACM DEBRIS is to be done immediately**. Use correct asbestos procedures. This action is required for compliance with regulatory requirements and good practice. The assessor should immediately notify the Asset or Property and Facility Manager, or Regional/Area Asbestos Management Coordinator of this condition.

ACTION 2 - Intermediate risk precautions for Entry into Areas with ACM DEBRIS

At locations where ACM **DEBRIS** can be isolated in lieu of removal or cleaned up, use appropriate means to limit entry to the area. Restrict access to the area to persons using intermediate risk asbestos precautions. The precautions will be required until the ACM **DEBRIS** has been cleaned up, and the source of the **DEBRIS** has been stabilized or removed.

ACTION 3 - ACM Removal Required for Compliance

Remove ACM for compliance with regulatory requirements and good practice. Utilize asbestos procedures appropriate to the scope of the removal work.

ACTION 4 - Access into areas where asbestos-containing material is present and likely to be disturbed by access requires intermediate risk precautions.

Intermediate risk asbestos precautions are to be used when entry or access into an area is likely to disturb the ACM. **ACTION 4** must be used until the ACM is re-moved (Use **ACTION 1** or **2** if **DEBRIS** is present). Intermediate risk or high-risk precautions should be used for removal (depending on extent of removal).

ACTION 5 - Proactive ACM Removal

Removal of ACM in lieu of repair may be considered, even if it is in **GOOD** condition at locations, where ACM is easily accessible, limited in quantity, and removal would be cost-effective.

ACTION 6 - ACM Repair

Repair ACM found in **FAIR** condition, and not likely to be damaged again or disturbed by normal use of the area or room. Upon completion of the re-pair work treat ACM as material **in GOOD** condition and implement **ACTION 7**. If ACM is likely to be damaged or disturbed during normal use of the area or room, **ACTION 5** is to be implemented.

ACTION 7 - Routine Surveillance

Institute routine surveillance of the ACM. Trained workers or contractors must use appropriate asbestos precautions (low, intermediate, or high) during disturbance of the remaining ACM.

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APPENDIX 1-6

Hazardous Building Materials Assessment
Building E0178, Employee Housing, House 06, British Columbia

ARCADIS Design & Consultancy for natural and built assets

Public Services and Procurement Canada

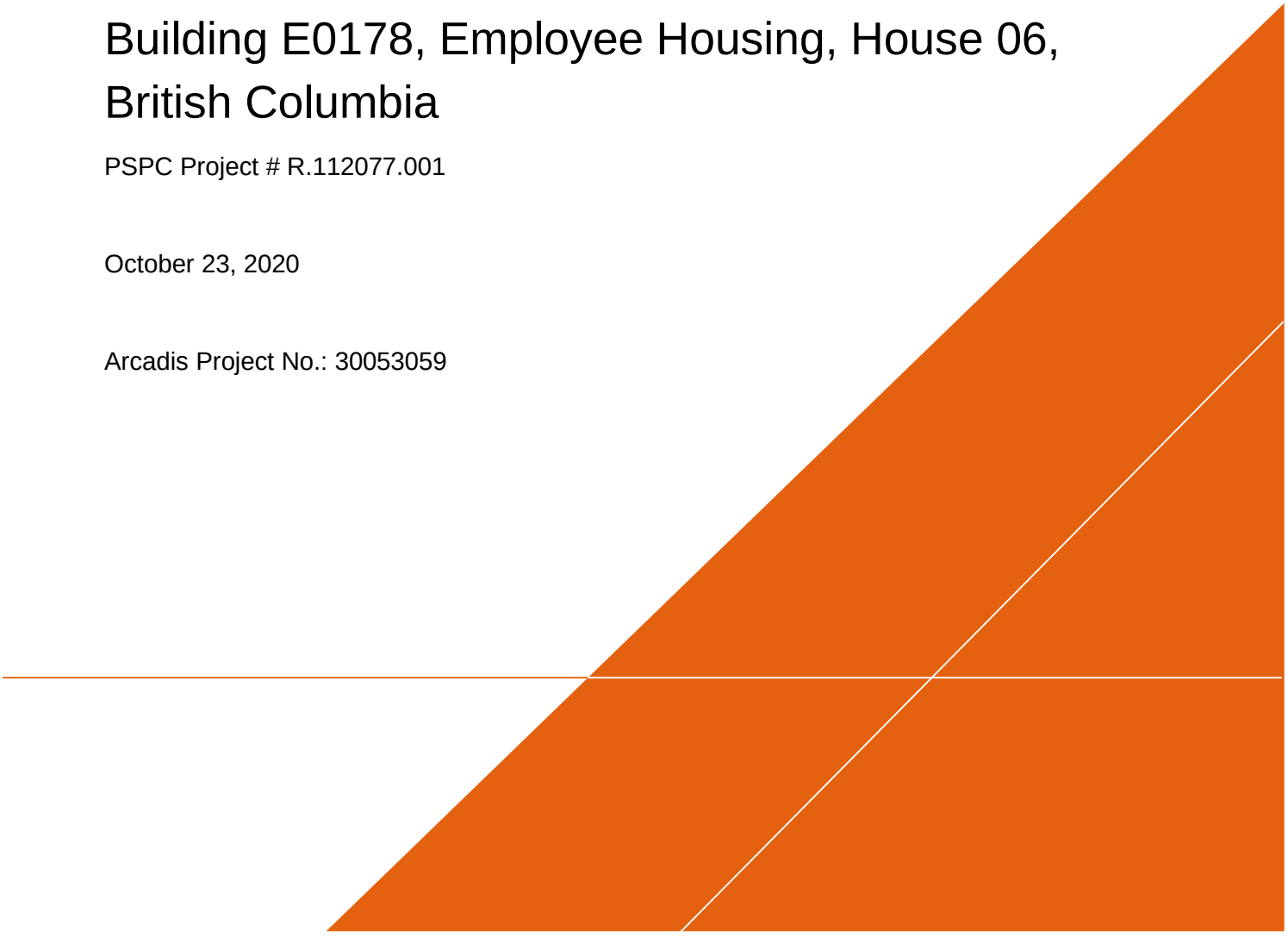
HAZARDOUS BUILDING MATERIALS ASSESSMENT

Building E0178, Employee Housing, House 06, British Columbia

PSPC Project # R.112077.001

October 23, 2020

Arcadis Project No.: 30053059



HAZARDOUS BUILDING MATERIALS ASSESSMENT

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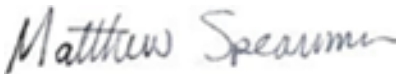

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ACRONYMS AND ABBREVIATIONS

ACM	Asbestos-Containing Materials
Arcadis	Arcadis Canada Inc.
CLC	Canada Labour Code
COHSR	Canada Occupational Health and Safety Regulations
HPP	Hazard Prevention Program
LCB	Lead-Containing Paints
NIOSH	National Institute for Occupational Safety and Health
NJC	National Joint Council
OHS	Occupational Health and Safety
PCBs	Polychlorinated Biphenyls
PLM	Polarized Light Microscopy
PSPC	Public Services and Procurement Canada
TEM	Transmission Electron Microscopy
USEPA	United States Environmental Protection Agency

EXECUTIVE SUMMARY

Arcadis Canada Inc. (Arcadis) was retained by Public Services and Procurement Canada (PSPC, Client) to conduct a hazardous building materials assessment of Building E0178, House 06, located in British Columbia.

This project consisted of a limited pre-renovation assessment to identify suspect hazardous materials in areas that were excluded from the original survey.

The renovation scope was limited to the part of the building scheduled for renovation, which consisted of replacing exterior windows, doors, vinyl siding, deck and stairs.

The hazardous building materials considered during this assessment included the following:

- Asbestos-containing materials (ACMs)
- Lead, including lead-containing paints (LCPs)
- Polychlorinated biphenyls (PCBs) in electrical equipment
- Suspect visible mould
- Mercury materials/products/equipment
- Ozone-depleting substances (ODSs) in heating, ventilation, and air conditioning (HVAC) equipment or fixed fire suppression systems
- Silica in building materials

Arcadis performed the assessment on July 9, 2020. The assessment was conducted by Matthew Spearman, Dipl T (Env), Field Technologist of Arcadis.

Summary of Findings

Asbestos: Asbestos-containing materials (ACM) were confirmed to be present as follows:

Material	Location(s)	Total Quantity	Condition (action)	Asbestos Type (%)
Black Mastic Residue	Exterior – around building on concrete foundation	~41 meters	Good (7)	4% Chrysotile

Lead: Confirmed lead is not present in assessed area.

Polychlorinated Biphenyls (PCBs): No PCBs were observed in the assessed area.

Suspect Visible Mould: No suspect visible mould was observed in the assessed area.

Mercury: No mercury vapour was visually confirmed in the assessed area.

Ozone Depleting Substances (ODS): ODS were not observed in the assessed area.

Silica: Crystalline silica is a presumed component of the following materials throughout the building: poured concrete.

Recommendations

The following is a summary of significant recommendations; refer to the body of the report for detailed recommendations.

1. Remove and properly dispose of asbestos-containing materials if disturbed by the planned renovation work.
2. Follow appropriate safe work procedures when handling or disturbing asbestos and silica.
3. Prepare and update plans and performance specifications regarding hazardous material removal for the planned work. The specifications should include the scope of work, safe work practices, personal protective equipment, respiratory protection, and disposal of waste materials.
4. Provide this report and the detailed plans and specifications to the contractor prior to bidding or commencing work.
5. Retain a qualified consultant to specify, inspect and verify the successful removal of hazardous materials.
6. Update the asbestos inventory upon completion of the abatement and removal of asbestos-containing materials.

Findings of this report are subject to our standard Limitations, as outlined in Section 7.

This Executive Summary is subject to the same standard limitations as contained in the report and must be read in conjunction with the entire report.

1 INTRODUCTION

1.1 Purpose

Arcadis Canada Inc. (Arcadis) was retained by Public Services and Procurement Canada (PSPC, Client) to conduct a hazardous building materials assessment of Building E0178, House 06, located in British Columbia.

This project consisted of a limited pre-renovation assessment to identify suspect hazardous materials in areas that were excluded from the original survey.

The renovation scope was limited to the part of the building scheduled for renovation, which consisted of replacing exterior windows, doors, vinyl siding, deck and stairs.

Arcadis performed the assessment on July 9, 2020. The assessment was conducted by Matthew Spearman, Dipl T (Env), Field Technologist of Arcadis.

1.2 Scope of Work

The scope of work for the project, as referenced in the Arcadis Workplan dated June 4, 2020, identifies the requirement to conduct a hazardous building material assessment within building E0178. Specifically, the scope of work included:

- Review of previous reports, construction specifications and drawings and identify any gaps related to hazardous building materials.
- Development of sampling strategy to address the identified gaps.
- Collect and submit representative suspect asbestos material and lead paint chip samples for analysis.
- Submit samples to accredited laboratories for analysis.
- Evaluation and interpretation of field findings and sample analytical results to develop conclusions and recommendations pertaining to hazardous building materials identified

For the purpose of this assessment, hazardous building materials re defined as follows:

- Asbestos-containing materials (ACMs)
- Lead, including lead-containing paints (LCPs)
- Polychlorinated biphenyls (PCBs) in electrical equipment
- Suspect visible mould
- Mercury materials/products/equipment
- Ozone-depleting substances (ODSs) in heating, ventilation, and air conditioning (HVAC) equipment or fixed fire suppression systems
- Silica in building materials

A general description of the building included in this assessment is provided in the table below:

Table 1. Building Description

Building Number (BU)	Building Name	Total Inside Gross m^2	Year Constructed	Building Description
E0178	House 06	206.60	1987	Two-story building with asphalt shingle roof and poured concrete foundation. Vinyl siding exterior. Drywall and ceramic tile interior walls. Drywall, texture coat, drywall lay-in ceiling tile and plywood ceilings. Poured concrete, wood laminate, plywood, and vinyl sheet flooring. Heating is supplied by gas fired forced air furnace and electric baseboard heaters.

2 BACKGROUND INFORMATION

Arcadis conducted previous assessments of the building and the findings are presented in the following reports:

- Asbestos-Containing Materials Survey, Building E0178, dated March 24, 2019, prepared by Arcadis Canada Inc. And,
- Hazardous Building Material Assessment, Building E0178, dated February 3, 2020, prepared by Arcadis Canada Inc.

2.1 Exclusions

The assessment was restricted to accessible locations of the building. Roofing or other material that may cause damage to the building envelope were not included unless specifically impacted by the proposed renovations and sampling would not compromise the building envelope integrity.

3 SURVEY METHODOLOGY

Sampling activities were conducted in accordance with Arcadis' Standard Operation Procedures which take into account current federal and provincial regulations pertaining to such work (i.e., sampling procedures, required number of samples and laboratory analytical procedures). Regulations are presented in Appendix D.

Representative bulk samples were collected of accessible suspect, PCB, lead, and asbestos in sufficient quantities for laboratory analysis. Samples were sealed in polyethylene zip-lock bags labeled with the sample number, suspect material description, and sample location. As part of sampling procedures, sampling tools were cleaned between sample collection events to avoid the potential for cross-contamination of samples.

All sample bags were compiled in order and placed into a single container accompanied with a chain of custody form outlining the project information, date, building location, number of samples, and sample description. Samples were submitted to the analytical laboratory in a sealed container via courier.

3.1 Asbestos-Containing Materials

A separate set of samples was collected of each type of homogenous material suspected to contain asbestos. A homogenous material is defined by the US EPA as material that is uniform in texture and appearance, was installed at one time, and is unlikely to consist of more than one type or formulation of material. The homogeneous materials are determined by visual examination, available information on the phases of the construction and prior renovations.

Bulk sampling protocols followed the ASTM E2356 Standard, which indicates requirements for the number of samples to collect for each homogeneous material. The table below provides an outline of the minimum number of samples to be collected from the ASTM E2356 Standard.

Table 2. Bulk Material Sample Quantities

Type of Material	Size of Area of Homogeneous Material	Minimum Number of Samples Collected
Any homogeneous material, including but not limited to fireproofing, drywall joint compound, ceiling tile stucco, acoustical and stipple finishes, and visually similar floor tiles	Less than 90 m^2 (<1,000 ft^2)	3
	90 m^2 or more, but less than 450 m^2 (1,000-5,000 ft^2)	5
	450 m^2 or more (>5,000 ft^2)	7

In some cases, manufactured products such as asbestos cement pipe were visually identified without sample confirmation.

Flooring mastic/adhesive are only sampled and analyzed if present on the underside of flooring samples (vinyl floor tile and vinyl sheet flooring) in sufficient quantity for laboratory analysis.

Attempts to distinguish and delineate asbestos-containing drywall compound from new non-asbestos drywall compound is often unachievable. Arcadis collected drywall joint compound samples from exterior walls, columns or other locations which are unlikely to have been renovated in an attempt to determine the presence of asbestos in the original drywall compound.

Arcadis submitted the bulk samples to a NVLAP accredited laboratory for analysis. The analysis is performed in accordance with Test Method EPA/600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials, July 1993.

EPA Method 600 states that materials characterized by interfering binder/matrix or low asbestos content may require additional gravimetric reduction sample treatment beyond routine polarized light microscopy (PLM) analysis (e.g. dissolution with hydrochloric acid, treatment with organic solvents or ashing in a muffle furnace or low temperature plasma asher to remove unwanted components).

Arcadis submitted one sample of each sample set (3) of vinyl floor tiles be analyzed by transmission electron microscopy (TEM) if the first two samples are reported negative by PLM.

The asbestos analysis was completed using a stop positive approach. Only one result of greater than the regulated criteria is required to determine that a material is asbestos-containing, but all samples must be analyzed to conclusively determine that a material is non-asbestos. The laboratory stopped analyzing samples from a homogeneous material once greater than the criteria was detected in any of the samples of that material. All samples of a homogeneous material were analyzed if no asbestos was detected. Where building materials are described in this report as non-asbestos, or described as containing no asbestos,

this is subject to the limitations of the analytical method used and should be understood to mean no asbestos was detected.

The classification, condition, and accessibility were assessed for the materials which could contain asbestos. To determine these factors, Arcadis followed the methodology outlined in the ASTM E356 Standard. The Standard provides definitions and criteria for the assessment of ACM. The classification, conditions, and accessibility information are provided in Appendix E.

Bulk samples of materials which could contain asbestos were collected and submitted to EMSL Canada Inc. (EMSL) for analysis of asbestos content. Asbestos-containing materials are defined as 0.5% or greater, or any amount if vermiculite.

3.2 Lead

Arcadis collected samples of distinctive paint finishes and surface coatings present in more than a limited application, where removal of the paint is possible. Arcadis collects samples by scraping the painted finish to include base and covering applications. 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. 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 were presumed to be the same, regardless of differing sub surface paints, if any.

The 2017 WorkSafeBC publication *Safe Work Practices for Handling Lead* (Lead Guideline) indicates the following:

> *Unlike for asbestos-containing material, WorkSafeBC does not numerically define what would be considered a lead-containing paint or coating. All suspected paints or coatings should be tested for lead because, depending on the nature of the work, even a small amount could pose a risk to workers. In order to determine which controls and personal protective equipment would be required for a particular job, a qualified person must consider this information as part of the risk assessment.*

- Improper removal of lead paint containing 600 mg/kg lead results in airborne lead concentrations that exceed half of the exposure limit
  - Exposure limit indicated in both the COHSR and BC Reg. 296/97 is 0.05 mg/m^3
  - Potential for exposure exceeding half of the occupational exposure limit would be the trigger for implementation of an exposure control plan.
- Lead concentrations as low as 90 mg/kg may present a risk to pregnant women and children
  - Any risk assessment should include for the presence of high risk individuals within the workplace

When reviewing the above, “high risk” individuals are not expected to be present in the workplace associated with this building during building material alteration activities (i.e., demolition) that would create significant disturbance to paint with such individuals present. As such, paints containing 600 ppm lead or more will be considered “lead-containing” for the purpose of this report, such that appropriate risk assessments can be completed for demolition planning. However, information regarding the lead content of all paints tested is provided herein, for reference and risk assessment should the consideration of high risk individuals be necessary, based on the requirements of a particular situation.

Although a concentration of 600 ppm lead has been used to define paint coatings as LCPs, it should be noted that this is related to painted surfaces and the determination of appropriate provisions to protect occupants and employees from exposure to elevated concentrations of lead during typical operations and maintenance or simple renovation. This does not include painted metal surfaces that are to be welded, burned or torch-cut.

Using an arc welder or oxyacetylene torch on steel that is coated with lead-containing paint can create hazardous lead fumes and is prohibited by section 12.115 of BC Reg. 296/97.

> Regulatory excerpt: **12.115 Coatings on metals**
>
> *A coating on metal which could emit harmful contaminants (such as lead, chromium, organic materials, or toxic combustion products) must be removed from the base metal, whenever practicable, before welding or cutting begins.*

In addition, the following information is provided in the Lead Guideline:

- Welding or torch cutting of paints or coatings on metal can create very high concentrations of airborne lead fumes. Torch cutting structural steel, coated with paint containing as little as 130 mg/kg (equivalent to ppm) lead, can release airborne levels of lead as high as 0.8 mg/m^3 (16 times the exposure limit).

Given this information and that the analytical detection limit for lead paint analysis is approximately 80– 90 ppm (not significantly different than 130 ppm, which, per above, may release airborne lead levels 16 times the exposure limit), any paint coating on a metal surface to be welded, burned or torch-cut must be removed prior to that action being undertaken, unless a project-specific or tasks-specific risk assessment and safe work practices are developed by a qualified person.

Paint and surface coatings are evaluated for condition. The criteria for condition evaluation pertaining to LCPs described herein are generally based on the United States Housing and Urban Development (HUD) 2012 *Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing*.

When evaluating the condition of LCPs, an attempt should be made to determine whether the deterioration is due to a moisture problem or some other existing building deficiency. **"Poor"** surfaces are considered to be a hazard and should be corrected. "**Fair"** surfaces should be repaired but are not yet considered to be a hazard; if not repaired, they should be monitored frequently. "**Good/intact"** surfaces should be monitored to ensure that they remain in a nonhazardous condition.

In addition, the presence of paint debris must be considered in evaluating condition. Given the variety of paint uses, there are many applications that can have a tendency for the paint to "wear" from the surface slowly, over an extended period of time. Conditions where paint has worn from a surface are worth noting for maintenance discussions (i.e., related to re-coating the surface should, for example, the coating provide weather protection), however, in the absence of loose paint chip debris/dust, such conditions would not represent a potential exposure situation related to lead.

The condition evaluation criteria for LCPs are summarized in the table below.

Table 3. Lead-Containing Paint Condition Categories

Type of Building Component[1]	Total Area of Deteriorated Paint on Each Component		
	Good/Intact	Fair[2]	Poor[3]
Exterior components with large surface areas.	Entire surface is intact.	Less than or equal to 10 square feet	More than 10 square feet
Interior components with large surface areas (walls, ceilings, floors, doors.	Entire surface is intact.	Less than or equal to 2 square feet	More than 2 square feet
Interior and exterior components with small surface areas (windowsills, baseboards, soffits, trim).	Entire surface is intact.	Less than or equal to 10% of the total surface area of the component.	More than 10% of the total surface area of the component

NOTES:

1. Building component in this table refers to each individual component or side of building, not the combined surface area of all similar components in a room (e.g., a wall with 1 square foot of deteriorated paint is in "fair" condition, even if the other three walls in a room are intact).
2. Surfaces in "fair" condition should be repaired and/or monitored but are not considered to be "lead-containing paint hazards".
3. Surfaces in "poor" condition are considered to be "lead-containing paint hazards" and should be addressed through abatement or interim controls.

Analysis for lead in paints or surface coatings was performed in accordance with EPA Method No. 3050B/Method No. 7420; flame atomic absorption at laboratory accredited by the American Industrial Hygiene Association (AIHA).

3.3 Polychlorinated Biphenyls (PCBs)

The presence or absence of fluorescent lights was documented during the course of our investigation to determine whether there were any of the T12 type. T12 fluorescent lamps, with a diameter of 1.5 inches, utilize transformer type magnetic ballasts, which may contain PCBs. The use of T12s has been discontinued and replaced with new high-efficiency 1-inch T8 lamps (and other types) which use electronic ballasts which do not contain PCBs.

Wet transformers were assessed for PCBs based on the age of the building, a review of maintenance records and examination of labels or nameplates on equipment, where present and accessible. The information is compared to known ban dates of PCBs and Environment Canada publications.

Dry type transformers are presumed to be free of dielectric fluids and hence non-PCB. Caulking's were not sampled for PCB content unless specifically impacted by the proposed renovation scope. The material is considered a PCB solid if PCB content is 50ppm or greater based on the threshold given in SOR/2008-273.

3.4 Suspect Visible Mould

Arcadis identified the presence of any suspect mould and/or moisture-impacted building materials by visual inspection during the course of our site investigation. Suspect mould is typically a coloured, textured substance or discolouration/staining on a building material surface which, based on our experience, may be mould growth. If any mould growth is concealed within wall, ceiling, or floor cavities, it is not addressed in this assessment. No mould sampling or moisture testing is performed unless directed by the Client. The adjective *suspect* is used where the presence of mould has not been confirmed by laboratory analysis.

3.5 Mercury

Building materials/products/equipment (e.g. thermostats, barometers, pressure gauges, light tubes), suspected to contain mercury were identified by visually inspection only. Dismantling of equipment suspected of containing mercury was not performed. Sampling of these materials for laboratory analysis of mercury content was not performed.

Mercury spills or damaged mercury-containing equipment was recorded where observed.

3.6 Ozone Depleting Substances (ODS)

Arcadis determined the potential presence of ODS (chlorofluorocarbons, hydrochlorofluorocarbons, hydrofluorocarbons, halons, etc.) in air conditioning units, chillers, commercial coolers, and fire suppression systems by visual inspection of manufactures' labels or plates, maintenance records, or logbooks, etc.

3.7 Silica

Arcadis identified building materials suspected of containing crystalline silica (e.g. concrete, cement, tile, brick, masonry, mortar) by knowledge of current and historic applications and visual inspection only. Arcadis did not perform sampling of these materials for laboratory analysis of crystalline silica content.

4 RESULTS

4.1 Asbestos

During the course of our assessment, representative bulk samples of material were collected by Arcadis staff. The samples were forwarded to EMSL in Burnaby, British Columbia (BC) for asbestos analyses. EMSL holds a current Certificate of Accreditation for Bulk Asbestos Fibre Analysis under the Voluntary Accreditation Program (NVLAP). Bulk sampling was performed in general accordance with the requirements specified in ASTM E2356 Standard, BC Reg. 296/97 and in the WorkSafe BC publication Safe Work Practices for Handling Asbestos.

Results of bulk sample analysis for asbestos content are provided in the table below. Samples that exceed the criteria are highlighted in yellow.

Site Photographs provided in Appendix A. Laboratory certificates of analysis have been provided in Appendix B. Floor plans indicating sample locations and room numbers are provided in Appendix C.

Table 4. Results of Bulk Sample Analysis for Asbestos

Sample Number	Sample Description	Sample Location	Asbestos Type %
S-01A	Black Mastic Residue	Exterior – North concrete foundation	4% Chrysotile
S-01B	Black Mastic Residue	Exterior – East concrete foundation	Stop Positive
S-01C	Black Mastic Residue	Exterior – South concrete foundation	Stop Positive
S-02A*	Black weatherproofing	Exterior – South concrete foundation	None Detected

*Only one sample was collected of mastic (black) on the northeast corner foundation due to limited quantity present.

No asbestos was identified in the previous reports.

The following building materials were common in the building: however, these materials do not contain asbestos and were not sampled during the survey:

- Vinyl siding, wood, and concrete.

Asbestos-containing materials were confirmed present in the following table:

Table 5. Summary of Confirmed Asbestos-Containing Materials

Material	Location(s)	Total Quantity	Condition	Asbestos Type (%)
Black Mastic Residue	Exterior – around building on concrete foundation	~41 meters	Good (7)	4% Chrysotile

Presumed Materials

No presumed materials that may contain asbestos are suspected to be present in the way of planned work.

4.2 Lead

During the course of our site investigation, representative bulk samples of predominant paint types were collected by Arcadis staff. The samples were forwarded to EMSL for lead analyses. Results of bulk sample analysis for lead content are provided in the table below. Results that exceed the criteria re highlighted in yellow.

The laboratory report is provided in Appendix B.

Table 6. Results of Analyses of Bulk Samples for Paint for Lead

Sample No.	Sample Location(s)	Sample Description	Lead Content (ppm)
L-01	Exterior - Wood stairs	Grey paint on wood	<80
L-02	Exterior – around perimeter of building	Brown paint on metal rain gutter	<140

Lead was not detected at a level above the definition of lead paint (600 mg/kg) in any samples. No lead paint was identified in the previous reports. Where one colour of paint is indicated in the sample descriptions in the table above, only one layer of paint was observed. Where multiple colours are indicated in the sample description, multiple layers of paint were observed.

All paint applications were noted to be generally in fair to good condition.

4.3 Polychlorinated Biphenyls (PCBs)

PCBs were not observed in the assessed area.

4.4 Suspect Visible Mould

Suspect visible mould growth was not observed in the assessed area.

4.5 Mercury

Mercury vapor was not observed in the assessed area.

4.6 Ozone Depleting Substances

ODS was not observed in the assessed area.

4.7 Silica

Crystalline silica is a presumed component of the following materials where present in the assessed area:

- poured concrete

5 RECOMMENDATIONS

If future building renovation or demolition is required beyond the scope of this project, a detailed intrusive assessment must be conducted. The assessment should include destructive testing (i.e. coring and/or removal of building finishes and components), and sampling of materials not previously tested (i.e. roofing materials, mastics etc.).

All hazardous building materials were reported in good condition. All ACM observed were considered to fall under a recommended Action Level 7 (routine surveillance).

5.1 Building Renovation Work

The following specific recommendations are made regarding renovation involving the hazardous materials identified.

1. Prepare plans and performance specifications for hazardous material removal required for the planned work. The specifications should include the scope of work, personal protective equipment, respiratory protection, and disposal of waste materials.
2. Provide this report and the detailed plans and specifications to the contractor prior to bidding or commencing work.
3. Retain a qualified consultant to specify, inspect and verify the successful removal of hazardous materials.
4. Update the asbestos inventory upon completion of the abatement and removal of asbestos-containing materials.

The following general recommendations are made regarding renovation involving the hazardous materials identified.

Asbestos
Remove all asbestos-containing materials (ACM) prior to renovation, alteration, maintenance, or demolition work or if ACM may be disturbed by the work.

If the identified ACM will not be removed prior to commencement of the work, disturbance of ACM must follow the appropriate asbestos precautions for the classification of work being performed.

Asbestos-containing materials must be disposed of at a landfill approved to accept asbestos waste.

Suspect Visible Mould
No mould was observed; if mould is uncovered inside wall cavities during hand demolition, use appropriate precautions and protect workers using methods that comply with provincial guidelines.

Silica
Construction disturbance of silica-containing products may result in excessive exposures to airborne silica, especially if performed indoors and dry. Cutting, grinding, drilling or demolition of materials containing silica should be completed only with proper respiratory protection and other worker safety precautions that comply with provincial standards or guidelines.

6 REFERENCES

The following legislation and documents were referenced in completing the assessment and this report:

1. Occupational Health and Safety Regulation, B.C. Reg. 296/97, WorkSafe BC.
2. Safe Work Practices for Handling Asbestos, WorkSafe BC, 2017 Edition.
3. Hazardous Waste Regulation, B.C. Reg. 63/88, November 2017, BC Environmental Management Act.
4. Ozone Depleting Substances and Other Halocarbons Regulation, B.C. Reg. 317/2012 Environmental Management Act.

5. PCB Regulations, SOR/2008-273, Canadian Environmental Protection Act.
6. Lead-Containing Paint and Coatings, Preventing Exposure in the Construction Industry, WorkSafe BC, June 2017.
7. Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing, United States Housing and Urban Development (HUD) 2012.
8. Mould Guidelines for the Canadian Construction Industry, Standard Construction Document 2018, Canadian Construction Association.
9. Minister of Justice Canada Labour Code. R.S.C., 1985, c. L-2. March 2020.
10. Minister of Justice. 2018. Canada Occupational Health and Safety Regulations. SOR/86-304, June 2019.
11. Public Services and Procurement Canada Asbestos Management Standard. June 2019.
12. Transport Canada Consolidated Transport of Dangerous Goods Regulations including Amendment SOR/2019-101.
13. ASTM E2356 Standard Practice for Comprehensive Buildings Asbestos Surveys.
14. Government of Canada, Asbestos Management Plan, Version 2020-01, January 2020.

7 LIMITATIONS

This report, prepared for Public Services and Procurement Canada on behalf of Government of Canada, does not provide certification or warranty, expressed or implied, that the investigation conducted by Arcadis identified all hazardous materials associated with the subject building. The work undertaken by Arcadis was directed to provide information on the presence of hazardous materials in construction materials based on visual inspection of readily accessible areas of the subject building, and on the results of laboratory analysis of a limited number of bulk samples. The material in this report reflects Arcadis' best judgment in light of the information available at the time of the investigation, which was performed on July 9, 2020. This report is not intended to be used as a scope of work or technical specification for remediation of hazardous materials. Any use which any other party makes of the report, or reliance on, or decisions to be based on it, is the responsibility of such parties.

APPENDIX A

Site Photographs

Project Photographs

Public Services and Procurement Canada
Building E0178, House 06, British Columbia

Photo: 1

Date:
July 9, 2020

Description:
View of Employee Housing, Front

Photo: 2

Date:
July 9, 2020

Description:
View of Employee Housing, Rear

Project Photographs

Public Services and Procurement Canada
Building E0178, House 06, British Columbia

Photo: 3

Date:
July 9, 2020

Description:
View of Employee Housing, Southwest.

Photo: 4

Date:
July 9, 2020

Description:
View of Employee Housing, Southeast.

Project Photographs

Public Services and Procurement Canada
Building E0178, House 06, British Columbia

Photo: 5

Date:
July 9, 2020

Description:
Worn non lead paint on wooden stairs.

Photo: 6

Date:
July 9, 2020

Description:
Asbestos-containing Black mastic residue (S-01C) on concrete foundation. Non-ACM black weatherproofing (S-02A) is below.

APPENDIX B

Laboratory Certificates of Analysis

EMSL Canada Inc.
2333 18th Avenue NE, Unit 48, Calgary, AB T2E 8T6
Phone/Fax: (403) 879-1149 / (403) 879-1152
http://www.EMSL.com CalgaryLab@EMSL.com

EMSL Canada Or	652005042
CustomerID:	55ACAV42
CustomerPO:	30053059
ProjectID:	

Attn: **Jerry Botti**
ARCADIS Canada Inc.
308-1080 Mainland Street
Vancouver, BC V6B 2T4

Phone: (604) 632-9941
Fax:
Received: 7/20/2020 08:30 AM
Collected: 7/9/2020

Project: **30053059 / E0178 / House 06**

Test Report: Lead in Paint Chips by Flame AAS (SW 846 3050B/7000B)*

Client Sample Description	*Lab ID*	*Collected*	*Analyzed*	*Weight*	*Lead Concentration*
L-01	*652005042-0001*	7/9/2020	7/21/2020	0.2544 g	<80 ppm
	Site: EXTERIOR - GREY PAINT ON WOOD STAIRS				
L-02	*652005042-0002*	7/9/2020	7/21/2020	0.1421 g	<140 ppm
	Site: EXTERIOR - BROWN PAINT ON METAL GUTTER Insufficient sample to reach reporting limit.				

Client request: Remove address from project name.

Jefferson Salvador, Laboratory Manager
or other approved signatory

Report Amended: 10/22/2020 10:19:23 Replaces the Inital Report 07/24/2020 16:08:57. Reason Code: Client-Other (see report comment)

EMSL Canada Inc.

4506 Dawson Street Burnaby, BC V5C 4C1
Phone/Fax: (604) 757-3158 / (604) 757-4731
http://www.EMSL.com / vancouverlab@EMSL.com

EMSL Canada Order 692001635
Customer ID: 55ACAV42
Customer PO: 30053059
Project ID:

Attn: Jerry Botti
ARCADIS Canada Inc.
308-1080 Mainland Street
Vancouver, BC V6B 2T4

Phone: (604) 632-9941
Fax:
Collected: 7/ 9/2020
Received: 7/16/2020
Analyzed: 7/21/2020

Proj: 30053059 / E0178 / House 06

Test Report: Asbestos Analysis in Bulk Material for Occupational Health and Safety British Columbia Regulation 188/2011 via EPA 600/R-93/116 Method

Client Sample ID: S-01A ***Lab Sample ID:*** **692001635-0001**
Sample Description: EXTERIOR - NORTH/MASTIC RESIDUE

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	7/21/2020	Black	0.0%	96.0%	**4% Chrysotile**	

Client Sample ID: S-01B ***Lab Sample ID:*** **692001635-0002**
Sample Description: EXTERIOR - EAST/MASTIC RESIDUE

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	7/21/2020				Positive Stop (Not Analyzed)	

Client Sample ID: S-01C ***Lab Sample ID:*** **692001635-0003**
Sample Description: EXTERIOR - SOUTH/MASTIC RESIDUE

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	7/21/2020				Positive Stop (Not Analyzed)	

Client Sample ID: S-02A ***Lab Sample ID:*** **692001635-0004**
Sample Description: EXTERIOR - SOUTH/WEATHERPROOFING

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	7/21/2020	Black	0.0%	100.0%	None Detected	

Analyst(s):

Margaret Lee PLM (2)

Reviewed and approved by:

Nicole Yeo, Laboratory Manager
or Other Approved Signatory

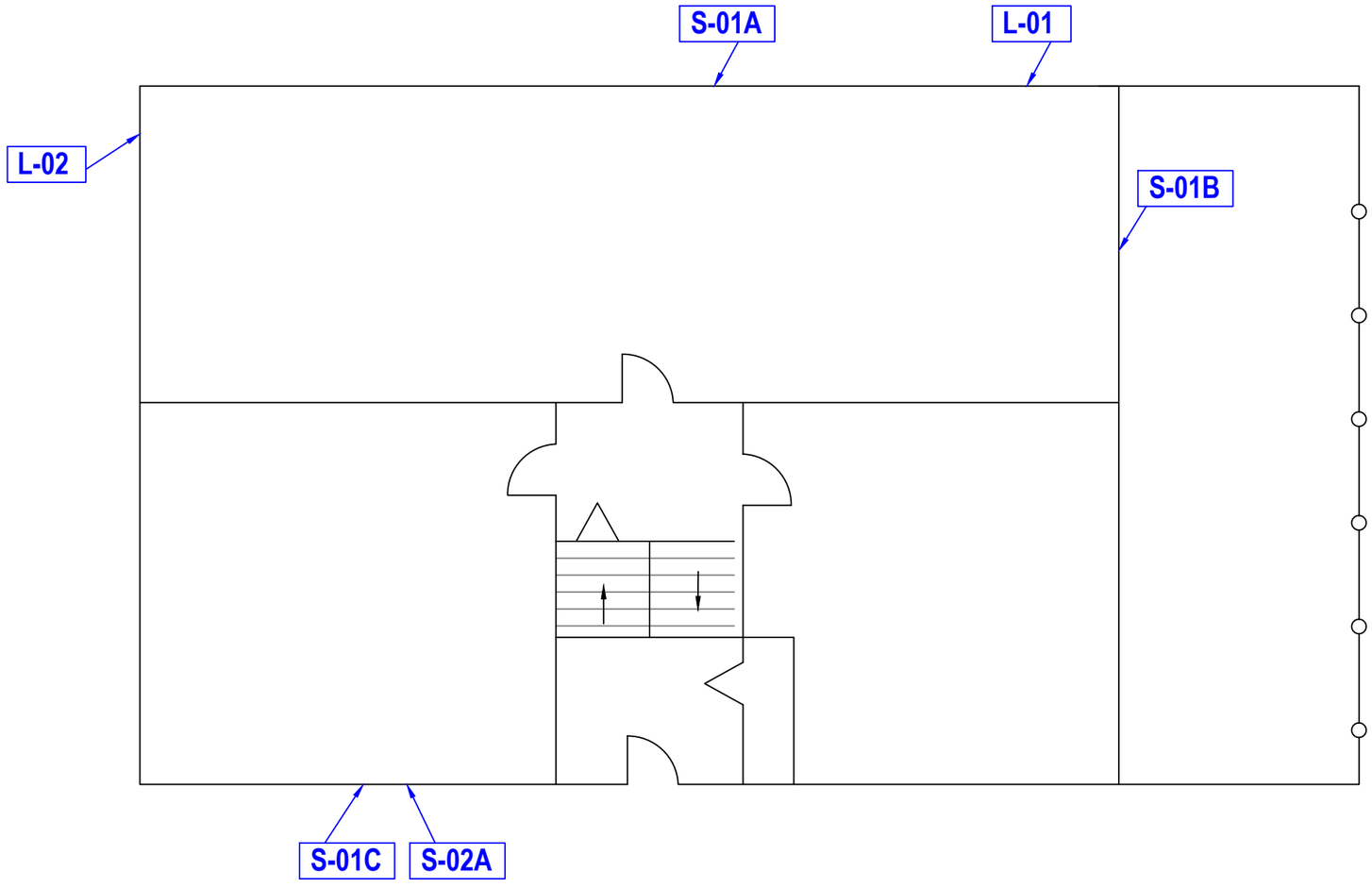
None Detected = <0.1%. EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations.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

Samples analyzed by EMSL Canada Inc. Burnaby, BC

Report amended: 10/21/202016:59:55 Replaces initial report from: 07/23/202011:44:33 Reason Code: Client-Change to Project

APPENDIX C

Floor Plans



LEGEND

S-XXX Bulk Asbestos Sample

L-XXX Bulk Lead Paint Sample

N.T.S

Title: **GOVERNMENT OF CANADA**
HAZARDOUS BUILDING MATERIAL ASSESSMENT - 2020

Project: BUILDING E0178 - HOUSE 08
FIRST FLOOR

Client: PUBLIC SERVICES AND PROCUREMENT CANADA

Project Number:	Drawn By:	Plot Size:	Date:
30053059	CB	11X17"	JULY 2020

ARCADIS

FIGURE 1

APPENDIX D

Regulations and Health Effects

Asbestos

Occupational Health and Safety (OHS) for federal employees is regulated by the Canada Labour Code (CLC) Part II. The *Canada Occupational Health and Safety Regulations (COHSR), Part X, Hazardous Substances* covers specific requirements related to the management and control of asbestos-containing materials (ACM). The COHSR, Part X, Hazardous Substances, states an employee shall be kept free from exposure to a concentration of airborne chrysotile asbestos in excess of 0.1 fibre/cm^3 or f/cc. There are also specific requirements for hazard prevention detailed in the Hazard Prevention Program (HPP) in the CLC.

For the purposes of this report, the following federal requirements will be followed, unless provincial requirements are more stringent. Federal legislation and policy referenced in this report includes:

- Canada Labour Code, March 2020;
- Canada Occupational Health and Safety Regulations Part X, Hazardous Substances; SOR/86-304, June 2019;
- Public Services and Procurement Canada Asbestos Management Standard, June 2019;
- Asbestos Management Plan, Government of Canada, Version 2020-01, January 2020; and,
- Transport Canada, Transport of Dangerous Goods Regulations

The management and requirements for the potential disturbance of asbestos in buildings is also regulated at the provincial level under the *British Columbia Occupational Health and Safety Regulations,296/97, and Safe Work Practices for Handling Asbestos, WorkSafeBC, 2017 Edition*.

The BC Occupational Health and Safety Regulations, 296/97 (BC Reg 296/97), require specific actions when asbestos is a potential health hazard in a workplace. Section 6.1 of the regulation defines an asbestos-containing material as follows:

"asbestos-containing material" means the following:

(a) a manufactured article or other material, other than vermiculite insulation, that would be determined to contain at least 0.5% asbestos if tested in accordance with one of the following methods:

(i) Asbestos, Chrysotile by XRD, Method 9000 (Issue 2, dated August 15, 1994) in the NIOSH Manual of Analytical Methods, published by the United States National Institute for Occupational Safety and Health, Centre for Disease Control;

(ii) Asbestos (bulk) by PLM, Method 9002 (Issue 2, dated August 15, 1994) in the NIOSH Manual of Analytical Methods, published by the United States National Institute for Occupational Safety and Health, Centre for Disease Control;

(iii) Test Method for the Determination of Asbestos in Bulk Building Materials (EPA/600/R-93/116, dated July 1993) published by the United States Environmental Protection Agency;

(b) vermiculite insulation that would be determined to contain any asbestos if tested in accordance with the Research Method for Sampling and Analysis of Fibrous Amphibole in Vermiculite Attic Insulation (EPA/600/R-04/004, dated January 2004) published by the United States Environmental Protection Agency;

The duties of employers, contractors, or owners include:

- identifying and labeling ACM that can potentially release asbestos fibres;
- keeping a current written record of all ACM present in the workplace;
- conducting regular surveillance and maintenance of asbestos materials to prevent fibre release;
- developing a written exposure control plan if workers may be exposed to harmful levels of asbestos;
- conducting work in a way that prevents the release of asbestos fibres as much as possible;
- notifying, informing, and training workers; and,
- notifying Occupational Health and Safety (OHS) at least 48 hours before beginning an asbestos-abatement.

Disturbance of asbestos during construction and demolition is regulated under section 20.112 of BC Reg 296/97.

The 2017 WorkSafeBC publication Safe Work Practices for Handling Asbestos (Asbestos Guide) is used by Occupational Health and Safety officers as a guide when reviewing abatement work practices and employer codes of practice, and generally meets the requirements of the COHSR.

The Asbestos Guide also provides significant additional background information pertaining to asbestos, along with details on health effects and other applicable legislation within the province of British Columbia (e.g., the federal Hazardous Products Act, the BC Building Code and waste disposal regulations).

Disposal of asbestos waste is governed by the British Columbia Hazardous Waste Regulation (BC Reg. 63/88). The Federal Transportation of Dangerous Goods Regulation and BC Reg. 63/88 set out the requirements for the proper transport of asbestos waste in British Columbia. In general, and for transportation and disposal, the waste must be placed in a double sealed container, properly labeled, free of cuts, tears or punctures and disposed of at a licensed waste station which has been properly notified of the presence of asbestos waste.

Health effects

Undisturbed asbestos within building materials poses no health risks. Asbestos poses a risk when building materials containing asbestos are impacted, or disturbed, thereby releasing the asbestos fibres into the air

Asbestos-related diseases are caused when suspended airborne asbestos fibres are inhaled and the fibres settle into various regions of the lungs and remain for extended periods. Once embedded in the lungs the asbestos fibres cause scarring within the lung tissue, ultimately leading to impaired lung function (asbestosis) and/or various cancers (lung cancer; mesothelioma). These asbestos-related diseases are irreversible and fatal. The risk of lung-related cancers is increased in individuals who smoke.

These asbestos-related diseases most often occur in individuals who have been exposed to high concentrations of airborne asbestos over a long period of time, though mesothelioma has been found in individuals with short-term exposures. Symptoms or the development of these asbestos-related diseases usually occur 10 to 25 years after exposure

Lead

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 (2005) to 90 ppm (2010).

With respect to potential lead exposures associated with disturbance to surfaces coated with lead-containing products, the 2017 WorkSafeBC manual titled Lead-Containing Paint and Coatings: Preventing Exposure in the Construction Industry, indicates the following:

- Improper removal of lead paint containing 600 mg/kg lead results in airborne lead concentrations that exceed half of the exposure limit
    - This potential for exposure exceeding half of the occupational exposure limit would be the trigger for implementation of an exposure control plan.
- Lead concentrations as low as 90 mg/kg may present a risk to pregnant women and children
    - Any risk assessment should include for the presence of high risk individuals within the workplace

The disposal of lead-containing paint is regulated under the Federal *Transportation of Dangerous Goods Act* and by the British Columbia Ministry of Environment. All lead-based paints and associated nonmetal substrate (concrete, plaster, wood, etc.) must undergo Toxicity Characteristic Leachate Properties (TCLP) metals testing to determine disposal procedures. Upon the completion of the test, the total concentration of metals in the waste extract must be compared to Schedule 4, Table 1 of the Hazardous Waste Regulation.

The Federal Transportation of Dangerous Goods Regulation and BC Reg. 63/88 set out the requirements for the proper transport of lead waste in British Columbia.

Health Effects

Elemental lead and inorganic lead compounds are absorbed through ingestion or inhalation and can incorporate into the bone marrow, nerve tissue, brain, and kidneys. In children, symptoms of lead poisoning can include headaches, irritability, abdominal pain, vomiting, anemia, weight loss, poor attention span, noticeable learning difficulty, slowed speech development, and hyperactivity. In adults, symptoms of lead poisoning can include pain, numbness or tingling of the extremities, muscular weakness, headache, abdominal pain, memory loss, unsteady gait, pale skin, weight loss, vomiting, irritability, and anemia. Although adults are susceptible to the toxic effects of lead, children are at high risk due to the nature of a child's activities that involve the introduction of non-food items into their bodies.

Excessive airborne lead and surface contamination can be transferred to employees' hands and may results in lead ingestion. Therefore, work practices intended to minimize surface lead concentrations, such as frequent cleaning of work surfaces should be included in an overall lead exposure control plan

PCB

As of September 5, 2008, under subsection 93(1) of the *Canadian Environmental Protection Act,* (CEPA), Federal PCB regulations were published by the Canada Gazette Part II (SOR/2008-273) that imposed specific deadlines for the elimination of all PCBs in concentrations at or above 50 milligrams/kilogram (mg/kg). This regulation required the elimination of all PCBs and PCB-containing materials currently in-use and in storage and limited the period of time PCB materials could 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.

In British Columbia, PCB equipment becomes PCB wastes as soon as it is removed from service. This is the case even if the intent is to treat, recycle, or reuse the equipment.

When PCB wastes are stored in British Columbia, the full requirements of BC Reg. 63/88 apply to:

- 1.0 kg or more of pure PCB
- 100 L or more of any liquid containing more than 50 ppm of PCB
- 100 kg or more of any material other than a liquid, contaminated with more than 50 ppm of PCB

These amounts are the total of all amounts at a single location owned or controlled by the same person. They include PCB equipment. BC Reg. 63/88 also provides packaging requirements for storage, labeling requirements, waste destruction requirements, and references SOR/2008-273, indicating:

The Federal Transportation of Dangerous Goods Regulation sets out the requirements for the proper transport of PCB waste across provincial boundaries.

In British Columbia, a manifest issued by the Ministry of Environment (or equivalent federal document) must be used for hazardous wastes shipped from sites in British Columbia. A manifest must be used to transport:

- 5 kg or more of PCB solids
- 5 L or more of PCB liquids
- An amount of a PCB solid or PCB liquid containing more than 500 g of PCB within BC
- 500 g or more of solids, liquids, or mixtures of these containing 50 mg/kg of PCB outside of BC

Health effects

PCBs are insoluble in water; however, they readily dissolve in fats and other organic compounds. It is these attributes and fat-solubility that allow PCBs to persist in the environment and bio-accumulate in humans and animals. Exposure to PCBs can affect the immune system, reproductive system, nervous system, and endocrine system. In humans, PCBs are potentially cancer-causing.

Mould

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, occupational health and safety regulations typically require employers to take every precaution reasonable in the circumstances for the protection of workers.

The WorkSafeBC Guideline for Part 4 of BC Reg. 296/97 discusses the application of the Regulation to workplaces with mould showing on exposed or hidden surfaces, or where mould may be a factor in complaints regarding indoor air quality. The guideline provides information for investigating indoor air quality complaints with respect to mould contamination, including information on sampling for the

presence of moulds in buildings. Information is also provided on possible health effects and for cleanup personnel involved in the remediation of buildings damaged by water and mould.

Health Effects

There are a number of documented cases of health problems related to exposure to indoor fungi.

Both high-level, short-term exposures and lower-level, long-term exposures can result in illness. The most common symptoms from exposure to mould in indoor environments are runny nose, eye irritation, cough, congestion, aggravation of asthma, headache, flu-like symptoms, fatigue, and skin rash. People with suppressed immune systems may be susceptible to fungal infections as a result of exposure to indoor moulds.

People who are exposed to mould growth on building materials will not necessarily exhibit adverse health effects. However, the mould must still be removed. Humans are at risk from indoor mould when fungal spores, fragments or metabolites are released into the air and inhaled or physically contacted (dermal exposure).

Not everyone experiences allergic reaction; the susceptibility to exposure varies with the individual's genetic predisposition, age, state of health, and concurrent exposures. For these reasons, and because the measurement of exposure is not standardized and biological markers of exposure to fungi are largely unknown, it is not possible to establish "safe" or "unsafe" levels of exposure. However, federal, and provincial policies have been written to minimize mould exposure and the elimination of mould indoors.

Mercury

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 disposal should be through a scrap dealer (elemental mercury), recycling firm for mercury vapour and returned to the manufacturer for light tubes and fixtures. Disposal of mercury waste is governed by BC Reg. 63/88.

The Federal Transportation of Dangerous Goods Regulation and BC Reg. 63/88 set out the requirements for the proper transport of mercury waste in British Columbia.

Health Effects

Routes of exposure for mercury and mercury compounds include inhalation, ingestion, skin and/or eye contact. 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.

Elemental (metallic) mercury most often causes health effects through inhalation of its vapour, which can be absorbed through the lungs. This kind of exposure can result when elemental mercury is spilled (or products that contain elemental mercury break) and the mercury is exposed to the air. Vapour concentrations can vary especially in warm or poorly-ventilated indoor spaces where the airborne concentration can exceed the permissible exposure limit (provincially set).

Chronic mercury "poisoning" can be caused by long-term exposure to low airborne concentrations (or low levels) of mercury. Symptoms or effects of mercury exposure include: tremors, emotional changes,

neuromuscular effects, mental changes/disturbances, digestive disturbances, headaches, insomnia, and changes in nervous response.

Silica

Regulations pertaining to silica are provided in BC Reg. 296/97. Included are general provisions (minimizing release; keeping worksite clear of unnecessary accumulations; ensuring methods for decontamination prevent generation of airborne silica), provisions for "restricted areas" (where there is a reasonable chance that the airborne concentration of silica exceeds or may exceed the occupational exposure limit), provisions for use in abrasive blasting, and provisions for health assessments for workers exposed to silica.

Health Effects

Crystalline silica dust particles, which are small enough to be inhaled into the lungs (respirable size), can cause a number of health problems. As with asbestos, silica within building materials poses no threat to human health if left undisturbed.

Exposure to crystalline silica airborne dust my cause scaring of the lungs with coughing and shortness of breath—also known as "silicosis", a form of disabling, progressive, and sometimes fatal pulmonary fibrosis.

Ozone Depleting Substances (ODS)

ODSs are regulated in British Columbia by the British Columbia *Waste Management Act*—Ozone Depleting Substances and Other Halocarbons Regulation (BC Reg. 387/99 as amended by BC Reg. 317/2012).

On federal land, aboriginal land and federal works, buildings and undertakings, the Federal Halocarbon Regulation 2003 (SOR/2003-289, including associated amendments) 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.

If ODS-containing materials are to be removed and disposed of, all ODSs must be handled, recycled, stored, and/or disposed of in accordance with the requirements of BC Reg. 63/88.

The Federal Transportation of Dangerous Goods Regulation and BC Reg. 63/88 set out the requirements for the proper transport of ODS waste in British Columbia.

Health Effects

Health effects are not typically related to exposure to ODSs directly, but to the consequences of ODS release to the atmosphere, subsequent degradation of the earth's ozone layer, and implications associated with increased UVB light exposure.

APPENDIX E

Classification, Condition and Accessibility

1.1 Spray Applied Fireproofing, Insulation and Texture Finishes

To evaluate the condition of ACM spray applied as fireproofing, thermal insulation, or texture, decorative or acoustic finishes, the following criteria are applied:

GOOD

Surface of material shows no significant signs of damage, deterioration, or delamination. Up to 1 percent visible damage to surface is allowed within range of **GOOD**. Evaluation of sprayed fireproofing requires the surveyor to be familiar with the irregular surface texture typical of sprayed asbestos products. **GOOD** condition includes un-encapsulated 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 1 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 survey or re-assessment form.

NOTE: **FAIR** condition is not utilized in the evaluation of the 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 are advised to be watchful for ACM **DEBRIS** prior to accessing or working above ceilings in areas of buildings with ACM regardless of the reported condition.

1.2 Mechanical Insulation

The evaluation of the condition of mechanical insulation (on boilers, breaching, ductwork, piping, tanks, equipment etc.) utilizes the following criteria:

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 penetrating 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. It is not possible to observe the full length of mechanical insulation from all angles.

1.3 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 should be treated as a friable product.

2. Evaluation of Accessibility

The accessibility of building materials known or suspected of being ACM is rated according to the following criteria:

ACCESS (A)

Areas of the building within reach (from floor level) of all building users. Includes areas such as gymnasiums, workshops, and storage areas where activities of the building users may result in disturbance of ACM not normally within reach from floor level.

ACCESS (B)

Frequently entered maintenance areas within reach of maintenance staff, without the need for a ladder. Includes: frequently entered pipe chases, tunnels and service areas or areas within reach from a fixed ladder or catwalk, e.g. tops of equipment, mezzanines.

ACCESS (C) EXPOSED

Areas of the building above 2.4 metres where use of a ladder is required to reach the ACM. Only refers to ACM that is exposed to view, from the floor or ladder, without the removal or opening of other building components such as ceiling tiles, or service access door or hatch. Does not include infrequently accessed service areas of the building.

ACCESS (C) CONCEALED

Areas of the building which require the removal of a building component, including lay-in ceilings and access panels into solid ceiling systems. Includes rarely entered crawl spaces, attic spaces, etc. Observations will be limited to the extent visible from the access points.

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 ACM. Evaluation of condition and extent of ACM is limited or impossible, depending on the surveyor's ability to visually examine materials in ACCESS D.

3. ACM DEBRIS

3.1 DEBRIS from Friable ACM

The presence of fallen ACM is noted separately from the presumed friable ACM source (sprayed fireproofing, thermal insulation, texture, decorative or acoustic finishes or mechanical insulation) and is referred to as **DEBRIS**.

3.2 DEBRIS from Damaged Non-Friable ACM

The presence of fallen ACM from damaged non-friable ACM is also reported separately from the non-friable ACM source. Only fallen non-friable ACM that has become friable is reported as **DEBRIS**.

The identification of the exact location or presence of **DEBRIS** on the top of ceiling tiles is limited by the number of observations made and the presence of building components such as ducts or full height walls

that obstruct observations. Workers are advised to be watchful for the presence of **DEBRIS** prior to accessing or working in proximity to mechanical insulation or above ceilings in areas of buildings with ACM regardless of the reported presence or absence of **DEBRIS**.

4. Action Matrix and Action Descriptions

The Asbestos Management Plan requires the following responses:

- Immediately clean-up **DEBRIS** that is likely to be disturbed.
- Remove, repair, or enclose friable ACM in **POOR** or **FAIR** condition whose continued deterioration will result in **DEBRIS** that is likely to be disturbed.

The following factors shall be considered in making site-specific recommendations for compliance with the existing applicable regulations or codes and the practical implementation of the Asbestos Management Plan:

1. ACM in **POOR** condition is not routinely repairable. If an abatement action is necessary, removal is the recommended action (enclosure is a viable option in unusual circumstances, e.g. where removal is difficult or costly and the asbestos-containing material can be thoroughly enclosed).

2. Mechanical insulation in **FAIR** condition will be repaired or removed based on the following general recommendations, applied on a case-by-case basis:
   - ACM insulation found in **FAIR** condition in ACCESS (B) or ACCESS (C) EXPOSED areas is to be repaired.
   - ACM mechanical insulation found in **FAIR** condition in ACCESS (B) and ACCESS (C) EXPOSED areas, where future damage to the ACM is likely to occur, is to be removed.

3. ACM in **GOOD** condition present in ACCESS (A) can be managed by surveillance, as long as it is not disturbed by future renovation, maintenance, or demolition. Proactive removal of the ACM in ACCESS (A) will be considered where damage is possible by on-going occupant activity (accidental or intentional).

4. Non-friable or manufactured products are considered in the action matrix as follows:
   - Non-friable and manufactured products reported in **POOR** condition, or friable **DEBRIS** resulting from the deterioration of non-friable ACM, are treated as friable materials and the appropriate action, and depending on accessibility is determined from the action matrix for friable ACM.
   - For non-friable or manufactured products reported in **GOOD** condition, Action 7 (surveillance) is recommended regardless of accessibility.

5. All asbestos-containing material from a particular area is to be removed where small quantities of asbestos are present, and removal will negate the need for the use of an Asbestos Management Program in that area.

The action matrix provided below establishes the recommended asbestos control action. The ACTIONS themselves are described in full following the table.

4.1 Action Matrix Tables

FRIABLE ACM				
ACCESS	**CONDITION**			**DEBRIS**
	GOOD	**FAIR**	**POOR**	
(A)	ACTION 5/7[1]	ACTION 5/6[2]	ACTION 3	ACTION 1
(B)	ACTION 7	ACTION 6/5[3]	ACTION 3	ACTION 1
(C) EXPOSED	ACTION 7	ACTION 6	ACTION 4	ACTION 2
(C) CONCEALED	ACTION 7	ACTION 7	ACTION 4	ACTION 2
(D)	ACTION 7	ACTION 7	ACTION 7	ACTION 7

[1] If material in **ACCESS (A)/GOOD** condition is not removed **ACTION 7** is required.

[2] If material in **ACCESS(A)/FAIR** condition is not removed **ACTION 6** is required.

[3] Remove ACM in **ACCESS (B)/FAIR** condition if ACM is likely to be disturbed.

4.2 Action Descriptions

ACTION 1 - Immediate Clean-Up of DEBRIS that is Likely to Be Disturbed

Access that is likely to cause a disturbance of the ACM **DEBRIS** is to be restricted and **clean up ACM DEBRIS is to be done immediately**. Use correct asbestos procedures. This action is required for compliance with regulatory requirements and good practice. The assessor should immediately notify the Asset or Property and Facility Manager, or Regional/Area Asbestos Management Coordinator of this condition.

ACTION 2 - Intermediate risk precautions for Entry into Areas with ACM DEBRIS

At locations where ACM **DEBRIS** can be isolated in lieu of removal or cleaned up, use appropriate means to limit entry to the area. Restrict access to the area to persons using intermediate risk asbestos precautions. The precautions will be required until the ACM **DEBRIS** has been cleaned up, and the source of the **DEBRIS** has been stabilized or removed.

ACTION 3 - ACM Removal Required for Compliance

Remove ACM for compliance with regulatory requirements and good practice. Utilize asbestos procedures appropriate to the scope of the removal work.

ACTION 4 - Access into areas where asbestos-containing material is present and likely to be disturbed by access requires intermediate risk precautions.

Intermediate risk asbestos precautions are to be used when entry or access into an area is likely to disturb the ACM. **ACTION 4** must be used until the ACM is re-moved (Use **ACTION 1** or **2** if **DEBRIS** is present). Intermediate risk or high-risk precautions should be used for removal (depending on extent of removal).

ACTION 5 - Proactive ACM Removal

Removal of ACM in lieu of repair may be considered, even if it is in **GOOD** condition at locations, where ACM is easily accessible, limited in quantity, and removal would be cost-effective.

ACTION 6 - ACM Repair

Repair ACM found in **FAIR** condition, and not likely to be damaged again or disturbed by normal use of the area or room. Upon completion of the re-pair work treat ACM as material **in GOOD** condition and implement **ACTION 7**. If ACM is likely to be damaged or disturbed during normal use of the area or room, **ACTION 5** is to be implemented.

ACTION 7 - Routine Surveillance

Institute routine surveillance of the ACM. Trained workers or contractors must use appropriate asbestos precautions (low, intermediate, or high) during disturbance of the remaining ACM.

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APPENDIX 1-7

Hazardous Building Materials Assessment
GOVERNMENT OF CANADA, E0154 Employee Housing, House 07

ARCADIS Design & Consultancy for natural and built assets

Public Services and Procurement Canada

HAZARDOUS BUILDING MATERIALS ASSESSMENT

GOVERNMENT OF CANADA

E0154 Employee Housing

House 07

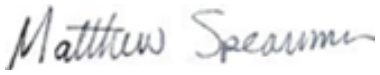
PSPC Project # R.112077.001

October 22, 2020

Arcadis Project No.: 30053059

HAZARDOUS BUILDING MATERIALS ASSESSMENT

Authored by:



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ACRONYMS AND ABBREVIATIONS

ACM	Asbestos-Containing Materials
Arcadis	Arcadis Canada Inc.
CLC	Canada Labour Code
COHSR	Canada Occupational Health and Safety Regulations
HPP	Hazard Prevention Program
LCB	Lead-Containing Paints
NIOSH	National Institute for Occupational Safety and Health
NJC	National Joint Council
OHS	Occupational Health and Safety
PCBs	Polychlorinated Biphenyls
PLM	Polarized Light Microscopy
PSPC	Public Services and Procurement Canada
TEM	Transmission Electron Microscopy
USEPA	United States Environmental Protection Agency

EXECUTIVE SUMMARY

Arcadis Canada Inc. (Arcadis) was retained by Public Services and Procurement Canada (PSPC, Client) to conduct a hazardous building material assessment of Building E0154, House 07, located in British Columbia.

This project consisted of a limited pre-renovation assessment to identify suspect hazardous materials in areas that were excluded from the original survey.

The renovation scope was limited to the part of the building scheduled for renovation, which consisted of replacing exterior windows, doors, vinyl siding, deck and stairs.

The hazardous building materials considered during this assessment included the following:

- Asbestos-containing materials (ACMs)
- Lead, including lead-containing paints (LCPs)
- Polychlorinated biphenyls (PCBs) in electrical equipment
- Suspect visible mould
- Mercury materials/products/equipment
- Ozone-depleting substances (ODSs) in heating, ventilation, and air conditioning (HVAC) equipment or fixed fire suppression systems
- Silica in building materials

Arcadis performed the assessment on July 9, 2020. The assessment was conducted by Matthew Spearman, Dipl T (Env), Field Technologist of Arcadis.

Summary of Findings

Asbestos: Asbestos-containing materials (ACM) were confirmed to be present as follows:

Material	Location(s)	Total Quantity	Condition (action)	Asbestos Type (%)
Black Weatherproofing	Exterior – around build on concrete foundation	~40 meters	Good (7)	1% Chrysotile
Black Window Sealant*	Exterior at front door	2 windows	Good (7)	5% Chrysotile
White Caulking*	Exterior around windows	12 windows	Good (7)	1% Chrysotile
Black Firestop Putty*	Exterior at cable penetration on West face	1 Penetration	Good (7)	8% Chrysotile

*Arcadis February 3, 2020 HBMA Report

Lead: Lead is confirmed present in the following paints and or surface coatings:

Color (substrate)	Location(s)	Total Quantity	Condition	Concentration (ppm)
White (Wood)	Exterior – around building on concrete foundation	~40 meters	Good	1900
White (Metal)*	Exterior – around building above concrete foundation	~40 meters	Good	2000

*Arcadis February 3, 2020 HBMA Report

Polychlorinated Biphenyls (PCBs): No PCBs were observed in the assessed area.

Suspect Visible Mould: No suspect visible mould was observed in the assessed area.

Mercury: No mercury vapour was visually confirmed in the assessed area.

Ozone Depleting Substances (ODS): ODS were not observed in the assessed area.

Silica: Crystalline silica is a presumed component of the following materials throughout the building: poured concrete

Recommendations

The following is a summary of significant recommendations; refer to the body of the report for detailed recommendations.

1. Remove and properly dispose of asbestos-containing materials if disturbed by the planned renovation work.
2. Follow appropriate safe work procedures when handling or disturbing asbestos, lead and silica.
3. Prepare and update plans and performance specifications regarding hazardous material removal for the planned work. The specifications should include the scope of work, safe work practices, personal protective equipment, respiratory protection, and disposal of waste materials.
4. Provide this report and the detailed plans and specifications to the contractor prior to bidding or commencing work.
5. Retain a qualified consultant to specify, inspect and verify the successful removal of hazardous materials.
6. Update the asbestos inventory upon completion of the abatement and removal of asbestos-containing materials.

Findings of this report are subject to our standard Limitations, as outlined in Section 7.

This Executive Summary is subject to the same standard limitations as contained in the report and must be read in conjunction with the entire report.

1 INTRODUCTION

1.1 Purpose

Arcadis Canada Inc. (Arcadis) was retained by Public Services and Procurement Canada (PSPC, Client) to conduct a hazardous building material assessment of Building E0154, House 07, located in British Columbia.

This project consisted of a limited pre-renovation assessment to identify suspect hazardous materials in areas that were excluded from the original survey.

The renovation scope was limited to the part of the building scheduled for renovation, which consisted of replacing exterior windows, doors, vinyl siding, deck and stairs.

Arcadis performed the assessment on July 9, 2020. The assessment was conducted by Matthew Spearman, Dipl T (Env), Field Technologist of Arcadis.

1.2 Scope of Work

The scope of work for the project, as referenced in the Arcadis Workplan dated June 5, 2020, identifies the requirement to conduct a hazardous building material assessment within building E0154. Specifically, the scope of work included:

- Review of previous reports, construction specifications and drawings and identify any gaps related to hazardous building materials.
- Development of sampling strategy to address the identified gaps.
- Collect and submit representative suspect asbestos material and lead paint chip samples for analysis.
- Submit samples to accredited laboratories for analysis.
- Evaluation and interpretation of field findings and sample analytical results to develop conclusions and recommendations pertaining to hazardous building materials identified

For the purpose of this assessment, hazardous building materials re defined as follows:

- Asbestos-containing materials (ACMs)
- Lead, including lead-containing paints (LCPs)
- Polychlorinated biphenyls (PCBs) in electrical equipment
- Suspect visible mould
- Mercury materials/products/equipment
- Ozone-depleting substances (ODSs) in heating, ventilation, and air conditioning (HVAC) equipment or fixed fire suppression systems
- Silica in building materials

A general description of the building included in this assessment is provided in the table below:

Table 1. Building Description

Building Number (BU)	Building Name	Total Inside Gross m^2	Year Constructed	Building Description
E0154	House 07	210.90	1988	Two-story building with asphalt shingle roof and concrete foundation. Vinyl exterior siding. Drywall and texture coat interior walls. Drywall, texture coat and plywood interior ceilings. Wood laminate, carpet, plywood, poured concrete, ceramic tile, and vinyl flooring. Heating is supplied by gas fired forced air furnace and electric baseboard heaters.

2 BACKGROUND INFORMATION

Arcadis conducted a previous assessment of the building and the findings are presented in the following report:

- Asbestos-Containing Materials Survey, Building E0154, dated March 24, 2019, prepared by Arcadis Canada Inc. and,
- Hazardous Building Material Assessment, Building E0154, dated February 3, 2020, prepared by Arcadis Canada Inc.

2.1 Exclusions

The assessment was restricted to accessible locations of the building exterior. Roofing or other material that may cause damage to the building envelope were not included unless specifically impacted by the proposed renovations and sampling would not compromise the building envelope integrity.

3 SURVEY METHODOLOGY

Sampling activities were conducted in accordance with Arcadis' Standard Operation Procedures which take into account current federal and provincial regulations pertaining to such work (i.e., sampling procedures, required number of samples and laboratory analytical procedures). Regulations are presented in Appendix D.

Representative bulk samples were collected of accessible suspect, PCB, lead, and asbestos in sufficient quantities for laboratory analysis. Samples were sealed in polyethylene zip-lock bags labeled with the sample number, suspect material description, and sample location. As part of sampling procedures, sampling tools were cleaned between sample collection events to avoid the potential for cross-contamination of samples.

All sample bags were compiled in order and placed into a single container accompanied with a chain of custody form outlining the project information, date, building location, number of samples, and sample description. Samples were submitted to the analytical laboratory in a sealed container via courier.

3.1 Asbestos-Containing Materials

A separate set of samples was collected of each type of homogenous material suspected to contain asbestos. A homogenous material is defined by the US EPA as material that is uniform in texture and appearance, was installed at one time, and is unlikely to consist of more than one type or formulation of material. The homogeneous materials are determined by visual examination, available information on the phases of the construction and prior renovations.

Bulk sampling protocols followed the ASTM E2356 Standard, which indicates requirements for the number of samples to collect for each homogeneous material. The table below provides an outline of the minimum number of samples to be collected from the ASTM E2356 Standard.

Table 2. Bulk Material Sample Quantities

Type of Material	Size of Area of Homogeneous Material	Minimum Number of Samples Collected
Any homogeneous material, including but not limited to fireproofing, drywall joint compound, ceiling tile stucco, acoustical and stipple finishes, and visually similar floor tiles	Less than 90 m^2 (<1,000 ft^2)	3
	90 m^2 or more, but less than 450 m^2 (1,000-5,000 ft^2)	5
	450 m^2 or more (>5,000 ft^2)	7

In some cases, manufactured products such as asbestos cement pipe were visually identified without sample confirmation.

Flooring mastic/adhesive are only sampled and analyzed if present on the underside of flooring samples (vinyl floor tile and vinyl sheet flooring) in sufficient quantity for laboratory analysis.

Attempts to distinguish and delineate asbestos-containing drywall compound from new non-asbestos drywall compound is often unachievable. Arcadis collected drywall joint compound samples from exterior walls, columns or other locations which are unlikely to have been renovated in an attempt to determine the presence of asbestos in the original drywall compound.

Arcadis submitted the bulk samples to a NVLAP accredited laboratory for analysis. The analysis is performed in accordance with Test Method EPA/600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials, July 1993.

EPA Method 600 states that materials characterized by interfering binder/matrix or low asbestos content may require additional gravimetric reduction sample treatment beyond routine polarized light microscopy (PLM) analysis (e.g. dissolution with hydrochloric acid, treatment with organic solvents or ashing in a muffle furnace or low temperature plasma asher to remove unwanted components).

Arcadis submitted one sample of each sample set (3) of vinyl floor tiles be analyzed by transmission electron microscopy (TEM) if the first two samples are reported negative by PLM.

The asbestos analysis was completed using a stop positive approach. Only one result of greater than the regulated criteria is required to determine that a material is asbestos-containing, but all samples must be analyzed to conclusively determine that a material is non-asbestos. The laboratory stopped analyzing samples from a homogeneous material once greater than the criteria was detected in any of the samples of that material. All samples of a homogeneous material were analyzed if no asbestos was detected. Where building materials are described in this report as non-asbestos, or described as containing no asbestos,

this is subject to the limitations of the analytical method used and should be understood to mean no asbestos was detected.

The classification, condition, and accessibility were assessed for the materials which could contain asbestos. To determine these factors, Arcadis followed the methodology outlined in the ASTM E356 Standard. The Standard provides definitions and criteria for the assessment of ACM. The classification, conditions, and accessibility information are provided in Appendix E.

Bulk samples of materials which could contain asbestos were collected and submitted to EMSL Canada Inc. (EMSL) for analysis of asbestos content. Asbestos-containing materials are defined as 0.5% or greater, or any amount if vermiculite.

3.2 Lead

Arcadis collected samples of distinctive paint finishes and surface coatings present in more than a limited application, where removal of the paint is possible. Arcadis collects samples by scraping the painted finish to include base and covering applications. 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. 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 were presumed to be the same, regardless of differing sub surface paints, if any.

The 2017 WorkSafeBC publication *Safe Work Practices for Handling Lead* (Lead Guideline) indicates the following:

> *Unlike for asbestos-containing material, WorkSafeBC does not numerically define what would be considered a lead-containing paint or coating. All suspected paints or coatings should be tested for lead because, depending on the nature of the work, even a small amount could pose a risk to workers. In order to determine which controls and personal protective equipment would be required for a particular job, a qualified person must consider this information as part of the risk assessment.*

- Improper removal of lead paint containing 600 mg/kg lead results in airborne lead concentrations that exceed half of the exposure limit
  - Exposure limit indicated in both the COHSR and BC Reg. 296/97 is 0.05 mg/m^3
  - Potential for exposure exceeding half of the occupational exposure limit would be the trigger for implementation of an exposure control plan.
- Lead concentrations as low as 90 mg/kg may present a risk to pregnant women and children
  - Any risk assessment should include for the presence of high risk individuals within the workplace

When reviewing the above, “high risk” individuals are not expected to be present in the workplace associated with this building during building material alteration activities (i.e., demolition) that would create significant disturbance to paint with such individuals present. As such, paints containing 600 ppm lead or more will be considered “lead-containing” for the purpose of this report, such that appropriate risk assessments can be completed for demolition planning. However, information regarding the lead content of all paints tested is provided herein, for reference and risk assessment should the consideration of high risk individuals be necessary, based on the requirements of a particular situation.

Although a concentration of 600 ppm lead has been used to define paint coatings as LCPs, it should be noted that this is related to painted surfaces and the determination of appropriate provisions to protect occupants and employees from exposure to elevated concentrations of lead during typical operations and maintenance or simple renovation. This does not include painted metal surfaces that are to be welded, burned or torch-cut.

Using an arc welder or oxyacetylene torch on steel that is coated with lead-containing paint can create hazardous lead fumes and is prohibited by section 12.115 of BC Reg. 296/97.

> Regulatory excerpt: **12.115 Coatings on metals**
>
> *A coating on metal which could emit harmful contaminants (such as lead, chromium, organic materials, or toxic combustion products) must be removed from the base metal, whenever practicable, before welding or cutting begins.*

In addition, the following information is provided in the Lead Guideline:

- Welding or torch cutting of paints or coatings on metal can create very high concentrations of airborne lead fumes. Torch cutting structural steel, coated with paint containing as little as 130 mg/kg (equivalent to ppm) lead, can release airborne levels of lead as high as 0.8 mg/m^3 (16 times the exposure limit).

Given this information and that the analytical detection limit for lead paint analysis is approximately 80– 90 ppm (not significantly different than 130 ppm, which, per above, may release airborne lead levels 16 times the exposure limit), any paint coating on a metal surface to be welded, burned or torch-cut must be removed prior to that action being undertaken, unless a project-specific or tasks-specific risk assessment and safe work practices are developed by a qualified person.

Paint and surface coatings are evaluated for condition. The criteria for condition evaluation pertaining to LCPs described herein are generally based on the United States Housing and Urban Development (HUD) 2012 *Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing*.

When evaluating the condition of LCPs, an attempt should be made to determine whether the deterioration is due to a moisture problem or some other existing building deficiency. **"Poor"** surfaces are considered to be a hazard and should be corrected. "**Fair"** surfaces should be repaired but are not yet considered to be a hazard; if not repaired, they should be monitored frequently. "**Good/intact"** surfaces should be monitored to ensure that they remain in a nonhazardous condition.

In addition, the presence of paint debris must be considered in evaluating condition. Given the variety of paint uses, there are many applications that can have a tendency for the paint to "wear" from the surface slowly, over an extended period of time. Conditions where paint has worn from a surface are worth noting for maintenance discussions (i.e., related to re-coating the surface should, for example, the coating provide weather protection), however, in the absence of loose paint chip debris/dust, such conditions would not represent a potential exposure situation related to lead.

The condition evaluation criteria for LCPs are summarized in the table below.

Table 3. Lead-Containing Paint Condition Categories

Type of Building Component[1]	Total Area of Deteriorated Paint on Each Component		
	Good/Intact	Fair[2]	Poor[3]
Exterior components with large surface areas.	Entire surface is intact.	Less than or equal to 10 square feet	More than 10 square feet
Interior components with large surface areas (walls, ceilings, floors, doors.	Entire surface is intact.	Less than or equal to 2 square feet	More than 2 square feet
Interior and exterior components with small surface areas (windowsills, baseboards, soffits, trim).	Entire surface is intact.	Less than or equal to 10% of the total surface area of the component.	More than 10% of the total surface area of the component

NOTES:

1. Building component in this table refers to each individual component or side of building, not the combined surface area of all similar components in a room (e.g., a wall with 1 square foot of deteriorated paint is in "fair" condition, even if the other three walls in a room are intact).
2. Surfaces in "fair" condition should be repaired and/or monitored but are not considered to be "lead-containing paint hazards".
3. Surfaces in "poor" condition are considered to be "lead-containing paint hazards" and should be addressed through abatement or interim controls.

Analysis for lead in paints or surface coatings was performed in accordance with EPA Method No. 3050B/Method No. 7420; flame atomic absorption at laboratory accredited by the American Industrial Hygiene Association (AIHA).

3.3 Polychlorinated Biphenyls (PCBs)

The presence or absence of fluorescent lights was documented during the course of our investigation to determine whether there were any of the T12 type. T12 fluorescent lamps, with a diameter of 1.5 inches, utilize transformer type magnetic ballasts, which may contain PCBs. The use of T12s has been discontinued and replaced with new high-efficiency 1-inch T8 lamps (and other types) which use electronic ballasts which do not contain PCBs.

Wet transformers were assessed for PCBs based on the age of the building, a review of maintenance records and examination of labels or nameplates on equipment, where present and accessible. The information is compared to known ban dates of PCBs and Environment Canada publications.

Dry type transformers are presumed to be free of dielectric fluids and hence non-PCB. Caulking's were not sampled for PCB content unless specifically impacted by the proposed renovation scope. The material is considered a PCB solid if PCB content is 50ppm or greater based on the threshold given in SOR/2008-273.

3.4 Suspect Visible Mould

Arcadis identified the presence of any suspect mould and/or moisture-impacted building materials by visual inspection during the course of our site investigation. Suspect mould is typically a coloured, textured substance or discolouration/staining on a building material surface which, based on our experience, may be mould growth. If any mould growth is concealed within wall, ceiling, or floor cavities, it is not addressed in this assessment. No mould sampling or moisture testing is performed unless directed by the Client. The adjective *suspect* is used where the presence of mould has not been confirmed by laboratory analysis.

3.5 Mercury

Building materials/products/equipment (e.g. thermostats, barometers, pressure gauges, light tubes), suspected to contain mercury were identified by visually inspection only. Dismantling of equipment suspected of containing mercury was not performed. Sampling of these materials for laboratory analysis of mercury content was not performed.

Mercury spills or damaged mercury-containing equipment was recorded where observed.

3.6 Ozone Depleting Substances (ODS)

Arcadis determined the potential presence of ODS (chlorofluorocarbons, hydrochlorofluorocarbons, hydrofluorocarbons, halons, etc.) in air conditioning units, chillers, commercial coolers, and fire suppression systems by visual inspection of manufactures' labels or plates, maintenance records, or logbooks, etc.

3.7 Silica

Arcadis identified building materials suspected of containing crystalline silica (e.g. concrete, cement, tile, brick, masonry, mortar) by knowledge of current and historic applications and visual inspection only. Arcadis did not perform sampling of these materials for laboratory analysis of crystalline silica content.

4 RESULTS

4.1 Asbestos

During the course of our assessment, representative bulk samples of material were collected by Arcadis staff. The samples were forwarded to EMSL in Burnaby, British Columbia (BC) for asbestos analyses. EMSL holds a current Certificate of Accreditation for Bulk Asbestos Fibre Analysis under the Voluntary Accreditation Program (NVLAP). Bulk sampling was performed in general accordance with the requirements specified in ASTM E2356 Standard, BC Reg. 296/97 and in the WorkSafe BC publication Safe Work Practices for Handling Asbestos.

Results of bulk sample analysis for asbestos content are provided in the table below. Samples that exceed the criteria are highlighted in yellow.

Site Photographs provided in Appendix A. Laboratory certificates of analysis have been provided in Appendix B. Floor plans indicating sample locations and room numbers are provided in Appendix C.

Table 4. Results of Bulk Sample Analysis for Asbestos

Sample Number	Sample Description	Sample Location	Asbestos Type %
S-01A	Building Paper	Exterior – West Face	None Detected
S-01B	Building Paper	Exterior – South Face	None Detected
S-01C	Building Paper	Exterior – South Face	None Detected
S-01D	Building Paper	Exterior – East Face	None Detected
S-01E	Building Paper	Exterior – North Face	None Detected
S-02A*	Black Weatherproofing	Exterior – South Face on concrete foundation	1% Chrysotile

*limited material was present to sample; therefore, only one sample was collected.

The following building materials were common in the assessed area: however, these materials do not contain asbestos and were not sampled during the survey:

- Vinyl siding; wood paneling, metal, and concrete.

Asbestos-containing materials were confirmed present in the following table:

Table 5. Summary of Confirmed Asbestos-Containing Materials

Material	Location(s)	Total Quantity	Condition	Asbestos Type (%)
Black Weatherproofing	Exterior – around building on concrete foundation	~40 meters	Good (7)	1% Chrysotile
Black Window Sealant*	Exterior at front door	2 windows	Good (7)	5% Chrysotile
White Caulking*	Exterior around windows	12 windows	Good (7)	1% Chrysotile
Black Firestop Putty*	Exterior at cable penetration on West face	1 Penetration	Good (7)	8% Chrysotile

*Arcadis February 3, 2020 HBMA Report.

Presumed Materials

No presumed materials that may contain asbestos are suspected to be present in the way of planned work.

4.2 Lead

During the course of our site investigation, representative bulk samples of predominant paint types were collected by Arcadis staff. The samples were forwarded to EMSL for lead analyses. Results of bulk sample analysis for lead content are provided in the table below. Results that exceed the criteria re highlighted in yellow.

The laboratory report is provided in Appendix B.

Table 6. Results of Analyses of Bulk Samples for Paint for Lead

Sample No.	Sample Location(s)	Sample Description	Lead Content (ppm)
L-01	Exterior – around building on concrete foundation	White paint on wood trim	1900
L-02	Exterior – beneath deck	White paint on metal support column	<80
L-03	Exterior – around perimeter of building	Brown paint on metal gutter	<80
-*	Exterior – around building above concrete foundation	White paint on metal trim	2000

*Arcadis February 3, 2020 HBMA Report

Lead was detected at a level above the definition of lead paint (600 ppm) in sample L-01 and in one sample from the February 2020 assessment. Where one colour of paint is indicated in the sample descriptions in the table above, only one layer of paint was observed. Where multiple colours are indicated in the sample description, multiple layers of paint were observed.

All paint applications were noted to be generally in good condition.

4.3 Polychlorinated Biphenyls (PCBs)

PCBs were not observed in the assessed area.

4.4 Suspect Visible Mould

Suspect visible mould was not observed in the assessed area.

4.5 Mercury

Mercury was not visually observed in the assessed area.

4.6 Ozone Depleting Substances

ODS was not observed in the assessed area.

4.7 Silica

Crystalline silica is a presumed component of the following materials where present in the building:

- poured concrete

5 RECOMMENDATIONS

If future building renovation or demolition is required beyond the scope of this project, a detailed intrusive assessment must be conducted. The assessment should include destructive testing (i.e. coring and/or removal of building finishes and components), and sampling of materials not previously tested (i.e. roofing materials, mastics etc.).

All hazardous building materials were reported in good condition. All ACM observed were considered to fall under a recommended Action Level 7 (routine surveillance).

5.1 Building Renovation Work

The following specific recommendations are made regarding renovation involving the hazardous materials identified.

1. Prepare plans and update performance specifications for hazardous material removal required for the planned work. The specifications should include the scope of work, personal protective equipment, respiratory protection, and disposal of waste materials.
2. Provide this report and the detailed plans and specifications to the contractor prior to bidding or commencing work.
3. Retain a qualified consultant to specify, inspect and verify the successful removal of hazardous materials.
4. Update the asbestos inventory upon completion of the abatement and removal of asbestos-containing materials.

The following general recommendations are made regarding renovation involving the hazardous materials identified.

Asbestos

Remove all asbestos-containing materials (ACM) prior to renovation, alteration, maintenance, or demolition work or if ACM may be disturbed by the work.

If the identified ACM will not be removed prior to commencement of the work, disturbance of ACM must follow the appropriate asbestos precautions for the classification of work being performed.

Asbestos-containing materials must be disposed of at a landfill approved to accept asbestos waste.

Lead

Construction disturbance of lead in paint and coatings (or other materials) may result in over-exposure to lead dust or fumes. The need for work procedures, engineering controls and personal protective equipment will need to be assessed on a project-by-project basis and must comply with provincial standards or guidelines. Performing an exposure assessment during work that disturbs lead in paints and coatings may be able to alleviate the use of some of the precautions specified by these standards or guidelines.

For building materials that are to be disposed at a landfill, all lead-based paints and associated substrate (concrete, plaster, wood, etc.) must undergo Toxicity Characteristic Leachate Properties (TCLP) testing to determine disposal procedures. A sample has been submitted and results will be presented under separate cover. Upon the completion of the test, the total concentration of metals in the waste extract will be

compared to Schedule 4, Table 1 of the Hazardous Waste Regulation. The disposal of lead-containing paint is regulated under the Federal *Transportation of Dangerous Goods Act* and by the British Columbia Ministry of Environment

Well adhered paints containing elevated levels of lead on metal substrates do not require leachable lead analysis as the materials can be recycled with the paint intact.

Suspect Visible Mould

No mould was observed; if mould is uncovered inside wall cavities during hand demolition, use appropriate precautions and protect workers using methods that comply with provincial guidelines.

Silica

Construction disturbance of silica-containing products may result in excessive exposures to airborne silica, especially if performed indoors and dry. Cutting, grinding, drilling or demolition of materials containing silica should be completed only with proper respiratory protection and other worker safety precautions that comply with provincial standards or guidelines.

6 REFERENCES

The following legislation and documents were referenced in completing the assessment and this report:

1. Occupational Health and Safety Regulation, B.C. Reg. 296/97, WorkSafe BC.
2. Safe Work Practices for Handling Asbestos, WorkSafe BC, 2017 Edition.
3. Hazardous Waste Regulation, B.C. Reg. 63/88, November 2017, BC Environmental Management Act.
4. Ozone Depleting Substances and Other Halocarbons Regulation, B.C. Reg. 317/2012 Environmental Management Act.
5. PCB Regulations, SOR/2008-273, Canadian Environmental Protection Act.
6. Lead-Containing Paint and Coatings, Preventing Exposure in the Construction Industry, WorkSafe BC, June 2017.
7. Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing, United States Housing and Urban Development (HUD) 2012.
8. Mould Guidelines for the Canadian Construction Industry, Standard Construction Document 2018, Canadian Construction Association.
9. Minister of Justice Canada Labour Code. R.S.C., 1985, c. L-2. March 2020.
10. Minister of Justice. 2018. Canada Occupational Health and Safety Regulations. SOR/86-304, June 2019.
11. Public Services and Procurement Canada Asbestos Management Standard. June 2019.
12. Transport Canada Consolidated Transport of Dangerous Goods Regulations including Amendment SOR/2019-101.

13. ASTM E2356 Standard Practice for Comprehensive Buildings Asbestos Surveys.

7 LIMITATIONS

This report, prepared for Public Services and Procurement Canada on behalf of Government of Canada, does not provide certification or warranty, expressed or implied, that the investigation conducted by Arcadis identified all hazardous materials associated with the subject building. The work undertaken by Arcadis was directed to provide information on the presence of hazardous materials in construction materials based on visual inspection of readily accessible areas of the subject building, and on the results of laboratory analysis of a limited number of bulk samples. The material in this report reflects Arcadis' best judgment in light of the information available at the time of the investigation, which was performed on July 9, 2020. This report is not intended to be used as a scope of work or technical specification for remediation of hazardous materials. Any use which any other party makes of the report, or reliance on, or decisions to be based on it, is the responsibility of such parties.

APPENDIX A

Site Photographs

Project Photographs

Public Services and Procurement Canada
Building E0154, House 07, British Columbia

Photo: 1

Date:
July 9, 2020

Description:
View of Employee Housing, Front

Photo: 2

Date:
July 9, 2020

Description:
View of Employee Housing, Rear

Project Photographs

Public Services and Procurement Canada
Building E0154, House 07, British Columbia

Photo: 3

Date:
July 9, 2020

Description:
View of Employee Housing. West Face

Photo: 4

Date:
July 9, 2020

Description:
Unpainted wood deck and stairs. Non lead painted steel support columns.

Project Photographs

Public Services and Procurement Canada
Building E0154, House 07, British Columbia

Photo: 5

Date:
July 9, 2020

Description:
Lead containing white paint on metal trim and wood trim.

Photo: 6

Date:
July 9, 2020

Description:
Lead containing paint on wood trim, on Styrofoam, on Black asbestos-containing weatherproofing.

APPENDIX B

Laboratory Certificates of Analysis

EMSL Canada Inc.
2333 18th Avenue NE, Unit 48, Calgary, AB T2E 8T6
Phone/Fax: (403) 879-1149 / (403) 879-1152
http://www.EMSL.com CalgaryLab@EMSL.com

EMSL Canada Or	652005046
CustomerID:	55ACAV42
CustomerPO:	30053059
ProjectID:	

Attn: **Jerry Botti**
ARCADIS Canada Inc.
308-1080 Mainland Street
Vancouver, BC V6B 2T4

Phone: (604) 632-9941
Fax:
Received: 7/20/2020 08:30 AM
Collected: 7/9/2020

Project: **30053059 / E0154 / House 07**

Test Report: Lead in Paint Chips by Flame AAS (SW 846 3050B/7000B)*

Client Sample Description	*Lab ID*	*Collected*	*Analyzed*	*Weight*	*Lead Concentration*
L-01	*652005046-0001*	7/9/2020	7/21/2020	0.2520 g	1900 ppm
	Site: EXTERIOR - WHITE PAINT ON WOOD TRIM				
L-02	*652005046-0002*	7/9/2020	7/21/2020	0.2518 g	<80 ppm
	Site: EXTERIOR - WHITE PAINT ON METAL COLUMN				
L-03	*652005046-0003*	7/9/2020	7/21/2020	0.2508 g	<80 ppm
	Site: EXTERIOR - BROWN PAINT ON METAL GUTTER				

Client request: Remove address from project name.

Jefferson Salvador, Laboratory Manager
or other approved signatory

Report Amended: 10/22/2020 10:11:03 Replaces the Inital Report 07/24/2020 15:53:34. Reason Code: Client-Other (see report comment)

EMSL Canada Inc.

4506 Dawson Street Burnaby, BC V5C 4C1
Phone/Fax: (604) 757-3158 / (604) 757-4731
http://www.EMSL.com / vancouverlab@EMSL.com

EMSL Canada Order 692001638
Customer ID: 55ACAV42
Customer PO: 30053059
Project ID:

Attn: Jerry Botti
ARCADIS Canada Inc.
308-1080 Mainland Street
Vancouver, BC V6B 2T4

Phone: (604) 632-9941
Fax:
Collected: 7/ 9/2020
Received: 7/16/2020
Analyzed: 7/21/2020

Proj: 30053059 / E0154 / House 07

Test Report: Asbestos Analysis in Bulk Material for Occupational Health and Safety British Columbia Regulation 188/2011 via EPA 600/R-93/116 Method

Client Sample ID: S-01A ***Lab Sample ID:*** **692001638-0001**
Sample Description: EXTERIOR - WEST/BUILDING PAPER

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	7/21/2020	Black	60.0%	40.0%	None Detected	

Client Sample ID: S-01B ***Lab Sample ID:*** **692001638-0002**
Sample Description: EXTERIOR - SOUTH/BUILDING PAPER

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	7/21/2020	Black	60.0%	40.0%	None Detected	

Client Sample ID: S-01C ***Lab Sample ID:*** **692001638-0003**
Sample Description: EXTERIOR - SOUTH/BUILDING PAPER

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	7/21/2020	Black	60.0%	40.0%	None Detected	

Client Sample ID: S-01D ***Lab Sample ID:*** **692001638-0004**
Sample Description: EXTERIOR - EAST/BUILDING PAPER

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	7/21/2020	Black	60.0%	40.0%	None Detected	

Client Sample ID: S-01E ***Lab Sample ID:*** **692001638-0005**
Sample Description: EXTERIOR - NORTH/BUILDING PAPER

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	7/21/2020	Brown	85.0%	15.0%	None Detected	

Client Sample ID: S-02A ***Lab Sample ID:*** **692001638-0006**
Sample Description: EXTERIOR - SOUTH/WEATHERPROOFING

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	7/21/2020	Black	0.0%	99.0%	**1% Chrysotile**	

EMSL Canada Inc.

4506 Dawson Street Burnaby, BC V5C 4C1
Phone/Fax: (604) 757-3158 / (604) 757-4731
http://www.EMSL.com / vancouverlab@EMSL.com

EMSL Canada Order 692001638
Customer ID: 55ACAV42
Customer PO: 30053059
Project ID:

Test Report: Asbestos Analysis in Bulk Material for Occupational Health and Safety British Columbia Regulation 188/2011 via EPA 600/R-93/116 Method

Analyst(s):

Chloe Huang	PLM (5)
Margaret Lee	PLM (1)

Reviewed and approved by:

Nicole Yeo, Laboratory Manager
or Other Approved Signatory

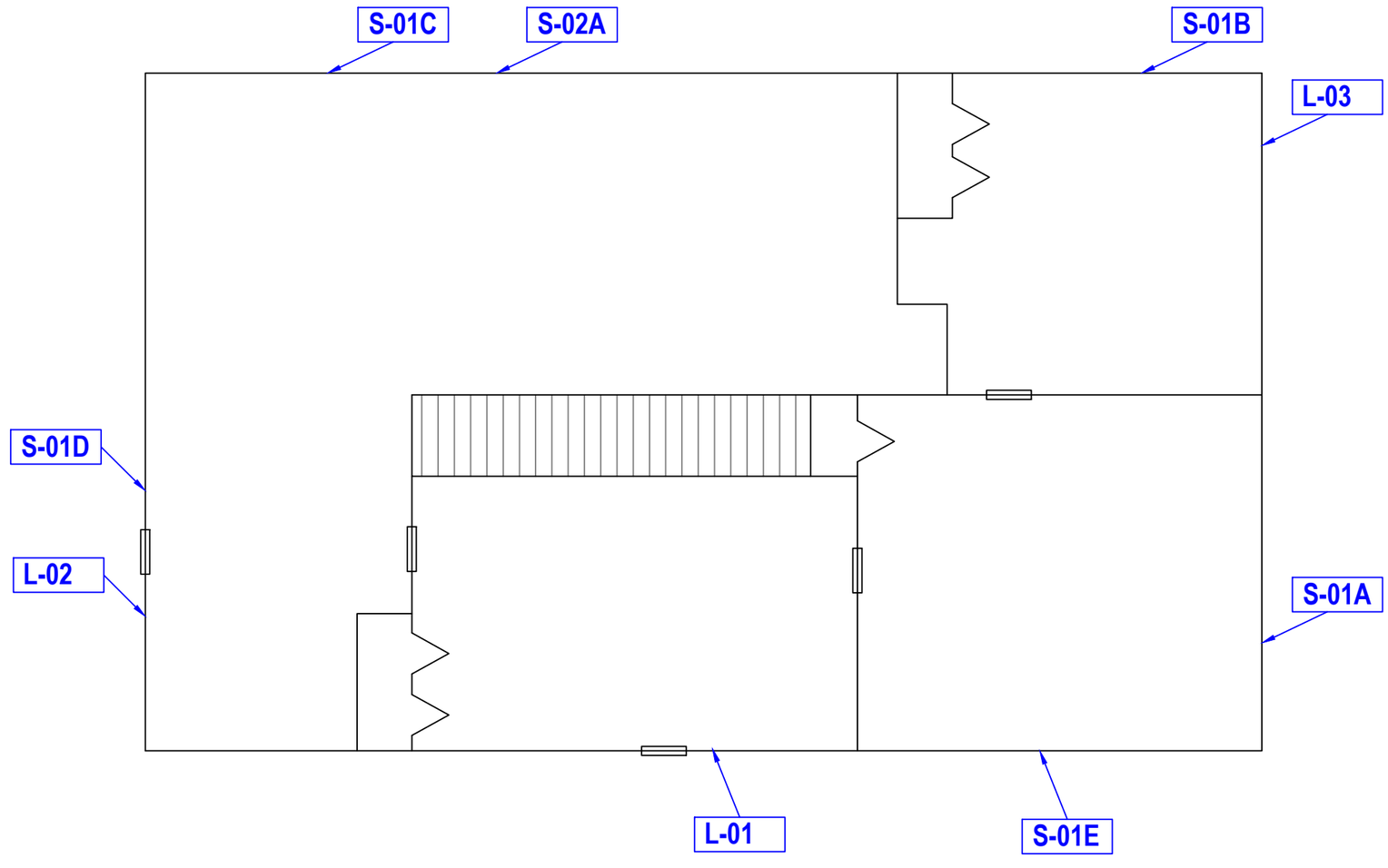
None Detected = <0.1%. EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations.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

Samples analyzed by EMSL Canada Inc. Burnaby, BC

Report amended: 10/21/202016:56:11 Replaces initial report from: 07/23/202011:46:13 Reason Code: Client-Change to Project

APPENDIX C

Floor Plans



LEGEND

S-XXX Bulk Asbestos Sample

L-XXX Bulk Lead Paint Sample

N.T.S

Title: **GOVERNMENT OF CANADA**
HAZARDOUS BUILDING MATERIAL ASSESSMENT - 2020

Project: BUILDING E0154 - HOUSE 07
FIRST FLOOR

Client: PUBLIC SERVICES AND PROCUREMENT CANADA

Project Number:	Drawn By:	Plot Size:	Date:
30053059	CB	11X17"	JULY 2020

ARCADIS

FIGURE 1

firstfloor G:\PROJECTS\30053059 - PSPC_RCMP Construction 2020\CAD\30053059-Maxhamish.dwg

APPENDIX D

Regulations and Health Effects

Asbestos

Occupational Health and Safety (OHS) for federal employees is regulated by the Canada Labour Code (CLC) Part II. The *Canada Occupational Health and Safety Regulations (COHSR), Part X, Hazardous Substances* covers specific requirements related to the management and control of asbestos-containing materials (ACM). The COHSR, Part X, Hazardous Substances, states an employee shall be kept free from exposure to a concentration of airborne chrysotile asbestos in excess of 0.1 fibre/cm^3 or f/cc. There are also specific requirements for hazard prevention detailed in the Hazard Prevention Program (HPP) in the CLC.

For the purposes of this report, the following federal requirements will be followed, unless provincial requirements are more stringent. Federal legislation and policy referenced in this report includes:

- Canada Labour Code, March 2020;
- Canada Occupational Health and Safety Regulations Part X, Hazardous Substances; SOR/86-304, June 2019;
- Public Services and Procurement Canada Asbestos Management Standard, June 2019;
- Asbestos Management Plan, Government of Canada, Version 2020-01, January 2020; and,
- Transport Canada, Transport of Dangerous Goods Regulations

The management and requirements for the potential disturbance of asbestos in buildings is also regulated at the provincial level under the *British Columbia Occupational Health and Safety Regulations,296/97, and Safe Work Practices for Handling Asbestos, WorkSafeBC, 2017 Edition*.

The BC Occupational Health and Safety Regulations, 296/97 (BC Reg 296/97), require specific actions when asbestos is a potential health hazard in a workplace. Section 6.1 of the regulation defines an asbestos-containing material as follows:

"asbestos-containing material" means the following:

(a) a manufactured article or other material, other than vermiculite insulation, that would be determined to contain at least 0.5% asbestos if tested in accordance with one of the following methods:

(i) Asbestos, Chrysotile by XRD, Method 9000 (Issue 2, dated August 15, 1994) in the NIOSH Manual of Analytical Methods, published by the United States National Institute for Occupational Safety and Health, Centre for Disease Control;

(ii) Asbestos (bulk) by PLM, Method 9002 (Issue 2, dated August 15, 1994) in the NIOSH Manual of Analytical Methods, published by the United States National Institute for Occupational Safety and Health, Centre for Disease Control;

(iii) Test Method for the Determination of Asbestos in Bulk Building Materials (EPA/600/R-93/116, dated July 1993) published by the United States Environmental Protection Agency;

(b) vermiculite insulation that would be determined to contain any asbestos if tested in accordance with the Research Method for Sampling and Analysis of Fibrous Amphibole in Vermiculite Attic Insulation (EPA/600/R-04/004, dated January 2004) published by the United States Environmental Protection Agency;

The duties of employers, contractors, or owners include:

- identifying and labeling ACM that can potentially release asbestos fibres;
- keeping a current written record of all ACM present in the workplace;
- conducting regular surveillance and maintenance of asbestos materials to prevent fibre release;
- developing a written exposure control plan if workers may be exposed to harmful levels of asbestos;
- conducting work in a way that prevents the release of asbestos fibres as much as possible;
- notifying, informing, and training workers; and,
- notifying Occupational Health and Safety (OHS) at least 48 hours before beginning an asbestos-abatement.

Disturbance of asbestos during construction and demolition is regulated under section 20.112 of BC Reg 296/97.

The 2017 WorkSafeBC publication Safe Work Practices for Handling Asbestos (Asbestos Guide) is used by Occupational Health and Safety officers as a guide when reviewing abatement work practices and employer codes of practice, and generally meets the requirements of the COHSR.

The Asbestos Guide also provides significant additional background information pertaining to asbestos, along with details on health effects and other applicable legislation within the province of British Columbia (e.g., the federal Hazardous Products Act, the BC Building Code and waste disposal regulations).

Disposal of asbestos waste is governed by the British Columbia Hazardous Waste Regulation (BC Reg. 63/88). The Federal Transportation of Dangerous Goods Regulation and BC Reg. 63/88 set out the requirements for the proper transport of asbestos waste in British Columbia. In general, and for transportation and disposal, the waste must be placed in a double sealed container, properly labeled, free of cuts, tears or punctures and disposed of at a licensed waste station which has been properly notified of the presence of asbestos waste.

Health effects

Undisturbed asbestos within building materials poses no health risks. Asbestos poses a risk when building materials containing asbestos are impacted, or disturbed, thereby releasing the asbestos fibres into the air

Asbestos-related diseases are caused when suspended airborne asbestos fibres are inhaled and the fibres settle into various regions of the lungs and remain for extended periods. Once embedded in the lungs the asbestos fibres cause scarring within the lung tissue, ultimately leading to impaired lung function (asbestosis) and/or various cancers (lung cancer; mesothelioma). These asbestos-related diseases are irreversible and fatal. The risk of lung-related cancers is increased in individuals who smoke.

These asbestos-related diseases most often occur in individuals who have been exposed to high concentrations of airborne asbestos over a long period of time, though mesothelioma has been found in individuals with short-term exposures. Symptoms or the development of these asbestos-related diseases usually occur 10 to 25 years after exposure

Lead

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 (2005) to 90 ppm (2010).

With respect to potential lead exposures associated with disturbance to surfaces coated with lead-containing products, the 2017 WorkSafeBC manual titled Lead-Containing Paint and Coatings: Preventing Exposure in the Construction Industry, indicates the following:

- Improper removal of lead paint containing 600 mg/kg lead results in airborne lead concentrations that exceed half of the exposure limit
    - This potential for exposure exceeding half of the occupational exposure limit would be the trigger for implementation of an exposure control plan.
- Lead concentrations as low as 90 mg/kg may present a risk to pregnant women and children
    - Any risk assessment should include for the presence of high risk individuals within the workplace

The disposal of lead-containing paint is regulated under the Federal *Transportation of Dangerous Goods Act* and by the British Columbia Ministry of Environment. All lead-based paints and associated nonmetal substrate (concrete, plaster, wood, etc.) must undergo Toxicity Characteristic Leachate Properties (TCLP) metals testing to determine disposal procedures. Upon the completion of the test, the total concentration of metals in the waste extract must be compared to Schedule 4, Table 1 of the Hazardous Waste Regulation.

The Federal Transportation of Dangerous Goods Regulation and BC Reg. 63/88 set out the requirements for the proper transport of lead waste in British Columbia.

Health Effects

Elemental lead and inorganic lead compounds are absorbed through ingestion or inhalation and can incorporate into the bone marrow, nerve tissue, brain, and kidneys. In children, symptoms of lead poisoning can include headaches, irritability, abdominal pain, vomiting, anemia, weight loss, poor attention span, noticeable learning difficulty, slowed speech development, and hyperactivity. In adults, symptoms of lead poisoning can include pain, numbness or tingling of the extremities, muscular weakness, headache, abdominal pain, memory loss, unsteady gait, pale skin, weight loss, vomiting, irritability, and anemia. Although adults are susceptible to the toxic effects of lead, children are at high risk due to the nature of a child's activities that involve the introduction of non-food items into their bodies.

Excessive airborne lead and surface contamination can be transferred to employees' hands and may results in lead ingestion. Therefore, work practices intended to minimize surface lead concentrations, such as frequent cleaning of work surfaces should be included in an overall lead exposure control plan

PCB

As of September 5, 2008, under subsection 93(1) of the *Canadian Environmental Protection Act,* (CEPA), Federal PCB regulations were published by the Canada Gazette Part II (SOR/2008-273) that imposed specific deadlines for the elimination of all PCBs in concentrations at or above 50 milligrams/kilogram (mg/kg). This regulation required the elimination of all PCBs and PCB-containing materials currently in-use and in storage and limited the period of time PCB materials could 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.

In British Columbia, PCB equipment becomes PCB wastes as soon as it is removed from service. This is the case even if the intent is to treat, recycle, or reuse the equipment.

When PCB wastes are stored in British Columbia, the full requirements of BC Reg. 63/88 apply to:

- 1.0 kg or more of pure PCB
- 100 L or more of any liquid containing more than 50 ppm of PCB
- 100 kg or more of any material other than a liquid, contaminated with more than 50 ppm of PCB

These amounts are the total of all amounts at a single location owned or controlled by the same person. They include PCB equipment. BC Reg. 63/88 also provides packaging requirements for storage, labeling requirements, waste destruction requirements, and references SOR/2008-273, indicating:

The Federal Transportation of Dangerous Goods Regulation sets out the requirements for the proper transport of PCB waste across provincial boundaries.

In British Columbia, a manifest issued by the Ministry of Environment (or equivalent federal document) must be used for hazardous wastes shipped from sites in British Columbia. A manifest must be used to transport:

- 5 kg or more of PCB solids
- 5 L or more of PCB liquids
- An amount of a PCB solid or PCB liquid containing more than 500 g of PCB within BC
- 500 g or more of solids, liquids, or mixtures of these containing 50 mg/kg of PCB outside of BC

Health effects

PCBs are insoluble in water; however, they readily dissolve in fats and other organic compounds. It is these attributes and fat-solubility that allow PCBs to persist in the environment and bio-accumulate in humans and animals. Exposure to PCBs can affect the immune system, reproductive system, nervous system, and endocrine system. In humans, PCBs are potentially cancer-causing.

Mould

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, occupational health and safety regulations typically require employers to take every precaution reasonable in the circumstances for the protection of workers.

The WorkSafeBC Guideline for Part 4 of BC Reg. 296/97 discusses the application of the Regulation to workplaces with mould showing on exposed or hidden surfaces, or where mould may be a factor in complaints regarding indoor air quality. The guideline provides information for investigating indoor air quality complaints with respect to mould contamination, including information on sampling for the

presence of moulds in buildings. Information is also provided on possible health effects and for cleanup personnel involved in the remediation of buildings damaged by water and mould.

Health Effects

There are a number of documented cases of health problems related to exposure to indoor fungi.

Both high-level, short-term exposures and lower-level, long-term exposures can result in illness. The most common symptoms from exposure to mould in indoor environments are runny nose, eye irritation, cough, congestion, aggravation of asthma, headache, flu-like symptoms, fatigue, and skin rash. People with suppressed immune systems may be susceptible to fungal infections as a result of exposure to indoor moulds.

People who are exposed to mould growth on building materials will not necessarily exhibit adverse health effects. However, the mould must still be removed. Humans are at risk from indoor mould when fungal spores, fragments or metabolites are released into the air and inhaled or physically contacted (dermal exposure).

Not everyone experiences allergic reaction; the susceptibility to exposure varies with the individual's genetic predisposition, age, state of health, and concurrent exposures. For these reasons, and because the measurement of exposure is not standardized and biological markers of exposure to fungi are largely unknown, it is not possible to establish "safe" or "unsafe" levels of exposure. However, federal, and provincial policies have been written to minimize mould exposure and the elimination of mould indoors.

Mercury

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 disposal should be through a scrap dealer (elemental mercury), recycling firm for mercury vapour and returned to the manufacturer for light tubes and fixtures. Disposal of mercury waste is governed by BC Reg. 63/88.

The Federal Transportation of Dangerous Goods Regulation and BC Reg. 63/88 set out the requirements for the proper transport of mercury waste in British Columbia.

Health Effects

Routes of exposure for mercury and mercury compounds include inhalation, ingestion, skin and/or eye contact. 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.

Elemental (metallic) mercury most often causes health effects through inhalation of its vapour, which can be absorbed through the lungs. This kind of exposure can result when elemental mercury is spilled (or products that contain elemental mercury break) and the mercury is exposed to the air. Vapour concentrations can vary especially in warm or poorly-ventilated indoor spaces where the airborne concentration can exceed the permissible exposure limit (provincially set).

Chronic mercury "poisoning" can be caused by long-term exposure to low airborne concentrations (or low levels) of mercury. Symptoms or effects of mercury exposure include: tremors, emotional changes,

neuromuscular effects, mental changes/disturbances, digestive disturbances, headaches, insomnia, and changes in nervous response.

Silica

Regulations pertaining to silica are provided in BC Reg. 296/97. Included are general provisions (minimizing release; keeping worksite clear of unnecessary accumulations; ensuring methods for decontamination prevent generation of airborne silica), provisions for "restricted areas" (where there is a reasonable chance that the airborne concentration of silica exceeds or may exceed the occupational exposure limit), provisions for use in abrasive blasting, and provisions for health assessments for workers exposed to silica.

Health Effects

Crystalline silica dust particles, which are small enough to be inhaled into the lungs (respirable size), can cause a number of health problems. As with asbestos, silica within building materials poses no threat to human health if left undisturbed.

Exposure to crystalline silica airborne dust my cause scaring of the lungs with coughing and shortness of breath—also known as "silicosis", a form of disabling, progressive, and sometimes fatal pulmonary fibrosis.

Ozone Depleting Substances (ODS)

ODSs are regulated in British Columbia by the British Columbia *Waste Management Act*—Ozone Depleting Substances and Other Halocarbons Regulation (BC Reg. 387/99 as amended by BC Reg. 317/2012).

On federal land, aboriginal land and federal works, buildings and undertakings, the Federal Halocarbon Regulation 2003 (SOR/2003-289, including associated amendments) 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.

If ODS-containing materials are to be removed and disposed of, all ODSs must be handled, recycled, stored, and/or disposed of in accordance with the requirements of BC Reg. 63/88.

The Federal Transportation of Dangerous Goods Regulation and BC Reg. 63/88 set out the requirements for the proper transport of ODS waste in British Columbia.

Health Effects

Health effects are not typically related to exposure to ODSs directly, but to the consequences of ODS release to the atmosphere, subsequent degradation of the earth's ozone layer, and implications associated with increased UVB light exposure.

APPENDIX E

Classification, Condition and Accessibility

1.1 Spray Applied Fireproofing, Insulation and Texture Finishes

To evaluate the condition of ACM spray applied as fireproofing, thermal insulation, or texture, decorative or acoustic finishes, the following criteria are applied:

GOOD

Surface of material shows no significant signs of damage, deterioration, or delamination. Up to 1 percent visible damage to surface is allowed within range of **GOOD**. Evaluation of sprayed fireproofing requires the surveyor to be familiar with the irregular surface texture typical of sprayed asbestos products. **GOOD** condition includes un-encapsulated 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 1 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 survey or re-assessment form.

NOTE: **FAIR** condition is not utilized in the evaluation of the 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 are advised to be watchful for ACM **DEBRIS** prior to accessing or working above ceilings in areas of buildings with ACM regardless of the reported condition.

1.2 Mechanical Insulation

The evaluation of the condition of mechanical insulation (on boilers, breaching, ductwork, piping, tanks, equipment etc.) utilizes the following criteria:

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 penetrating 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. It is not possible to observe the full length of mechanical insulation from all angles.

1.3 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 should be treated as a friable product.

2. Evaluation of Accessibility

The accessibility of building materials known or suspected of being ACM is rated according to the following criteria:

ACCESS (A)

Areas of the building within reach (from floor level) of all building users. Includes areas such as gymnasiums, workshops, and storage areas where activities of the building users may result in disturbance of ACM not normally within reach from floor level.

ACCESS (B)

Frequently entered maintenance areas within reach of maintenance staff, without the need for a ladder. Includes: frequently entered pipe chases, tunnels and service areas or areas within reach from a fixed ladder or catwalk, e.g. tops of equipment, mezzanines.

ACCESS (C) EXPOSED

Areas of the building above 2.4 metres where use of a ladder is required to reach the ACM. Only refers to ACM that is exposed to view, from the floor or ladder, without the removal or opening of other building components such as ceiling tiles, or service access door or hatch. Does not include infrequently accessed service areas of the building.

ACCESS (C) CONCEALED

Areas of the building which require the removal of a building component, including lay-in ceilings and access panels into solid ceiling systems. Includes rarely entered crawl spaces, attic spaces, etc. Observations will be limited to the extent visible from the access points.

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 ACM. Evaluation of condition and extent of ACM is limited or impossible, depending on the surveyor's ability to visually examine materials in ACCESS D.

3. ACM DEBRIS

3.1 DEBRIS from Friable ACM

The presence of fallen ACM is noted separately from the presumed friable ACM source (sprayed fireproofing, thermal insulation, texture, decorative or acoustic finishes or mechanical insulation) and is referred to as **DEBRIS**.

3.2 DEBRIS from Damaged Non-Friable ACM

The presence of fallen ACM from damaged non-friable ACM is also reported separately from the non-friable ACM source. Only fallen non-friable ACM that has become friable is reported as **DEBRIS**.

The identification of the exact location or presence of **DEBRIS** on the top of ceiling tiles is limited by the number of observations made and the presence of building components such as ducts or full height walls

that obstruct observations. Workers are advised to be watchful for the presence of **DEBRIS** prior to accessing or working in proximity to mechanical insulation or above ceilings in areas of buildings with ACM regardless of the reported presence or absence of **DEBRIS**.

4. Action Matrix and Action Descriptions

The Asbestos Management Plan requires the following responses:

- Immediately clean-up **DEBRIS** that is likely to be disturbed.
- Remove, repair, or enclose friable ACM in **POOR** or **FAIR** condition whose continued deterioration will result in **DEBRIS** that is likely to be disturbed.

The following factors shall be considered in making site-specific recommendations for compliance with the existing applicable regulations or codes and the practical implementation of the Asbestos Management Plan:

1. ACM in **POOR** condition is not routinely repairable. If an abatement action is necessary, removal is the recommended action (enclosure is a viable option in unusual circumstances, e.g. where removal is difficult or costly and the asbestos-containing material can be thoroughly enclosed).

2. Mechanical insulation in **FAIR** condition will be repaired or removed based on the following general recommendations, applied on a case-by-case basis:
   - ACM insulation found in **FAIR** condition in ACCESS (B) or ACCESS (C) EXPOSED areas is to be repaired.
   - ACM mechanical insulation found in **FAIR** condition in ACCESS (B) and ACCESS (C) EXPOSED areas, where future damage to the ACM is likely to occur, is to be removed.

3. ACM in **GOOD** condition present in ACCESS (A) can be managed by surveillance, as long as it is not disturbed by future renovation, maintenance, or demolition. Proactive removal of the ACM in ACCESS (A) will be considered where damage is possible by on-going occupant activity (accidental or intentional).

4. Non-friable or manufactured products are considered in the action matrix as follows:
   - Non-friable and manufactured products reported in **POOR** condition, or friable **DEBRIS** resulting from the deterioration of non-friable ACM, are treated as friable materials and the appropriate action, and depending on accessibility is determined from the action matrix for friable ACM.
   - For non-friable or manufactured products reported in **GOOD** condition, Action 7 (surveillance) is recommended regardless of accessibility.

5. All asbestos-containing material from a particular area is to be removed where small quantities of asbestos are present, and removal will negate the need for the use of an Asbestos Management Program in that area.

The action matrix provided below establishes the recommended asbestos control action. The ACTIONS themselves are described in full following the table.

4.1 Action Matrix Tables

FRIABLE ACM				
ACCESS	**CONDITION**			**DEBRIS**
	GOOD	**FAIR**	**POOR**	
(A)	ACTION 5/7[1]	ACTION 5/6[2]	ACTION 3	ACTION 1
(B)	ACTION 7	ACTION 6/5[3]	ACTION 3	ACTION 1
(C) EXPOSED	ACTION 7	ACTION 6	ACTION 4	ACTION 2
(C) CONCEALED	ACTION 7	ACTION 7	ACTION 4	ACTION 2
(D)	ACTION 7	ACTION 7	ACTION 7	ACTION 7

[1] If material in **ACCESS (A)/GOOD** condition is not removed **ACTION 7** is required.

[2] If material in **ACCESS(A)/FAIR** condition is not removed **ACTION 6** is required.

[3] Remove ACM in **ACCESS (B)/FAIR** condition if ACM is likely to be disturbed.

4.2 Action Descriptions

ACTION 1 - Immediate Clean-Up of DEBRIS that is Likely to Be Disturbed

Access that is likely to cause a disturbance of the ACM **DEBRIS** is to be restricted and **clean up ACM DEBRIS is to be done immediately**. Use correct asbestos procedures. This action is required for compliance with regulatory requirements and good practice. The assessor should immediately notify the Asset or Property and Facility Manager, or Regional/Area Asbestos Management Coordinator of this condition.

ACTION 2 - Intermediate risk precautions for Entry into Areas with ACM DEBRIS

At locations where ACM **DEBRIS** can be isolated in lieu of removal or cleaned up, use appropriate means to limit entry to the area. Restrict access to the area to persons using intermediate risk asbestos precautions. The precautions will be required until the ACM **DEBRIS** has been cleaned up, and the source of the **DEBRIS** has been stabilized or removed.

ACTION 3 - ACM Removal Required for Compliance

Remove ACM for compliance with regulatory requirements and good practice. Utilize asbestos procedures appropriate to the scope of the removal work.

ACTION 4 - Access into areas where asbestos-containing material is present and likely to be disturbed by access requires intermediate risk precautions.

Intermediate risk asbestos precautions are to be used when entry or access into an area is likely to disturb the ACM. **ACTION 4** must be used until the ACM is re-moved (Use **ACTION 1** or **2** if **DEBRIS** is present). Intermediate risk or high-risk precautions should be used for removal (depending on extent of removal).

ACTION 5 - Proactive ACM Removal

Removal of ACM in lieu of repair may be considered, even if it is in **GOOD** condition at locations, where ACM is easily accessible, limited in quantity, and removal would be cost-effective.

ACTION 6 - ACM Repair

Repair ACM found in **FAIR** condition, and not likely to be damaged again or disturbed by normal use of the area or room. Upon completion of the re-pair work treat ACM as material **in GOOD** condition and implement **ACTION 7**. If ACM is likely to be damaged or disturbed during normal use of the area or room, **ACTION 5** is to be implemented.

ACTION 7 - Routine Surveillance

Institute routine surveillance of the ACM. Trained workers or contractors must use appropriate asbestos precautions (low, intermediate, or high) during disturbance of the remaining ACM.

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APPENDIX 1-8

Hazardous Building Materials Assessment
Government of Canada, Building E0179, Employee Housing, House 08, British Columbia

ARCADIS Design & Consultancy for natural and built assets

Public Services and Procurement Canada

HAZARDOUS BUILDING MATERIALS ASSESSMENT

Government of Canada, Building E0179, Employee Housing, House 08, British Columbia

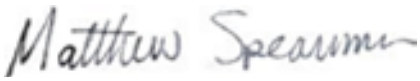
PSPC Project # R.112077.001

October 23, 2020

Arcadis Project No.: 30053059

HAZARDOUS BUILDING MATERIALS ASSESSMENT

Authored by:



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ACRONYMS AND ABBREVIATIONS

ACM	Asbestos-Containing Materials
Arcadis	Arcadis Canada Inc.
CLC	Canada Labour Code
COHSR	Canada Occupational Health and Safety Regulations
HPP	Hazard Prevention Program
LCB	Lead-Containing Paints
NIOSH	National Institute for Occupational Safety and Health
NJC	National Joint Council
OHS	Occupational Health and Safety
PCBs	Polychlorinated Biphenyls
PLM	Polarized Light Microscopy
PSPC	Public Services and Procurement Canada
TEM	Transmission Electron Microscopy
USEPA	United States Environmental Protection Agency

EXECUTIVE SUMMARY

Arcadis Canada Inc. (Arcadis) was retained by Public Services and Procurement Canada (PSPC, Client) to conduct a hazardous building materials assessment of Building E0179, House 08, located in British Columbia.

The project consisted of a pre-construction assessment based on the provided renovation scope. The objective of the pre-construction assessment was to identify hazardous building materials in preparation for building renovation.

The renovation scope was limited to the part of the building scheduled for renovation, which consisted of replacing exterior windows, doors and vinyl siding as well as repairing window sills and interior window wells.

The hazardous building materials considered during this assessment included the following:

- Asbestos-containing materials (ACMs)
- Lead, including lead-containing paints (LCPs)
- Polychlorinated biphenyls (PCBs) in electrical equipment
- Suspect visible mould
- Mercury materials/products/equipment
- Ozone-depleting substances (ODSs) in heating, ventilation, and air conditioning (HVAC) equipment or fixed fire suppression systems
- Silica in building materials

Arcadis performed the assessment on July 9, 2020. The assessment was conducted by Matthew Spearman, Dipl T (Env), Field Technologist of Arcadis.

Summary of Findings

Asbestos: No asbestos-containing materials (ACM) were found to be present in the assessed area.

Lead: No confirmed lead paint or products were present in the assessed area.

Polychlorinated Biphenyls (PCBs): No PCBs were observed in the assessed area.

Suspect Visible Mould: No suspect visible mould was observed in the assessed area.

Mercury: No mercury vapour was visually confirmed in the assessed area.

Ozone Depleting Substances (ODS): ODS were not observed in the assessed area.

Silica: Crystalline silica is a presumed component of the following materials throughout the assessed area: poured concrete

Recommendations

The following is a summary of significant recommendations; refer to the body of the report for detailed recommendations.

1. Follow appropriate safe work procedures when handling or disturbing silica.
2. Provide this report and the detailed plans and specifications to the contractor prior to bidding or commencing work.

Findings of this report are subject to our standard Limitations, as outlined in Section 7.

This Executive Summary is subject to the same standard limitations as contained in the report and must be read in conjunction with the entire report.

1 INTRODUCTION

1.1 Purpose

Arcadis Canada Inc. (Arcadis) was retained by Public Services and Procurement Canada (PSPC, Client) to conduct a hazardous building materials assessment of Building E0179, House 08, located in British Columbia.

The project consisted of a limited pre-construction assessment based on the renovation scope. The objective of the pre-construction assessment was to identify hazardous building materials in preparation for building renovation.

The renovation scope was limited to the part of the building scheduled for renovation, which consisted of replacing exterior windows and vinyl siding as well as repairing window sills and window wells.

Arcadis performed the assessment on July 9, 2020. The assessment was conducted by Matthew Spearman, Dipl T (Env), Field Technologist of Arcadis.

1.2 Scope of Work

The scope of work for the project, as referenced in the Arcadis Workplan dated June 4, 2020 , identifies the requirement to conduct a hazardous building material assessment within building E0179. Specifically, the scope of work included:

- Review of previous reports, construction specifications and drawings and identify any gaps related to hazardous building materials.
- Development of sampling strategy to address the identified gaps.
- Collect and submit representative suspect asbestos material and lead paint chip samples for analysis.
- Submit samples to accredited laboratories for analysis.
- Evaluation and interpretation of field findings and sample analytical results to develop conclusions and recommendations pertaining to hazardous building materials identified

For the purpose of this assessment, hazardous building materials re defined as follows:

- Asbestos-containing materials (ACMs)
- Lead, including lead-containing paints (LCPs)
- Polychlorinated biphenyls (PCBs) in electrical equipment
- Suspect visible mould
- Mercury materials/products/equipment
- Ozone-depleting substances (ODSs) in heating, ventilation, and air conditioning (HVAC) equipment or fixed fire suppression systems
- Silica in building materials

A general description of the building included in this assessment is provided in the table below:

Table 1. Building Description

Building Number (BU)	Building Name	Total Inside Gross m^2	Year Constructed	Building Description
E0179	House 08	239.70	1987	Two-story building with unfinished below grade basement. The building has asphalt shingle roof and poured concrete foundation with texture cement parging. Vinyl siding exterior. Drywall interior walls. Drywall, texture coat and plywood ceilings. Poured concrete, carpet, wood laminate, plywood, and vinyl sheet flooring. Heating is supplied by gas fired forced air furnace and electric baseboard heaters.

2 BACKGROUND INFORMATION

Arcadis was provided and instructed to rely on information presented in the following reports:

- Asbestos-Containing Materials Survey, Building E0179, dated March 24, 2019, prepared by Arcadis Canada Inc. And,
- Hazardous Building Material Assessment, Building E0179, dated February 3, 2020, prepared by Arcadis Canada Inc.

2.1 Exclusions

The assessment was restricted to accessible locations of the building. Roofing or other material that may cause damage to the building envelope were not included unless specifically impacted by the proposed renovations and sampling would not compromise the building envelope integrity.

3 SURVEY METHODOLOGY

Sampling activities were conducted in accordance with Arcadis' Standard Operation Procedures which take into account current federal and provincial regulations pertaining to such work (i.e., sampling procedures, required number of samples and laboratory analytical procedures). Regulations are presented in Appendix D.

Representative bulk samples were collected of accessible suspect, PCB, lead, and asbestos in sufficient quantities for laboratory analysis. Samples were sealed in polyethylene zip-lock bags labeled with the sample number, suspect material description, and sample location. As part of sampling procedures, sampling tools were cleaned between sample collection events to avoid the potential for cross-contamination of samples.

All sample bags were compiled in order and placed into a single container accompanied with a chain of custody form outlining the project information, date, building location, number of samples, and sample description. Samples were submitted to the analytical laboratory in a sealed container via courier.

3.1 Asbestos-Containing Materials

A separate set of samples was collected of each type of homogenous material suspected to contain asbestos. A homogenous material is defined by the US EPA as material that is uniform in texture and appearance, was installed at one time, and is unlikely to consist of more than one type or formulation of material. The homogeneous materials are determined by visual examination, available information on the phases of the construction and prior renovations.

Bulk sampling protocols followed the ASTM E2356 Standard, which indicates requirements for the number of samples to collect for each homogeneous material. The table below provides an outline of the minimum number of samples to be collected from the ASTM E2356 Standard.

Table 2. Bulk Material Sample Quantities

Type of Material	Size of Area of Homogeneous Material	Minimum Number of Samples Collected
Any homogeneous material, including but not limited to fireproofing, drywall joint compound, ceiling tile stucco, acoustical and stipple finishes, and visually similar floor tiles	Less than 90 m^2 (<1,000 ft^2)	3
	90 m^2 or more, but less than 450 m^2 (1,000-5,000 ft^2)	5
	450 m^2 or more (>5,000 ft^2)	7

In some cases, manufactured products such as asbestos cement pipe were visually identified without sample confirmation.

Flooring mastic/adhesive are only sampled and analyzed if present on the underside of flooring samples (vinyl floor tile and vinyl sheet flooring) in sufficient quantity for laboratory analysis.

Attempts to distinguish and delineate asbestos-containing drywall compound from new non-asbestos drywall compound is often unachievable. Arcadis collected drywall joint compound samples from exterior walls, columns or other locations which are unlikely to have been renovated in an attempt to determine the presence of asbestos in the original drywall compound.

Arcadis submitted the bulk samples to a NVLAP accredited laboratory for analysis. The analysis is performed in accordance with Test Method EPA/600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials, July 1993.

EPA Method 600 states that materials characterized by interfering binder/matrix or low asbestos content may require additional gravimetric reduction sample treatment beyond routine polarized light microscopy (PLM) analysis (e.g. dissolution with hydrochloric acid, treatment with organic solvents or ashing in a muffle furnace or low temperature plasma asher to remove unwanted components).

Arcadis submitted one sample of each sample set (3) of vinyl floor tiles be analyzed by transmission electron microscopy (TEM) if the first two samples are reported negative by PLM.

The asbestos analysis was completed using a stop positive approach. Only one result of greater than the regulated criteria is required to determine that a material is asbestos-containing, but all samples must be analyzed to conclusively determine that a material is non-asbestos. The laboratory stopped analyzing samples from a homogeneous material once greater than the criteria was detected in any of the samples of that material. All samples of a homogeneous material were analyzed if no asbestos was detected. Where building materials are described in this report as non-asbestos, or described as containing no asbestos,

this is subject to the limitations of the analytical method used and should be understood to mean no asbestos was detected.

The classification, condition, and accessibility were assessed for the materials which could contain asbestos. To determine these factors, Arcadis followed the methodology outlined in the ASTM E356 Standard. The Standard provides definitions and criteria for the assessment of ACM. The classification, conditions, and accessibility information are provided in Appendix E.

Bulk samples of materials which could contain asbestos were collected and submitted to EMSL Canada Inc. (EMSL) for analysis of asbestos content. Asbestos-containing materials are defined as 0.5% or greater, or any amount if vermiculite.

3.2 Lead

Arcadis collected samples of distinctive paint finishes and surface coatings present in more than a limited application, where removal of the paint is possible. Arcadis collects samples by scraping the painted finish to include base and covering applications. 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. 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 were presumed to be the same, regardless of differing sub surface paints, if any.

The 2017 WorkSafeBC publication *Safe Work Practices for Handling Lead* (Lead Guideline) indicates the following:

> *Unlike for asbestos-containing material, WorkSafeBC does not numerically define what would be considered a lead-containing paint or coating. All suspected paints or coatings should be tested for lead because, depending on the nature of the work, even a small amount could pose a risk to workers. In order to determine which controls and personal protective equipment would be required for a particular job, a qualified person must consider this information as part of the risk assessment.*

- Improper removal of lead paint containing 600 mg/kg lead results in airborne lead concentrations that exceed half of the exposure limit
  - Exposure limit indicated in both the COHSR and BC Reg. 296/97 is 0.05 mg/m^3
  - Potential for exposure exceeding half of the occupational exposure limit would be the trigger for implementation of an exposure control plan.
- Lead concentrations as low as 90 mg/kg may present a risk to pregnant women and children
  - Any risk assessment should include for the presence of high risk individuals within the workplace

When reviewing the above, “high risk” individuals are not expected to be present in the workplace associated with this building during building material alteration activities (i.e., demolition) that would create significant disturbance to paint with such individuals present. As such, paints containing 600 ppm lead or more will be considered “lead-containing” for the purpose of this report, such that appropriate risk assessments can be completed for demolition planning. However, information regarding the lead content of all paints tested is provided herein, for reference and risk assessment should the consideration of high risk individuals be necessary, based on the requirements of a particular situation.

Although a concentration of 600 ppm lead has been used to define paint coatings as LCPs, it should be noted that this is related to painted surfaces and the determination of appropriate provisions to protect occupants and employees from exposure to elevated concentrations of lead during typical operations and maintenance or simple renovation. This does not include painted metal surfaces that are to be welded, burned or torch-cut.

Using an arc welder or oxyacetylene torch on steel that is coated with lead-containing paint can create hazardous lead fumes and is prohibited by section 12.115 of BC Reg. 296/97.

> Regulatory excerpt: **12.115 Coatings on metals**
>
> *A coating on metal which could emit harmful contaminants (such as lead, chromium, organic materials, or toxic combustion products) must be removed from the base metal, whenever practicable, before welding or cutting begins.*

In addition, the following information is provided in the Lead Guideline:

- Welding or torch cutting of paints or coatings on metal can create very high concentrations of airborne lead fumes. Torch cutting structural steel, coated with paint containing as little as 130 mg/kg (equivalent to ppm) lead, can release airborne levels of lead as high as 0.8 mg/m^3 (16 times the exposure limit).

Given this information and that the analytical detection limit for lead paint analysis is approximately 80– 90 ppm (not significantly different than 130 ppm, which, per above, may release airborne lead levels 16 times the exposure limit), any paint coating on a metal surface to be welded, burned or torch-cut must be removed prior to that action being undertaken, unless a project-specific or tasks-specific risk assessment and safe work practices are developed by a qualified person.

Paint and surface coatings are evaluated for condition. The criteria for condition evaluation pertaining to LCPs described herein are generally based on the United States Housing and Urban Development (HUD) 2012 *Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing*.

When evaluating the condition of LCPs, an attempt should be made to determine whether the deterioration is due to a moisture problem or some other existing building deficiency. **"Poor"** surfaces are considered to be a hazard and should be corrected. "**Fair"** surfaces should be repaired but are not yet considered to be a hazard; if not repaired, they should be monitored frequently. "**Good/intact"** surfaces should be monitored to ensure that they remain in a nonhazardous condition.

In addition, the presence of paint debris must be considered in evaluating condition. Given the variety of paint uses, there are many applications that can have a tendency for the paint to "wear" from the surface slowly, over an extended period of time. Conditions where paint has worn from a surface are worth noting for maintenance discussions (i.e., related to re-coating the surface should, for example, the coating provide weather protection), however, in the absence of loose paint chip debris/dust, such conditions would not represent a potential exposure situation related to lead.

The condition evaluation criteria for LCPs are summarized in the table below.

Table 3. Lead-Containing Paint Condition Categories

Type of Building Component[1]	Total Area of Deteriorated Paint on Each Component		
	Good/Intact	Fair[2]	Poor[3]
Exterior components with large surface areas.	Entire surface is intact.	Less than or equal to 10 square feet	More than 10 square feet
Interior components with large surface areas (walls, ceilings, floors, doors.	Entire surface is intact.	Less than or equal to 2 square feet	More than 2 square feet
Interior and exterior components with small surface areas (windowsills, baseboards, soffits, trim).	Entire surface is intact.	Less than or equal to 10% of the total surface area of the component.	More than 10% of the total surface area of the component

NOTES:

1. Building component in this table refers to each individual component or side of building, not the combined surface area of all similar components in a room (e.g., a wall with 1 square foot of deteriorated paint is in "fair" condition, even if the other three walls in a room are intact).
2. Surfaces in "fair" condition should be repaired and/or monitored but are not considered to be "lead-containing paint hazards".
3. Surfaces in "poor" condition are considered to be "lead-containing paint hazards" and should be addressed through abatement or interim controls.

Analysis for lead in paints or surface coatings was performed in accordance with EPA Method No. 3050B/Method No. 7420; flame atomic absorption at laboratory accredited by the American Industrial Hygiene Association (AIHA).

3.3 Polychlorinated Biphenyls (PCBs)

The presence or absence of fluorescent lights was documented during the course of our investigation to determine whether there were any of the T12 type. T12 fluorescent lamps, with a diameter of 1.5 inches, utilize transformer type magnetic ballasts, which may contain PCBs. The use of T12s has been discontinued and replaced with new high-efficiency 1-inch T8 lamps (and other types) which use electronic ballasts which do not contain PCBs.

Wet transformers were assessed for PCBs based on the age of the building, a review of maintenance records and examination of labels or nameplates on equipment, where present and accessible. The information is compared to known ban dates of PCBs and Environment Canada publications.

Dry type transformers are presumed to be free of dielectric fluids and hence non-PCB. Caulking's were not sampled for PCB content unless specifically impacted by the proposed renovation scope. The material is considered a PCB solid if PCB content is 50ppm or greater based on the threshold given in SOR/2008-273.

3.4 Suspect Visible Mould

Arcadis identified the presence of any suspect mould and/or moisture-impacted building materials by visual inspection during the course of our site investigation. Suspect mould is typically a coloured, textured substance or discolouration/staining on a building material surface which, based on our experience, may be mould growth. If any mould growth is concealed within wall, ceiling, or floor cavities, it is not addressed in this assessment. No mould sampling or moisture testing is performed unless directed by the Client. The adjective *suspect* is used where the presence of mould has not been confirmed by laboratory analysis.

3.5 Mercury

Building materials/products/equipment (e.g. thermostats, barometers, pressure gauges, light tubes), suspected to contain mercury were identified by visually inspection only. Dismantling of equipment suspected of containing mercury was not performed. Sampling of these materials for laboratory analysis of mercury content was not performed.

Mercury spills or damaged mercury-containing equipment was recorded where observed.

3.6 Ozone Depleting Substances (ODS)

Arcadis determined the potential presence of ODS (chlorofluorocarbons, hydrochlorofluorocarbons, hydrofluorocarbons, halons, etc.) in air conditioning units, chillers, commercial coolers, and fire suppression systems by visual inspection of manufactures' labels or plates, maintenance records, or logbooks, etc.

3.7 Silica

Arcadis identified building materials suspected of containing crystalline silica (e.g. concrete, cement, tile, brick, masonry, mortar) by knowledge of current and historic applications and visual inspection only. Arcadis did not perform sampling of these materials for laboratory analysis of crystalline silica content.

4 RESULTS

4.1 Asbestos

During the course of our assessment, representative bulk samples of material were collected by Arcadis staff. The samples were forwarded to <EMSL in Burnaby, British Columbia (BC)> for asbestos analyses. EMSL holds a current Certificate of Accreditation for Bulk Asbestos Fibre Analysis under the Voluntary Accreditation Program (NVLAP). Bulk sampling was performed in general accordance with the requirements specified in ASTM E2356 Standard, BC Reg. 296/97 and in the WorkSafe BC publication Safe Work Practices for Handling Asbestos.

Results of bulk sample analysis for asbestos content are provided in the table below. Samples that exceed the criteria are highlighted in yellow.

Site Photographs provided in Appendix A. Laboratory certificates of analysis have been provided in Appendix B. Floor plans indicating sample locations and room numbers are provided in Appendix C.

Table 4. Results of Bulk Sample Analysis for Asbestos

Sample Number	Sample Description	Sample Location	Asbestos Type %
S-01A	Building Paper	Exterior – East Face	None Detected
S-01B	Building Paper	Exterior – North Face	None Detected
S-01C	Building Paper	Exterior – North Face	None Detected
S-01D	Building Paper	Exterior – West Face	None Detected
S-01E	Building Paper	Exterior – West Face	None Detected

No asbestos was identified in the previous reports.

The following building materials were common in the building: however, these materials do not contain asbestos and were not sampled during the survey:

- UPDATE AS NEEDED Vinyl siding, wood, and concrete.

No asbestos-containing materials were confirmed present in the assessed area.

Presumed Materials

No presumed materials that may contain asbestos are suspected to be present in the way of planned work.

4.2 Lead

During the course of our site investigation, representative bulk samples of predominant paint types were collected by Arcadis staff. The samples were forwarded to EMSL for lead analyses. Results of bulk sample analysis for lead content are provided in the table below. Results that exceed the criteria re highlighted in yellow.

The laboratory report is provided in Appendix B.

Table 5. Results of Analyses of Bulk Samples for Paint for Lead

Sample No.	Sample Location(s)	Sample Description	Lead Content (ppm)
L-01	Exterior – around perimeter of building	Brown paint on metal rain gutter	<86
L-02	Exterior - Carport	White paint on metal columns	<80

No lead was detected at a level above the definition of lead paint (600 ppm) in any samples. No lead paint was identified in the previous reports. Where one colour of paint is indicated in the sample descriptions in the table above, only one layer of paint was observed. Where multiple colours are indicated in the sample description, multiple layers of paint were observed.

All paint applications were noted to be generally in good condition.

4.3 Polychlorinated Biphenyls (PCBs)

PCBs were not observed in the assessed area.

4.4 Suspect Visible Mould

Suspect visible mould observed in the assessed area.

4.5 Mercury

Mercury vapor was not observed in the assessed area.

4.6 Ozone Depleting Substances

ODS was not observed in the assessed area.

4.7 Silica

Crystalline silica is a presumed component of the following materials where present in the assessed area:

- poured concrete

5 RECOMMENDATIONS

If future building renovation or demolition is required beyond the scope of this project, a detailed intrusive assessment must be conducted. The assessment should include destructive testing (i.e. coring and/or removal of building finishes and components), and sampling of materials not previously tested (i.e. roofing materials, mastics etc.).

5.1 Building Renovation Work

The following specific recommendations are made regarding renovation involving the hazardous materials identified.

1. Provide this report and the detailed plans and specifications to the contractor prior to bidding or commencing work.

The following general recommendations are made regarding renovation involving the hazardous materials identified.

Suspect Visible Mould
No mould was observed; if mould is uncovered during the work, use appropriate precautions, and protect workers using methods that comply with provincial guidelines.

Silica
Construction disturbance of silica-containing products may result in excessive exposures to airborne silica, especially if performed indoors and dry. Cutting, grinding, drilling or demolition of materials containing silica

should be completed only with proper respiratory protection and other worker safety precautions that comply with provincial standards or guidelines.

6 REFERENCES

The following legislation and documents were referenced in completing the assessment and this report:

1. Occupational Health and Safety Regulation, B.C. Reg. 296/97, WorkSafe BC.
2. Safe Work Practices for Handling Asbestos, WorkSafe BC, 2017 Edition.
3. Hazardous Waste Regulation, B.C. Reg. 63/88, November 2017, BC Environmental Management Act.
4. Ozone Depleting Substances and Other Halocarbons Regulation, B.C. Reg. 317/2012 Environmental Management Act.
5. PCB Regulations, SOR/2008-273, Canadian Environmental Protection Act.
6. Lead-Containing Paint and Coatings, Preventing Exposure in the Construction Industry, WorkSafe BC, June 2017.
7. Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing, United States Housing and Urban Development (HUD) 2012.
8. Mould Guidelines for the Canadian Construction Industry, Standard Construction Document 2018, Canadian Construction Association.
9. Minister of Justice Canada Labour Code. R.S.C., 1985, c. L-2. March 2020.
10. Minister of Justice. 2018. Canada Occupational Health and Safety Regulations. SOR/86-304, June 2019.
11. Public Services and Procurement Canada Asbestos Management Standard. June 2019.
12. Transport Canada Consolidated Transport of Dangerous Goods Regulations including Amendment SOR/2019-101.
13. ASTM E2356 Standard Practice for Comprehensive Buildings Asbestos Surveys.
14. Government of Canada, Asbestos Management Plan, Version 2020-01, January 2020.

7 LIMITATIONS

This report, prepared for Public Services and Procurement Canada on behalf of Government of Canada, does not provide certification or warranty, expressed or implied, that the investigation conducted by Arcadis identified all hazardous materials associated with the subject building. The work undertaken by Arcadis was directed to provide information on the presence of hazardous materials in construction materials based on

visual inspection of readily accessible areas of the subject building, and on the results of laboratory analysis of a limited number of bulk samples. The material in this report reflects Arcadis' best judgment in light of the information available at the time of the investigation, which was performed on July 9, 2020. This report is not intended to be used as a scope of work or technical specification for remediation of hazardous materials. Any use which any other party makes of the report, or reliance on, or decisions to be based on it, is the responsibility of such parties.

APPENDIX A

Site Photographs

Project Photographs

Public Services and Procurement Canada
Building E0179, House 08, British Columbia

Photo: 1

Date:
July 9, 2020

Description:
View of Employee Housing, Front. Southeast.

Photo: 2

Date:
July 9, 2020

Description:
View of Employee Housing, Front. Southwest.

Project Photographs

Public Services and Procurement Canada
Building E0179, House 08, British Columbia

Photo: 3

Date:
July 9, 2020

Description:
View of Employee Housing, West Face.

Photo: 4

Date:
July 9, 2020

Description:
View of Employee Housing, Rear.

Project Photographs

Public Services and Procurement Canada
Building E0179, House 08, British Columbia

Photo: 5

Date:
July 9, 2020

Description:
Unpainted deck and stairs at the rear of the building.

Photo: 6

Date:
July 9, 2020

Description:
Vinyl siding on Styrofoam, on non asbestos building paper, on wood.

APPENDIX B

Laboratory Certificates of Analysis

EMSL Canada Inc.
2333 18th Avenue NE, Unit 48, Calgary, AB T2E 8T6
Phone/Fax: (403) 879-1149 / (403) 879-1152
http://www.EMSL.com CalgaryLab@EMSL.com

EMSL Canada Or	652005049
CustomerID:	55ACAV42
CustomerPO:	30053059
ProjectID:	

Attn: **Jerry Botti**
ARCADIS Canada Inc.
308-1080 Mainland Street
Vancouver, BC V6B 2T4

Phone: (604) 632-9941
Fax:
Received: 7/20/2020 08:30 AM
Collected: 7/9/2020

Project: **30053059 / E0179 / House 08**

Test Report: Lead in Paint Chips by Flame AAS (SW 846 3050B/7000B)*

Client Sample Description	*Lab ID*	*Collected*	*Analyzed*	*Weight*	*Lead Concentration*
L-01	*652005049-0001*	7/9/2020	7/21/2020	0.2319 g	<86 ppm
	Site: EXTERIOR - BROWN PAINT ON METAL GUTTER Insufficient sample to reach reporting limit.				
L-02	*652005049-0002*	7/9/2020	7/21/2020	0.2510 g	<80 ppm
	Site: EXTERIOR - WHITE PAINT ON METAL				

Client request: Remove address from project name.

Jefferson Salvador, Laboratory Manager
or other approved signatory

Report Amended: 10/22/2020 10:20:48 Replaces the Inital Report 07/24/2020 15:43:05. Reason Code: Client-Other (see report comment)

EMSL Canada Inc.

4506 Dawson Street Burnaby, BC V5C 4C1
Phone/Fax: (604) 757-3158 / (604) 757-4731
http://www.EMSL.com / vancouverlab@EMSL.com

EMSL Canada Order 692001637
Customer ID: 55ACAV42
Customer PO: 30053059
Project ID:

Attn: Jerry Botti
ARCADIS Canada Inc.
308-1080 Mainland Street
Vancouver, BC V6B 2T4

Phone: (604) 632-9941
Fax:
Collected: 7/ 9/2020
Received: 7/16/2020
Analyzed: 7/21/2020

Proj: 30053059/ E0179 / House 08

Test Report: Asbestos Analysis in Bulk Material for Occupational Health and Safety British Columbia Regulation 188/2011 via EPA 600/R-93/116 Method

Client Sample ID: S-01A ***Lab Sample ID:*** **692001637-0001**
Sample Description: EXTERIOR - EAST FACE/BUILDING PAPER

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	7/21/2020	Brown	90.0%	10.0%	None Detected	

Client Sample ID: S-01B ***Lab Sample ID:*** **692001637-0002**
Sample Description: EXTERIOR - NORTH FACE/BUILDING PAPER

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	7/21/2020	Brown	90.0%	10.0%	None Detected	

Client Sample ID: S-01C ***Lab Sample ID:*** **692001637-0003**
Sample Description: EXTERIOR - NORTH FACE/BUILDING PAPER

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	7/21/2020	Brown	90.0%	10.0%	None Detected	

Client Sample ID: S-01D ***Lab Sample ID:*** **692001637-0004**
Sample Description: EXTERIOR - WEST FACE/BUILDING PAPER

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	7/21/2020	Brown	90.0%	10.0%	None Detected	

Client Sample ID: S-01E ***Lab Sample ID:*** **692001637-0005**
Sample Description: EXTERIOR - WEST FACE/BUILDING PAPER

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	7/21/2020	Brown	90.0%	10.0%	None Detected	

EMSL Canada Inc.

4506 Dawson Street Burnaby, BC V5C 4C1
Phone/Fax: (604) 757-3158 / (604) 757-4731
http://www.EMSL.com / vancouverlab@EMSL.com

EMSL Canada Order 692001637
Customer ID: 55ACAV42
Customer PO: 30053059
Project ID:

Test Report: Asbestos Analysis in Bulk Material for Occupational Health and Safety British Columbia Regulation 188/2011 via EPA 600/R-93/116 Method

Analyst(s):

Margaret Lee PLM (5)

Reviewed and approved by:

Nicole Yeo, Laboratory Manager
or Other Approved Signatory

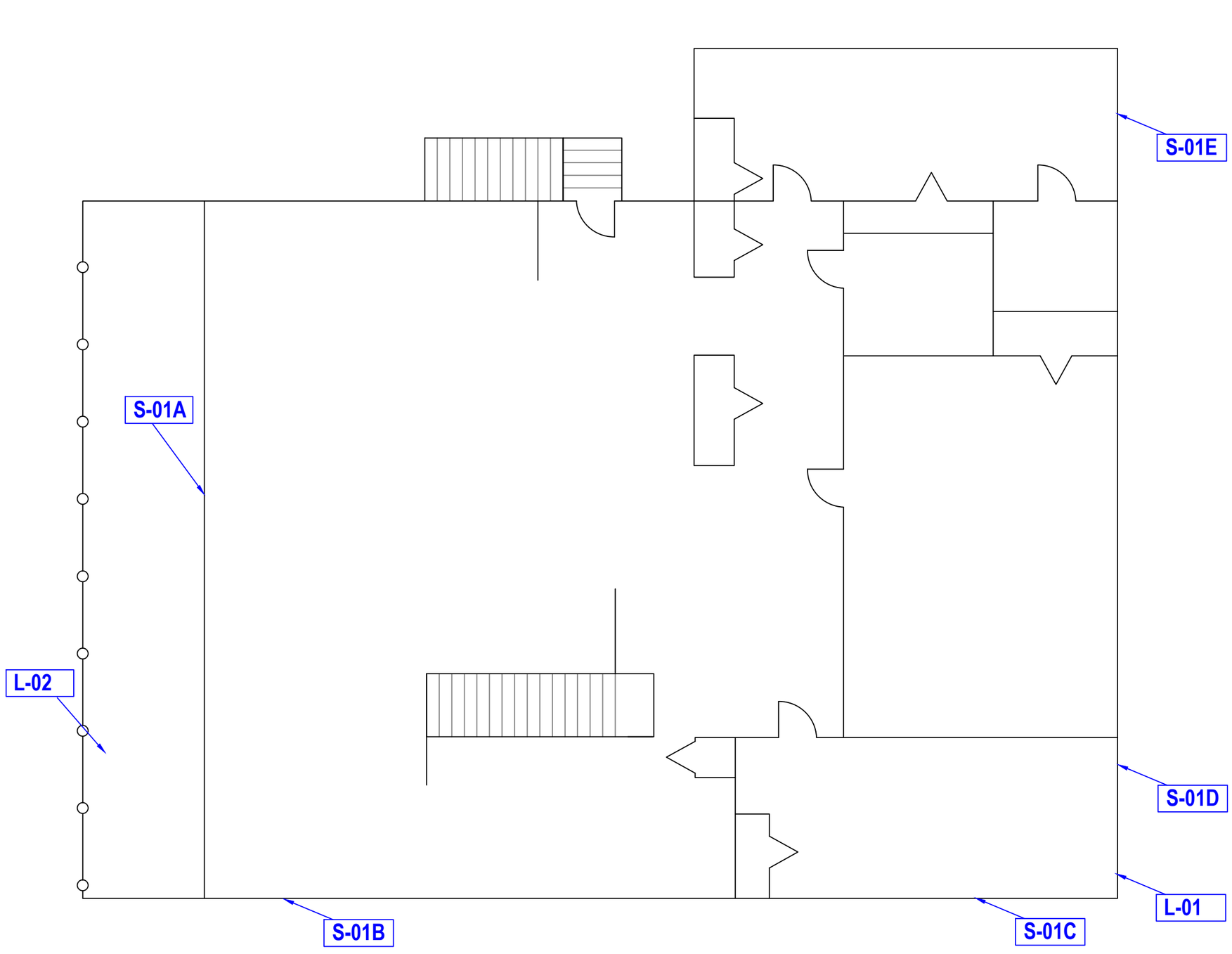
None Detected = <0.1%. EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations.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

Samples analyzed by EMSL Canada Inc. Burnaby, BC

Report amended: 10/21/202016:51:10 Replaces initial report from: 07/23/202011:43:52 Reason Code: Client-Change to Project

APPENDIX C

Floor Plans



LEGEND

S-XXX Bulk Asbestos Sample

L-XXX Bulk Lead Paint Sample

N.T.S

Title: **GOVERNMENT OF CANADA**
HAZARDOUS BUILDING MATERIAL ASSESSMENT - 2020

Project: BUILDING E0179 - HOUSE 08
SECOND FLOOR

Client: PUBLIC SERVICES AND PROCUREMENT CANADA

Project Number:	Drawn By:	Plot Size:	Date:
30053059	CB	11X17"	JULY 2020

ARCADIS

FIGURE 1

secondfloor G:\PROJECTS\30053059 - PSPC_RCMP Construction 2020\CAD\30053059-Minnaker5.dwg

APPENDIX D

Regulations and Health Effects

Asbestos

Occupational Health and Safety (OHS) for federal employees is regulated by the Canada Labour Code (CLC) Part II. The *Canada Occupational Health and Safety Regulations (COHSR), Part X, Hazardous Substances* covers specific requirements related to the management and control of asbestos-containing materials (ACM). The COHSR, Part X, Hazardous Substances, states an employee shall be kept free from exposure to a concentration of airborne chrysotile asbestos in excess of 0.1 fibre/cm^3 or f/cc. There are also specific requirements for hazard prevention detailed in the Hazard Prevention Program (HPP) in the CLC.

For the purposes of this report, the following federal requirements will be followed, unless provincial requirements are more stringent. Federal legislation and policy referenced in this report includes:

- Canada Labour Code, March 2020;
- Canada Occupational Health and Safety Regulations Part X, Hazardous Substances; SOR/86-304, June 2019;
- Public Services and Procurement Canada Asbestos Management Standard, June 2019;
- Asbestos Management Plan, Government of Canada, Version 2020-01, January 2020; and,
- Transport Canada, Transport of Dangerous Goods Regulations

The management and requirements for the potential disturbance of asbestos in buildings is also regulated at the provincial level under the *British Columbia Occupational Health and Safety Regulations,296/97, and Safe Work Practices for Handling Asbestos, WorkSafeBC, 2017 Edition*.

The BC Occupational Health and Safety Regulations, 296/97 (BC Reg 296/97), require specific actions when asbestos is a potential health hazard in a workplace. Section 6.1 of the regulation defines an asbestos-containing material as follows:

"asbestos-containing material" means the following:

(a) a manufactured article or other material, other than vermiculite insulation, that would be determined to contain at least 0.5% asbestos if tested in accordance with one of the following methods:

(i) Asbestos, Chrysotile by XRD, Method 9000 (Issue 2, dated August 15, 1994) in the NIOSH Manual of Analytical Methods, published by the United States National Institute for Occupational Safety and Health, Centre for Disease Control;

(ii) Asbestos (bulk) by PLM, Method 9002 (Issue 2, dated August 15, 1994) in the NIOSH Manual of Analytical Methods, published by the United States National Institute for Occupational Safety and Health, Centre for Disease Control;

(iii) Test Method for the Determination of Asbestos in Bulk Building Materials (EPA/600/R-93/116, dated July 1993) published by the United States Environmental Protection Agency;

(b) vermiculite insulation that would be determined to contain any asbestos if tested in accordance with the Research Method for Sampling and Analysis of Fibrous Amphibole in Vermiculite Attic Insulation (EPA/600/R-04/004, dated January 2004) published by the United States Environmental Protection Agency;

The duties of employers, contractors, or owners include:

- identifying and labeling ACM that can potentially release asbestos fibres;
- keeping a current written record of all ACM present in the workplace;
- conducting regular surveillance and maintenance of asbestos materials to prevent fibre release;
- developing a written exposure control plan if workers may be exposed to harmful levels of asbestos;
- conducting work in a way that prevents the release of asbestos fibres as much as possible;
- notifying, informing, and training workers; and,
- notifying Occupational Health and Safety (OHS) at least 48 hours before beginning an asbestos-abatement.

Disturbance of asbestos during construction and demolition is regulated under section 20.112 of BC Reg 296/97.

The 2017 WorkSafeBC publication Safe Work Practices for Handling Asbestos (Asbestos Guide) is used by Occupational Health and Safety officers as a guide when reviewing abatement work practices and employer codes of practice, and generally meets the requirements of the COHSR.

The Asbestos Guide also provides significant additional background information pertaining to asbestos, along with details on health effects and other applicable legislation within the province of British Columbia (e.g., the federal Hazardous Products Act, the BC Building Code and waste disposal regulations).

Disposal of asbestos waste is governed by the British Columbia Hazardous Waste Regulation (BC Reg. 63/88). The Federal Transportation of Dangerous Goods Regulation and BC Reg. 63/88 set out the requirements for the proper transport of asbestos waste in British Columbia. In general, and for transportation and disposal, the waste must be placed in a double sealed container, properly labeled, free of cuts, tears or punctures and disposed of at a licensed waste station which has been properly notified of the presence of asbestos waste.

Health effects

Undisturbed asbestos within building materials poses no health risks. Asbestos poses a risk when building materials containing asbestos are impacted, or disturbed, thereby releasing the asbestos fibres into the air

Asbestos-related diseases are caused when suspended airborne asbestos fibres are inhaled and the fibres settle into various regions of the lungs and remain for extended periods. Once embedded in the lungs the asbestos fibres cause scarring within the lung tissue, ultimately leading to impaired lung function (asbestosis) and/or various cancers (lung cancer; mesothelioma). These asbestos-related diseases are irreversible and fatal. The risk of lung-related cancers is increased in individuals who smoke.

These asbestos-related diseases most often occur in individuals who have been exposed to high concentrations of airborne asbestos over a long period of time, though mesothelioma has been found in individuals with short-term exposures. Symptoms or the development of these asbestos-related diseases usually occur 10 to 25 years after exposure

Lead

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 (2005) to 90 ppm (2010).

With respect to potential lead exposures associated with disturbance to surfaces coated with lead-containing products, the 2017 WorkSafeBC manual titled Lead-Containing Paint and Coatings: Preventing Exposure in the Construction Industry, indicates the following:

- Improper removal of lead paint containing 600 mg/kg lead results in airborne lead concentrations that exceed half of the exposure limit
    - This potential for exposure exceeding half of the occupational exposure limit would be the trigger for implementation of an exposure control plan.
- Lead concentrations as low as 90 mg/kg may present a risk to pregnant women and children
    - Any risk assessment should include for the presence of high risk individuals within the workplace

The disposal of lead-containing paint is regulated under the Federal *Transportation of Dangerous Goods Act* and by the British Columbia Ministry of Environment. All lead-based paints and associated nonmetal substrate (concrete, plaster, wood, etc.) must undergo Toxicity Characteristic Leachate Properties (TCLP) metals testing to determine disposal procedures. Upon the completion of the test, the total concentration of metals in the waste extract must be compared to Schedule 4, Table 1 of the Hazardous Waste Regulation.

The Federal Transportation of Dangerous Goods Regulation and BC Reg. 63/88 set out the requirements for the proper transport of lead waste in British Columbia.

Health Effects

Elemental lead and inorganic lead compounds are absorbed through ingestion or inhalation and can incorporate into the bone marrow, nerve tissue, brain, and kidneys. In children, symptoms of lead poisoning can include headaches, irritability, abdominal pain, vomiting, anemia, weight loss, poor attention span, noticeable learning difficulty, slowed speech development, and hyperactivity. In adults, symptoms of lead poisoning can include pain, numbness or tingling of the extremities, muscular weakness, headache, abdominal pain, memory loss, unsteady gait, pale skin, weight loss, vomiting, irritability, and anemia. Although adults are susceptible to the toxic effects of lead, children are at high risk due to the nature of a child's activities that involve the introduction of non-food items into their bodies.

Excessive airborne lead and surface contamination can be transferred to employees' hands and may results in lead ingestion. Therefore, work practices intended to minimize surface lead concentrations, such as frequent cleaning of work surfaces should be included in an overall lead exposure control plan

PCB

As of September 5, 2008, under subsection 93(1) of the *Canadian Environmental Protection Act,* (CEPA), Federal PCB regulations were published by the Canada Gazette Part II (SOR/2008-273) that imposed specific deadlines for the elimination of all PCBs in concentrations at or above 50 milligrams/kilogram (mg/kg). This regulation required the elimination of all PCBs and PCB-containing materials currently in-use and in storage and limited the period of time PCB materials could 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.

In British Columbia, PCB equipment becomes PCB wastes as soon as it is removed from service. This is the case even if the intent is to treat, recycle, or reuse the equipment.

When PCB wastes are stored in British Columbia, the full requirements of BC Reg. 63/88 apply to:

- 1.0 kg or more of pure PCB
- 100 L or more of any liquid containing more than 50 ppm of PCB
- 100 kg or more of any material other than a liquid, contaminated with more than 50 ppm of PCB

These amounts are the total of all amounts at a single location owned or controlled by the same person. They include PCB equipment. BC Reg. 63/88 also provides packaging requirements for storage, labeling requirements, waste destruction requirements, and references SOR/2008-273, indicating:

The Federal Transportation of Dangerous Goods Regulation sets out the requirements for the proper transport of PCB waste across provincial boundaries.

In British Columbia, a manifest issued by the Ministry of Environment (or equivalent federal document) must be used for hazardous wastes shipped from sites in British Columbia. A manifest must be used to transport:

- 5 kg or more of PCB solids
- 5 L or more of PCB liquids
- An amount of a PCB solid or PCB liquid containing more than 500 g of PCB within BC
- 500 g or more of solids, liquids, or mixtures of these containing 50 mg/kg of PCB outside of BC

Health effects

PCBs are insoluble in water; however, they readily dissolve in fats and other organic compounds. It is these attributes and fat-solubility that allow PCBs to persist in the environment and bio-accumulate in humans and animals. Exposure to PCBs can affect the immune system, reproductive system, nervous system, and endocrine system. In humans, PCBs are potentially cancer-causing.

Mould

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, occupational health and safety regulations typically require employers to take every precaution reasonable in the circumstances for the protection of workers.

The WorkSafeBC Guideline for Part 4 of BC Reg. 296/97 discusses the application of the Regulation to workplaces with mould showing on exposed or hidden surfaces, or where mould may be a factor in complaints regarding indoor air quality. The guideline provides information for investigating indoor air quality complaints with respect to mould contamination, including information on sampling for the

presence of moulds in buildings. Information is also provided on possible health effects and for cleanup personnel involved in the remediation of buildings damaged by water and mould.

Health Effects

There are a number of documented cases of health problems related to exposure to indoor fungi.

Both high-level, short-term exposures and lower-level, long-term exposures can result in illness. The most common symptoms from exposure to mould in indoor environments are runny nose, eye irritation, cough, congestion, aggravation of asthma, headache, flu-like symptoms, fatigue, and skin rash. People with suppressed immune systems may be susceptible to fungal infections as a result of exposure to indoor moulds.

People who are exposed to mould growth on building materials will not necessarily exhibit adverse health effects. However, the mould must still be removed. Humans are at risk from indoor mould when fungal spores, fragments or metabolites are released into the air and inhaled or physically contacted (dermal exposure).

Not everyone experiences allergic reaction; the susceptibility to exposure varies with the individual's genetic predisposition, age, state of health, and concurrent exposures. For these reasons, and because the measurement of exposure is not standardized and biological markers of exposure to fungi are largely unknown, it is not possible to establish "safe" or "unsafe" levels of exposure. However, federal, and provincial policies have been written to minimize mould exposure and the elimination of mould indoors.

Mercury

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 disposal should be through a scrap dealer (elemental mercury), recycling firm for mercury vapour and returned to the manufacturer for light tubes and fixtures. Disposal of mercury waste is governed by BC Reg. 63/88.

The Federal Transportation of Dangerous Goods Regulation and BC Reg. 63/88 set out the requirements for the proper transport of mercury waste in British Columbia.

Health Effects

Routes of exposure for mercury and mercury compounds include inhalation, ingestion, skin and/or eye contact. 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.

Elemental (metallic) mercury most often causes health effects through inhalation of its vapour, which can be absorbed through the lungs. This kind of exposure can result when elemental mercury is spilled (or products that contain elemental mercury break) and the mercury is exposed to the air. Vapour concentrations can vary especially in warm or poorly-ventilated indoor spaces where the airborne concentration can exceed the permissible exposure limit (provincially set).

Chronic mercury "poisoning" can be caused by long-term exposure to low airborne concentrations (or low levels) of mercury. Symptoms or effects of mercury exposure include: tremors, emotional changes,

neuromuscular effects, mental changes/disturbances, digestive disturbances, headaches, insomnia, and changes in nervous response.

Silica

Regulations pertaining to silica are provided in BC Reg. 296/97. Included are general provisions (minimizing release; keeping worksite clear of unnecessary accumulations; ensuring methods for decontamination prevent generation of airborne silica), provisions for "restricted areas" (where there is a reasonable chance that the airborne concentration of silica exceeds or may exceed the occupational exposure limit), provisions for use in abrasive blasting, and provisions for health assessments for workers exposed to silica.

Health Effects

Crystalline silica dust particles, which are small enough to be inhaled into the lungs (respirable size), can cause a number of health problems. As with asbestos, silica within building materials poses no threat to human health if left undisturbed.

Exposure to crystalline silica airborne dust my cause scaring of the lungs with coughing and shortness of breath—also known as "silicosis", a form of disabling, progressive, and sometimes fatal pulmonary fibrosis.

Ozone Depleting Substances (ODS)

ODSs are regulated in British Columbia by the British Columbia *Waste Management Act*—Ozone Depleting Substances and Other Halocarbons Regulation (BC Reg. 387/99 as amended by BC Reg. 317/2012).

On federal land, aboriginal land and federal works, buildings and undertakings, the Federal Halocarbon Regulation 2003 (SOR/2003-289, including associated amendments) 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.

If ODS-containing materials are to be removed and disposed of, all ODSs must be handled, recycled, stored, and/or disposed of in accordance with the requirements of BC Reg. 63/88.

The Federal Transportation of Dangerous Goods Regulation and BC Reg. 63/88 set out the requirements for the proper transport of ODS waste in British Columbia.

Health Effects

Health effects are not typically related to exposure to ODSs directly, but to the consequences of ODS release to the atmosphere, subsequent degradation of the earth's ozone layer, and implications associated with increased UVB light exposure.

APPENDIX E

Classification, Condition and Accessibility

1.1 Spray Applied Fireproofing, Insulation and Texture Finishes

To evaluate the condition of ACM spray applied as fireproofing, thermal insulation, or texture, decorative or acoustic finishes, the following criteria are applied:

GOOD

Surface of material shows no significant signs of damage, deterioration, or delamination. Up to 1 percent visible damage to surface is allowed within range of **GOOD**. Evaluation of sprayed fireproofing requires the surveyor to be familiar with the irregular surface texture typical of sprayed asbestos products. **GOOD** condition includes un-encapsulated 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 1 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 survey or re-assessment form.

NOTE: **FAIR** condition is not utilized in the evaluation of the 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 are advised to be watchful for ACM **DEBRIS** prior to accessing or working above ceilings in areas of buildings with ACM regardless of the reported condition.

1.2 Mechanical Insulation

The evaluation of the condition of mechanical insulation (on boilers, breaching, ductwork, piping, tanks, equipment etc.) utilizes the following criteria:

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 penetrating 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. It is not possible to observe the full length of mechanical insulation from all angles.

1.3 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 should be treated as a friable product.

2. Evaluation of Accessibility

The accessibility of building materials known or suspected of being ACM is rated according to the following criteria:

ACCESS (A)

Areas of the building within reach (from floor level) of all building users. Includes areas such as gymnasiums, workshops, and storage areas where activities of the building users may result in disturbance of ACM not normally within reach from floor level.

ACCESS (B)

Frequently entered maintenance areas within reach of maintenance staff, without the need for a ladder. Includes: frequently entered pipe chases, tunnels and service areas or areas within reach from a fixed ladder or catwalk, e.g. tops of equipment, mezzanines.

ACCESS (C) EXPOSED

Areas of the building above 2.4 metres where use of a ladder is required to reach the ACM. Only refers to ACM that is exposed to view, from the floor or ladder, without the removal or opening of other building components such as ceiling tiles, or service access door or hatch. Does not include infrequently accessed service areas of the building.

ACCESS (C) CONCEALED

Areas of the building which require the removal of a building component, including lay-in ceilings and access panels into solid ceiling systems. Includes rarely entered crawl spaces, attic spaces, etc. Observations will be limited to the extent visible from the access points.

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 ACM. Evaluation of condition and extent of ACM is limited or impossible, depending on the surveyor's ability to visually examine materials in ACCESS D.

3. ACM DEBRIS

3.1 DEBRIS from Friable ACM

The presence of fallen ACM is noted separately from the presumed friable ACM source (sprayed fireproofing, thermal insulation, texture, decorative or acoustic finishes or mechanical insulation) and is referred to as **DEBRIS**.

3.2 DEBRIS from Damaged Non-Friable ACM

The presence of fallen ACM from damaged non-friable ACM is also reported separately from the non-friable ACM source. Only fallen non-friable ACM that has become friable is reported as **DEBRIS**.

The identification of the exact location or presence of **DEBRIS** on the top of ceiling tiles is limited by the number of observations made and the presence of building components such as ducts or full height walls

that obstruct observations. Workers are advised to be watchful for the presence of **DEBRIS** prior to accessing or working in proximity to mechanical insulation or above ceilings in areas of buildings with ACM regardless of the reported presence or absence of **DEBRIS**.

4. Action Matrix and Action Descriptions

The Asbestos Management Plan requires the following responses:

- Immediately clean-up **DEBRIS** that is likely to be disturbed.
- Remove, repair, or enclose friable ACM in **POOR** or **FAIR** condition whose continued deterioration will result in **DEBRIS** that is likely to be disturbed.

The following factors shall be considered in making site-specific recommendations for compliance with the existing applicable regulations or codes and the practical implementation of the Asbestos Management Plan:

1. ACM in **POOR** condition is not routinely repairable. If an abatement action is necessary, removal is the recommended action (enclosure is a viable option in unusual circumstances, e.g. where removal is difficult or costly and the asbestos-containing material can be thoroughly enclosed).

2. Mechanical insulation in **FAIR** condition will be repaired or removed based on the following general recommendations, applied on a case-by-case basis:
   - ACM insulation found in **FAIR** condition in ACCESS (B) or ACCESS (C) EXPOSED areas is to be repaired.
   - ACM mechanical insulation found in **FAIR** condition in ACCESS (B) and ACCESS (C) EXPOSED areas, where future damage to the ACM is likely to occur, is to be removed.

3. ACM in **GOOD** condition present in ACCESS (A) can be managed by surveillance, as long as it is not disturbed by future renovation, maintenance, or demolition. Proactive removal of the ACM in ACCESS (A) will be considered where damage is possible by on-going occupant activity (accidental or intentional).

4. Non-friable or manufactured products are considered in the action matrix as follows:
   - Non-friable and manufactured products reported in **POOR** condition, or friable **DEBRIS** resulting from the deterioration of non-friable ACM, are treated as friable materials and the appropriate action, and depending on accessibility is determined from the action matrix for friable ACM.
   - For non-friable or manufactured products reported in **GOOD** condition, Action 7 (surveillance) is recommended regardless of accessibility.

5. All asbestos-containing material from a particular area is to be removed where small quantities of asbestos are present, and removal will negate the need for the use of an Asbestos Management Program in that area.

The action matrix provided below establishes the recommended asbestos control action. The ACTIONS themselves are described in full following the table.

4.1 Action Matrix Tables

FRIABLE ACM				
ACCESS	**CONDITION**			**DEBRIS**
	GOOD	**FAIR**	**POOR**	
(A)	ACTION 5/7[1]	ACTION 5/6[2]	ACTION 3	ACTION 1
(B)	ACTION 7	ACTION 6/5[3]	ACTION 3	ACTION 1
(C) EXPOSED	ACTION 7	ACTION 6	ACTION 4	ACTION 2
(C) CONCEALED	ACTION 7	ACTION 7	ACTION 4	ACTION 2
(D)	ACTION 7	ACTION 7	ACTION 7	ACTION 7

[1] If material in **ACCESS (A)/GOOD** condition is not removed **ACTION 7** is required.

[2] If material in **ACCESS(A)/FAIR** condition is not removed **ACTION 6** is required.

[3] Remove ACM in **ACCESS (B)/FAIR** condition if ACM is likely to be disturbed.

4.2 Action Descriptions

ACTION 1 - Immediate Clean-Up of DEBRIS that is Likely to Be Disturbed

Access that is likely to cause a disturbance of the ACM **DEBRIS** is to be restricted and **clean up ACM DEBRIS is to be done immediately**. Use correct asbestos procedures. This action is required for compliance with regulatory requirements and good practice. The assessor should immediately notify the Asset or Property and Facility Manager, or Regional/Area Asbestos Management Coordinator of this condition.

ACTION 2 - Intermediate risk precautions for Entry into Areas with ACM DEBRIS

At locations where ACM **DEBRIS** can be isolated in lieu of removal or cleaned up, use appropriate means to limit entry to the area. Restrict access to the area to persons using intermediate risk asbestos precautions. The precautions will be required until the ACM **DEBRIS** has been cleaned up, and the source of the **DEBRIS** has been stabilized or removed.

ACTION 3 - ACM Removal Required for Compliance

Remove ACM for compliance with regulatory requirements and good practice. Utilize asbestos procedures appropriate to the scope of the removal work.

ACTION 4 - Access into areas where asbestos-containing material is present and likely to be disturbed by access requires intermediate risk precautions.

Intermediate risk asbestos precautions are to be used when entry or access into an area is likely to disturb the ACM. **ACTION 4** must be used until the ACM is re-moved (Use **ACTION 1** or **2** if **DEBRIS** is present). Intermediate risk or high-risk precautions should be used for removal (depending on extent of removal).

ACTION 5 - Proactive ACM Removal

Removal of ACM in lieu of repair may be considered, even if it is in **GOOD** condition at locations, where ACM is easily accessible, limited in quantity, and removal would be cost-effective.

ACTION 6 - ACM Repair

Repair ACM found in **FAIR** condition, and not likely to be damaged again or disturbed by normal use of the area or room. Upon completion of the re-pair work treat ACM as material **in GOOD** condition and implement **ACTION 7**. If ACM is likely to be damaged or disturbed during normal use of the area or room, **ACTION 5** is to be implemented.

ACTION 7 - Routine Surveillance

Institute routine surveillance of the ACM. Trained workers or contractors must use appropriate asbestos precautions (low, intermediate, or high) during disturbance of the remaining ACM.

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APPENDIX 1-9

Hazardous Building Material Assessment
Government of Canada, Building E0183, Employee Housing, House 09, British Columbia

ARCADIS Design & Consultancy for natural and built assets

Public Services and Procurement Canada

HAZARDOUS BUILDING MATERIAL-ASSESSMENT

Government of Canada, Building E0183, Employee Housing, House 09, British Columbia

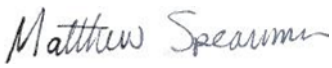
PSPC Project # R.106467.001

October 26, 2020

Arcadis Project No.:30034527

HAZARDOUS BUILDING MATERIAL ASSESSMENT

Authored by:



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ACRONYMS AND ABBREVIATIONS

ACM	Asbestos-Containing Materials
Arcadis	Arcadis Canada Inc.
CLC	Canada Labour Code
COHSR	Canada Occupational Health and Safety Regulations
HPP	Hazard Prevention Program
LPB	Lead Based Paints
NIOSH	National Institute for Occupational Safety and Health
NJC	National Joint Council
OHS	Occupational Health and Safety
PCBs	Polychlorinated Biphenyls
PLM	Polarized Light Microscopy
PSPC	Public Services and Procurement Canada
TEM	Transmission Electron Microscopy
USEPA	United States Environmental Protection Agency

EXECUTIVE SUMMARY

Arcadis Canada Inc. (Arcadis) was retained by Public Services and Procurement Canada (PSPC, Client) to conduct a hazardous building material assessment of Building E0183, House 09, located in British Columbia.

The project consisted of a baseline assessment for the full interior of the building and a limited pre-construction assessment based on a renovation scope. The objective of the baseline assessment was to document the locations of specified hazardous building materials, evaluate their condition and develop corrective action plans as required for the purposes of long term management. The objective of the pre-construction assessment was to identify hazardous building materials in preparation for building renovation.

The assessed area for the baseline assessment consisted of the entire building interior. The renovation scope assessed area was limited to the part of the building scheduled for renovation, which consisted of replacing exterior windows vinyl siding, exterior door leading from kitchen to deck and, replacing deck and stairs..

The hazardous building materials considered during this assessment included the following:

- Asbestos-containing materials (ACMs)
- Lead, including lead-containing paints (LCPs)
- Polychlorinated biphenyls (PCBs) in electrical equipment
- Mould and/or moisture-impacted building materials
- Mercury in electrical equipment
- Ozone-depleting substances (ODSs) in heating, ventilation and air conditioning (HVAC) equipment or fixed fire suppression systems
- Silica in building materials

Arcadis performed the assessment on December 9, 2019. The assessment was conducted by Matthew Spearman, Dipl. Tech., Field Technologist of Arcadis.

Summary of Findings

Asbestos: No asbestos-containing materials (ACM) were confirmed to be present.

Lead: No confirmed lead is present in the building.

Silica: Crystalline silica is present in concrete where present in the building

Mercury: Mercury vapor is present in fluorescent lamps located in Room 3 and Room 13.

Polychlorinated Biphenyls (PCBs): No PCBs were identified during the assessment.

Ozone Depleting Substances: One domestic refrigerator located in Room 3.

Mould: No suspect visible mould was identified during the assessment.

Recommendations

The following is a summary of significant recommendations; refer to the body of the report for detailed recommendations.

1. Remove and dispose of mercury-containing items when taken out of service or if disturbed by the planned renovation work.
2. Remove and recycle ODS prior to decommissioning.
3. Follow appropriate safe work procedures when handling or disturbing silica.

Findings of this report are subject to our standard Limitations, as outlined in Section 7.

This Executive Summary is subject to the same standard limitations as contained in the report and must be read in conjunction with the entire report.

1 INTRODUCTION

1.1 Purpose

Arcadis Canada Inc. (Arcadis) was retained by Public Services and Procurement Canada (PSPC, Client) to conduct a hazardous building material assessment of Building E0183, House 09, located in British Columbia.

The project consisted of a baseline assessment for the full interior of the building and a limited pre-construction assessment based on a renovation scope. The objective of the baseline assessment was to document the locations of specified hazardous building materials, evaluate their condition and develop corrective action plans as required for the purposes of long term management. The objective of the pre-construction assessment was to identify hazardous building materials in preparation for building renovation.

The assessed area for the baseline assessment consisted of the entire building interior. The renovation scope assessed area was limited to the part of the building scheduled for renovation, which consisted of replacing exterior windows vinyl siding, exterior door leading from kitchen to deck and, replacing deck and stairs. At the time of assessment, the deck and stairs were covered with snow and ice. The underside of the deck and stairs appeared to be unpainted.

Arcadis performed the assessment on December 9, 2019. The assessment was conducted by Matthew Spearman, Dipl. Tech., Field Technologist of Arcadis.

1.2 Scope of Work

The scope of work for the project, as referenced in the Arcadis Workplan dated October 30, 2019, identifies the requirement to conduct a hazardous building material assessment within building E0183. Specifically, the scope of work included:

- Review of previous reports and development of assessment protocol for conducting a non-destructive assessment.
- Review the scope of renovations, which included: replacing exterior windows vinyl siding, exterior door leading from kitchen to deck and replacing deck and stairs.
- Conduct visual assessment of readily accessible areas for the presence of suspected hazardous building materials.
- Collect and submit representative suspect asbestos material and lead paint chip samples for analysis.
- Collect and submit representative samples of caulking for PCBs where impacted by the proposed renovations.
- Submit samples to accredited laboratories for analysis.
- Evaluation and interpretation of field findings and sample analytical results to develop conclusions and recommendations pertaining to hazardous building materials identified

For the purpose of this assessment, hazardous building materials are defined as follows:

- Asbestos-containing materials (ACMs)

- Lead, including lead-containing paints (LCPs)
- Polychlorinated biphenyls (PCBs) in electrical equipment
- Mould and/or moisture-impacted building materials
- Mercury in electrical equipment
- Ozone-depleting substances (ODSs) in heating, ventilation and air conditioning (HVAC) equipment or fixed fire suppression systems
- Silica in building materials

A general description of the building included in this assessment is provided in **Table 1** below:

Table 1. Building Description

Building Number (BU)	Building Name	Total Inside Gross m^2	Year Constructed	Building Description
E0183	House 09	208.70	Unknown	Two-story building with asphalt shingle roof and poured concrete foundation. Vinyl siding exterior. Drywall and fibre board interior walls. Drywall, texture coat and plywood ceilings. Poured concrete, wood laminate, plywood, carpet, and vinyl sheet flooring. Heating is supplied by gas fired forced air furnace and electric baseboard heaters.

The assessment was restricted to accessible locations of the buildings. Inaccessible areas, such as fixed ceiling spaces and behind fixed walls, were not investigated at the time of the assessment unless specifically impacted by the proposed renovations. Roofing or other material that may cause damage to the building envelope were not included unless specifically impacted by the proposed renovations and sampling would not compromise the building envelope integrity. Concrete block walls were not investigated for vermiculite insulation unless specifically impacted by the proposed renovations. Crawlspaces were inspected by Arcadis staff from the access hatch. No direct entry was made by Arcadis staff into crawlspace locations. Similarly, attic spaces were visually inspected by Arcadis staff using the existing access hatch. No direct entry was made by Arcadis staff into attic locations.

2 BACKGROUND INFORMATION

Arcadis was provided and instructed to relay on information presented in the following reports:

- Asbestos-Containing Materials Survey, Building E0183, dated March 24, 2019, prepared by Arcadis Canada Inc.

3 SURVEY METHODOLOGY

Sampling activities were conducted in accordance with Arcadis' Standard Operation Procedures which take into account current federal and provincial regulations pertaining to such work (i.e., sampling procedures,

required number of samples and laboratory analytical procedures). Regulations are presented in **Appendix D.**

Representative bulk samples were collected of accessible suspect, PCB, lead, and asbestos materials in sufficient quantities for laboratory analysis. Samples were sealed in polyethylene zip-lock bags labeled with the sample number, suspect material description, and sample location. As part of sampling procedures, sampling tools were cleaned between sample collection events to avoid the potential for cross-contamination of samples.

All sample bags were compiled in order and placed into a single container accompanied with a chain of custody form outlining the project information, date, building location, number of samples, and sample description. Samples were submitted to the analytical laboratory in a sealed container via courier.

3.1 Asbestos-Containing Materials

A separate set of samples was collected of each type of homogenous material suspected to contain asbestos. A homogenous material is defined by the US EPA as material that is uniform in texture and appearance, was installed at one time, and is unlikely to consist of more than one type or formulation of material. The homogeneous materials are determined by visual examination, available information on the phases of the construction and prior renovations.

Bulk sampling protocols followed the ASTM E2356 Standard, which indicates requirements for the number of samples to collect for each homogeneous material. **Table 2,** shown below, provides an outline of the minimum number of samples to be collected from the ASTM E2356 Standard.

Table 2. Bulk Material Sample Quantities

Type of Material	Size of Area of Homogeneous Material	Minimum Number of Samples Collected
Any homogeneous material, including but not limited to fireproofing, drywall joint compound, ceiling tile stucco, acoustical and stipple finishes and visually similar floor tiles	Less than 90 m^2 (<1,000 ft^2)	3
	90 m^2 or more, but less than 450 m^2 (1,000-5,000 ft^2)	5
	450 m^2 or more (>5,000 ft^2)	7

In some cases, manufactured products such as asbestos cement pipe were visually identified without sample confirmation.

Flooring mastic/adhesive are only sampled and analyzed if present on the underside of flooring samples (vinyl floor tile and vinyl sheet flooring) in sufficient quantity for laboratory analysis.

Attempts to distinguish and delineate asbestos-containing drywall compound from new non-asbestos drywall compound is often unachievable. Arcadis collected drywall joint compound samples from exterior walls, columns or other locations which are unlikely to have been renovated in an attempt to determine the presence of asbestos in the original drywall compound.

Arcadis submitted the bulk samples to a NVLAP accredited laboratory for analysis. The analysis is performed in accordance with Test Method EPA/600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials, July 1993.

EPA Method 600 states that materials characterized by interfering binder/matrix or low asbestos content may require additional gravimetric reduction sample treatment beyond routine polarized light microscopy (PLM) analysis (e.g. dissolution with hydrochloric acid, treatment with organic solvents or ashing in a muffle furnace or low temperature plasma asher to remove unwanted components).

The asbestos analysis was completed using a stop positive approach. Only one result of greater than the regulated criteria is required to determine that a material is asbestos-containing, but all samples must be analyzed to conclusively determine that a material is non-asbestos. The laboratory stopped analyzing samples from a homogeneous material once greater than the criteria was detected in any of the samples of that material. All samples of a homogeneous material were analyzed if no asbestos was detected. Where building materials are described in this report as non-asbestos, or described as containing no asbestos, this is subject to the limitations of the analytical method used and should be understood to mean no asbestos was detected.

The classification, condition, and accessibility were assessed for the materials which could contain asbestos. To determine these factors, Arcadis followed the methodology outlined in the ASTM E356 Standard. The Standard provides definitions and criteria for the assessment of ACM. The classification, conditions, and accessibility information are provided in Appendix E.

Bulk samples of materials which could contain asbestos were collected and submitted to EMSL Canada Inc. (EMSL) for analysis of asbestos content. Asbestos-containing materials are defined as 0.5% or greater, or any amount if vermiculite.

3.2 Lead

Arcadis collected samples of distinctive paint finishes and surface coatings present in more than a limited application, where removal of the paint is possible. Arcadis collects samples by scraping the painted finish to include base and covering applications. 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. 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 were presumed to be the same, regardless of differing sub surface paints, if any.

The 2017 WorkSafeBC publication *Safe Work Practices for Handling Lead* (Lead Guideline) indicates the following:

> *Unlike for asbestos-containing material, WorkSafeBC does not numerically define what would be considered a lead-containing paint or coating. All suspected paints or coatings should be tested for lead because, depending on the nature of the work, even a small amount could pose a risk to workers. In order to determine which controls and personal protective equipment would be required for a particular job, a qualified person must consider this information as part of the risk assessment.*

- Improper removal of lead paint containing 600 mg/kg lead results in airborne lead concentrations that exceed half of the exposure limit
  - Exposure limit indicated in both the COHSR and BC Reg. 296/97 is 0.05 mg/m^3

    - Potential for exposure exceeding half of the occupational exposure limit would be the trigger for implementation of an exposure control plan.
- Lead concentrations as low as 90 mg/kg may present a risk to pregnant women and children
    - Any risk assessment should include for the presence of high risk individuals within the workplace

When reviewing the above, “high risk” individuals are not expected to be present in the workplace associated with this building during building material alteration activities (i.e., demolition) that would create significant disturbance to paint with such individuals present. As such, paints containing 600 ppm lead or more will be considered “lead-containing” for the purpose of this report, such that appropriate risk assessments can be completed for demolition planning. However, information regarding the lead content of all paints tested is provided herein, for reference and risk assessment should the consideration of high risk individuals be necessary, based on the requirements of a particular situation.

Although a concentration of 600 ppm lead has been used to define paint coatings as LCPs, it should be noted that this is related to painted surfaces and the determination of appropriate provisions to protect occupants and employees from exposure to elevated concentrations of lead during typical operations and maintenance or simple renovation. This does not include painted metal surfaces that are to be welded, burned or torch-cut.

Using an arc welder or oxyacetylene torch on steel that is coated with lead-containing paint can create hazardous lead fumes and is prohibited by section 12.115 of BC Reg. 296/97.

> Regulatory excerpt: **12.115 Coatings on metals**
>
> *A coating on metal which could emit harmful contaminants (such as lead, chromium, organic materials, or toxic combustion products) must be removed from the base metal, whenever practicable, before welding or cutting begins.*

In addition, the following information is provided in the Lead Guideline:

- Welding or torch cutting of paints or coatings on metal can create very high concentrations of airborne lead fumes. Torch cutting structural steel, coated with paint containing as little as 130 mg/kg (equivalent to ppm) lead, can release airborne levels of lead as high as 0.8 mg/m^3 (16 times the exposure limit).

Given this information and that the analytical detection limit for lead paint analysis is approximately 80– 90 ppm (not significantly different than 130 ppm, which, per above, may release airborne lead levels 16 times the exposure limit), any paint coating on a metal surface to be welded, burned or torch-cut must be removed prior to that action being undertaken, unless a project-specific or tasks-specific risk assessment and safe work practices are developed by a qualified person.

Paint and surface coatings are evaluated for condition. The criteria for condition evaluation pertaining to LCPs described herein are generally based on the United States Housing and Urban Development (HUD) 2012 *Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing*.

When evaluating the condition of LCPs, an attempt should be made to determine whether the deterioration is due to a moisture problem or some other existing building deficiency. **"Poor"** surfaces are considered to be a hazard and should be corrected. "**Fair"** surfaces should be repaired but are not yet considered to be a hazard; if not repaired, they should be monitored frequently. "**Good/intact"** surfaces should be monitored to ensure that they remain in a nonhazardous condition.

In addition, the presence of paint debris must be considered in evaluating condition. Given the variety of paint uses, there are many applications that can have a tendency for the paint to "wear" from the surface slowly, over an extended period of time. Conditions where paint has worn from a surface are worth noting for maintenance discussions (i.e., related to re-coating the surface should, for example, the coating provide weather protection), however, in the absence of loose paint chip debris/dust, such conditions would not represent a potential exposure situation related to lead.

The condition evaluation criteria for LCPs are summarized in Table 3, below.

Table 3. Lead-Containing Paint Condition Categories

Type of Building Component[1]	Total Area of Deteriorated Paint on Each Component		
	Good/Intact	**Fair[2]**	**Poor[3]**
Exterior components with large surface areas.	Entire surface is intact.	Less than or equal to 10 square feet	More than 10 square feet
Interior components with large surface areas (walls, ceilings, floors, doors.	Entire surface is intact.	Less than or equal to 2 square feet	More than 2 square feet
Interior and exterior components with small surface areas (windowsills, baseboards, soffits, trim).	Entire surface is intact.	Less than or equal to 10% of the total surface area of the component.	More than 10% of the total surface area of the component

NOTES:

1. Building component in this table refers to each individual component or side of building, not the combined surface area of all similar components in a room (e.g., a wall with 1 square foot of deteriorated paint is in "fair" condition, even if the other three walls in a room are intact).
2. Surfaces in "fair" condition should be repaired and/or monitored but are not considered to be "lead-containing paint hazards".
3. Surfaces in "poor" condition are considered to be "lead-containing paint hazards" and should be addressed through abatement or interim controls.

Analysis for lead in paints or surface coatings was performed in accordance with EPA Method No. 3050B/Method No. 7420; flame atomic absorption at laboratory accredited by the American Industrial Hygiene Association (AIHA).

3.3 Silica

Arcadis identified building materials suspected of containing crystalline silica (e.g. concrete, cement, tile, brick, masonry, mortar) by knowledge of current and historic applications and visual inspection only. Arcadis did not perform sampling of these materials for laboratory analysis of crystalline silica content.

3.4 Mercury

Building materials/products/equipment (e.g. thermostats, barometers, pressure gauges, light tubes), suspected to contain mercury were identified by visually inspection only. Dismantling of equipment suspected of containing mercury was not performed. Sampling of these materials for laboratory analysis of mercury content was not performed.

Mercury spills or damaged mercury-containing equipment was recorded where observed.

3.5 Polychlorinated Biphenyls (PCBs)

The presence or absence of fluorescent lights was documented during the course of our investigation to determine whether there were any of the T12 type. T12 fluorescent lamps, with a diameter of 1.5 inches, utilize transformer type magnetic ballasts, which may contain PCBs. The use of T12s has been discontinued and replaced with new high-efficiency 1-inch T8 lamps (and other types) which use electronic ballasts which do not contain PCBs.

Wet transformers were assessed for PCBs based on the age of the building, a review of maintenance records and examination of labels or nameplates on equipment, where present and accessible. The information is compared to known ban dates of PCBs and Environment Canada publications.

Dry type transformers are presumed to be free of dielectric fluids and hence non-PCB. Caulking's were not sampled for PCB content unless specifically impacted by the proposed renovation scope. The material is considered a PCB solid if PCB content is 50ppm or greater based on the threshold given in SOR/2008-273.

3.6 Suspect Visible Mould

Arcadis identified the presence of any suspect visible mould or water damage observed during the course of our site investigation. Suspect visible mould is typically a coloured, textured substance or discolouration or staining on a building material surface which, based on our experience, may be mould growth. The adjective *suspect* is used where the presence of mould has not been confirmed by laboratory analysis. If any mould growth is concealed within wall cavities it is not addressed in this assessment.

3.7 Ozone Depleting Substances (ODS)

Arcadis determined the potential presence of ODS (chlorofluorocarbons, hydrochlorofluorocarbons, hydrofluorocarbons, halons, etc.) in air conditioning units, chillers, commercial coolers, and fire suppression systems by visual inspection of manufactures' labels or plates, maintenance records, or logbooks, etc.

4 RESULTS

4.1 Asbestos

During the course of our assessment, representative bulk samples of material were collected by Arcadis staff. The samples were forwarded to EMSL in Burnaby, British Columbia (BC) for asbestos analyses. EMSL holds a current Certificate of Accreditation for Bulk Asbestos Fibre Analysis under the Voluntary Accreditation Program (NVLAP). Bulk sampling was performed in general accordance with the requirements specified in ASTM E2356 Standard, BC Reg. 296/97 and in the WorkSafe BC publication Safe Work Practices for Handling Asbestos.

Results of bulk sample analysis for asbestos content are provided in Table 4. Site Photographs provided in **Appendix A.** Laboratory certificates of analysis have been provided in **Appendix B**. Floor plans indicating sample locations and room numbers are provided in **Appendix C**.

Table 4. Results of Bulk Sample Analysis for Asbestos

Sample Number	Sample Description	Sample Location	Asbestos Type %	Friable (Y/N)	Accessibility	Condition (action)
A1A	Caulking around window trim	Room 3	None Detected	NA	NA	NA
A1B	Caulking around window trim	Room 5	None Detected	NA	NA	NA
A1C	Caulking around window trim	Room 6	None Detected	NA	NA	NA
A2A*	Firestop Putty	Exterior	None Detected	NA	NA	NA
A3A	Construction Paper	Exterior	None Detected	NA	NA	NA
A3B	Construction Paper	Exterior	None Detected	NA	NA	NA
A3C	Construction Paper	Exterior	None Detected	NA	NA	NA
A3D	Construction Paper	Exterior	None Detected	NA	NA	NA
A3E	Construction Paper	Exterior	None Detected	NA	NA	NA

Notes: NA: Not Applicable

* Due to the limited quantity of material on site, or potential for visible and building envelope damage, limited sampling was completed.

The following building materials were common in the building: however, these materials do not contain asbestos and were not sampled during the survey:

- Vinyl siding, fibre board, plywood, poured concrete, wood laminate, carpet, wood baseboard, acrylic, porcelain, plastic and glass fiber insulation.

Asbestos-containing materials were not identified during this assessment. No asbestos-containing material were identified in the 2018 assessment report.

Potential for Vermiculite Insulation

As part of the assessment, Arcadis assessed the subject building for areas where vermiculite insulation, a potential ACM, would likely be present. This included making note of attic spaces, floor cavities and masonry block or brick walls, which are typical areas where vermiculite is found. Limited intrusive investigation was performed only where impacted by proposed renovations. No locations that may potentially contain vermiculite (that could not otherwise be assessed) were observed by Arcadis.

Presumed Materials

A number of materials which might contain asbestos were not sampled during this assessment due to limitations in scope or were too destructive to sample effectively. Where present, these materials are presumed to contain asbestos until otherwise proven by sampling and analysis.

Materials observed on site and presumed to contain asbestos include:

- Roofing, felts, and tar;
- Window Sealant (concealed);
- Mastic (concealed); and,
- Electrical components or wiring within control centers, breakers, motors or lights, insulation on wiring.

4.2 Lead

During the course of our site investigation, representative bulk samples of predominant paint types were collected by Arcadis staff. The samples were forwarded to EMSL for lead analyses. Results of bulk sample analysis for lead content are provided in Table 5. The laboratory report is provided in **Appendix B**.

Table 5. Results of Analyses of Bulk Samples for Paint for Lead

Sample No.	Sample Location(s)	Sample Description	Lead Content (PPM OR %)
L01	Room 15	Blue paint on gypsum board wall	<180 PPM
L02	Room 7	White paint on wood window trim	<190 PPM
L03	Room 3B	Beige paint on gypsum board wall	<270 PPM
L04	Room 12	Grey paint on wood floor	170 PPM
L05	Exterior	White paint on concrete foundation	<80 PPM

Lead was not detected at a level above the definition of lead paint (600 PPM) in any samples. Where one colour of paint is indicated in the sample descriptions in Table 5, only one layer of paint was observed. Where multiple colours are indicated in the sample description, multiple layers of paint were observed.

All paint applications were noted to be generally in good condition.

Lead is presumed present in the solder on the sweated-on joints between copper pipe and fittings.

4.3 Silica

Crystalline silica is a presumed component of the following materials where present in the building:

- poured or pre-cast concrete

4.4 Mercury

Mercury vapor is present in fluorescent lamps located in Room 3 and Room 13.

4.5 Polychlorinated Biphenyls (PCBs)

Based visual observations (evidence of T-8 fixtures) the building has been comprehensively re-lamped and will not contain PCB ballasts.

Caulking in the assessed areas was not suspected to contain PCBs due to the date of installation (after 1985).

4.6 Suspect Visible Mould

Suspect visible mould and/or water staining was not observed during the assessment.

4.7 Ozone Depleting Substances

Ozone Depleting Substances (ODS) was identified as follows:

Table 6. Equipment Containing ODS

Equipment Type	Location(s)	ODS Type	Weight (kgs)
Domestic Refrigerator	Room 3	Fluorocarbons	Unknown

5 RECOMMENDATIONS

Perform a detailed intrusive assessment prior to future building renovation or demolition operations. The assessment should include destructive testing (i.e. coring and/or removal of building finishes and components), and sampling of materials not previously tested (i.e. roofing materials, mastics etc.).

5.1 Ongoing Management

1. If silica-containing materials will be affected by sanding, drilling, chipping, grinding, cutting, sawing, sweeping or blasting, develop a silica exposure control plan to address control methods and personal protective equipment requirements in order to reduce worker exposure to a level as low as reasonably achievable below the occupational exposure limit prescribed in the *Canada Occupational Health and Safety Regulation* and BC *Occupational Health and Safety Regulation*. Guidance is provided in the WorkSafeBC publication *Developing a Silica Exposure Control Plan*. Silica control methods can include construction of barriers or enclosure systems to restrict access to and contain the work area; the use of wet methods; local exhaust ventilation when practical; and the use of personnel protective equipment.
2. Recycle fluorescent lamps when taken out of service. Do not break lamps.
3. Ozone depleting substances must be managed in accordance with the provincial and federal regulations (e.g. prohibition of release, recovery, record keeping, servicing by certified personnel, leak testing, etc.).

5.2 Building Renovation Work

The following specific recommendations are made regarding renovation involving the hazardous materials identified.

1. Provide this report m2)to the contractor prior to bidding or commencing work.

The following general recommendations are made regarding renovation involving the hazardous materials identified.

Silica
Construction disturbance of silica-containing products may result in excessive exposures to airborne silica, especially if performed indoors and dry. Cutting, grinding, drilling or demolition of materials containing silica should be completed only with proper respiratory protection and other worker safety precautions that comply with provincial standards or guidelines.

Mercury
Do not break lamps. Recycle fluorescent lamps when taken out of service.

Mould
No mould was observed; if mould is uncovered inside wall cavities during hand demolition, use appropriate precautions and protect workers using methods that comply with provincial guidelines.

Ozone Depleting Substances
Remove and recover refrigerants prior to disposal in compliance with regulations. Used licensed technicians to perform this work.

6 REFERENCES

The following legislation and documents were referenced in completing the assessment and this report:

1. Occupational Health and Safety Regulation, B.C. Reg. 296/97, WorkSafe BC.
2. Safe Work Practices for Handling Asbestos, WorkSafe BC, 2012 Edition.

3. Hazardous Waste Regulation, B.C. Reg. 261/2006, BC Ministry of Environment.
4. Ozone Depleting Substances and Other Halocarbons Regulation, B.C. Reg. 220/2006, Environmental Management Act.
5. PCB Regulations, SOR/2008-273, Canadian Environmental Protection Act.
6. Lead-Containing Paint and Coatings, Preventing Exposure in the Construction Industry, WorkSafe BC, June 2011.
7. Mould Guidelines for the Canadian Construction Industry, Standard Construction Document CCA 82 – 2004, Canadian Construction Association.
8. Minister of Justice. 2018. Canada Labour Code. R.S.C., 1985, c. L-2. August 27, 2018.
9. Minister of Justice. 2018. Canada Occupational Health and Safety Regulations. SOR/86-304. August 27, 2018.
10. Public Services and Procurement Canada. 2017. Asbestos Management Standard. June 5, 2017.
11. Transport Canada. 2017. Consolidated Transport of Dangerous Goods Regulations including Amendment SOR/2017-253.
12. ASTM E2356 Standard Practice for Comprehensive Buildings Asbestos Surveys
13. Government of Canada, Asbestos Management Plan, Version 2018-01, February 2018

7 LIMITATIONS

This report, prepared for Public Services and Procurement Canada, does not provide certification or warranty, expressed or implied, that the investigation conducted by Arcadis identified all hazardous materials associated with the subject building. The work undertaken by Arcadis was directed to provide information on the presence of hazardous materials in construction materials based on visual inspection of readily accessible areas of the subject building, and on the results of laboratory analysis of a limited number of bulk samples. The material in this report reflects Arcadis' best judgment in light of the information available at the time of the investigation, which was performed on December 9, 2019 This report is not intended to be used as a scope of work or technical specification for remediation of hazardous materials. This report was prepared by Arcadis for Public Services and Procurement Canada. Any use which any other party makes of the report, or reliance on, or decisions to be based on it, is the responsibility of such parties.

APPENDIX A

Site Photographs

Project Photographs

Public Services and Procurement Canada
Building E0183, House 09, British Columbia

Photo: 1

Date:
December 9, 2019

Description:
Front view of employee housing

Photo: 2

Date:
December 9, 2019

Description:
Rear view of employee housing

Project Photographs

Public Services and Procurement Canada
Building E0183, House 09, British Columbia

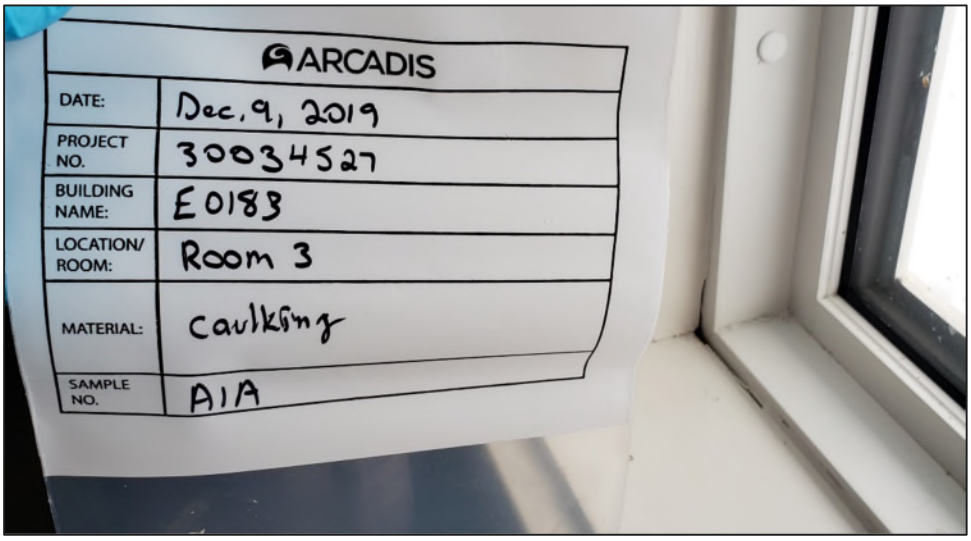

Photo: 3

Date:
December 9, 2019

Description:
Typical non-ACM caulking around interior of windows

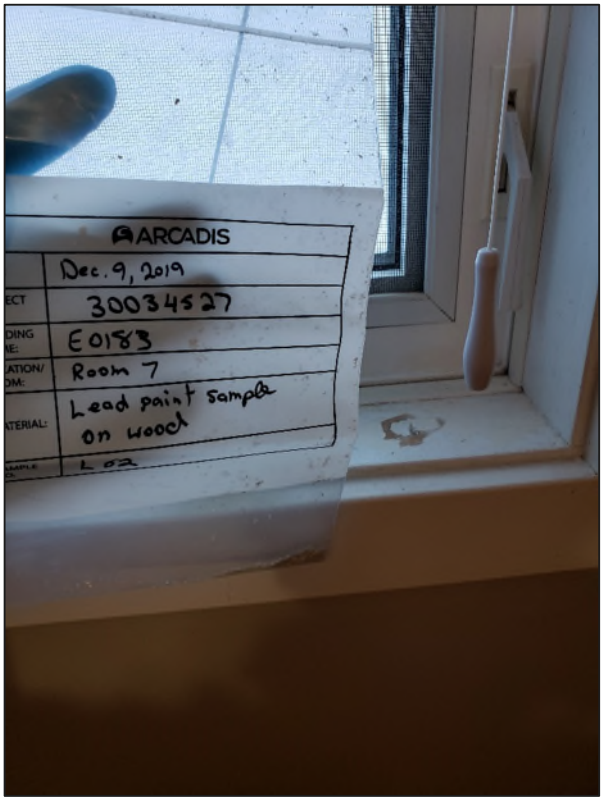

Photo: 4

Date:
December 9, 2019

Description:
Typical non-lead paint on window sills

Project Photographs

Public Services and Procurement Canada
Building E0183, House 09, British Columbia

Photo: 5

Date:
December 9, 2019

Description:
Non-ACM firestop putty at exterior cable penetration

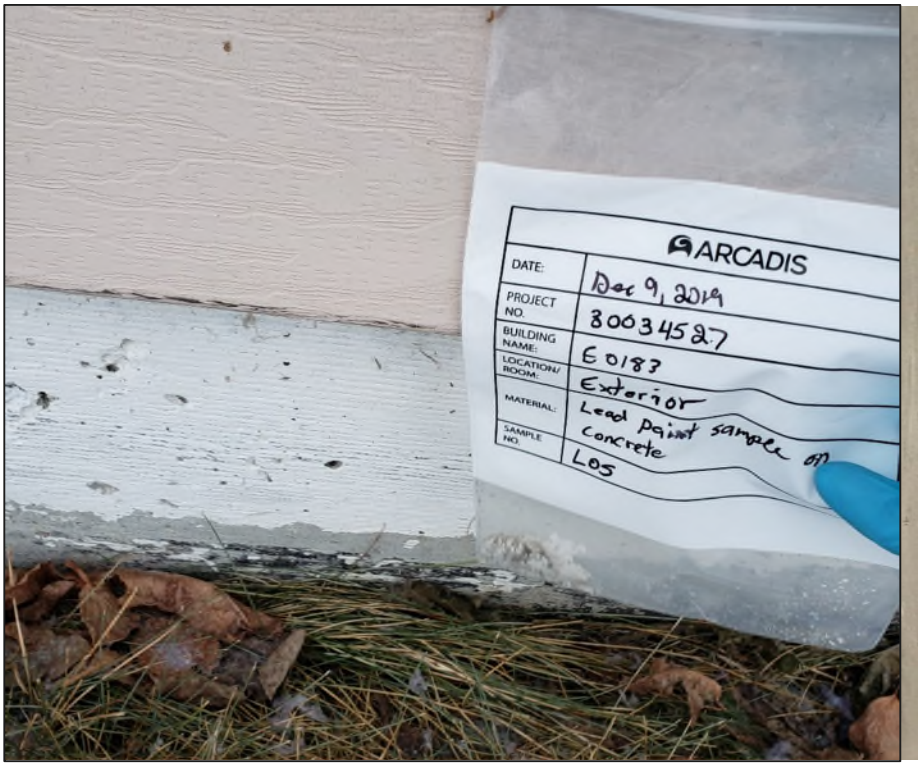

Photo: 6

Date:
December 9, 2019

Description:
Non-lead paint on exterior concrete foundation

APPENDIX B

Laboratory Certificates of Analysis

EMSL Canada Inc.

4506 Dawson Street Burnaby, BC V5C 4C1
Phone/Fax: (604) 757-3158 / (604) 757-4731
http://www.EMSL.com / vancouverlab@EMSL.com

EMSL Canada Order 691903451
Customer ID: 55ACAV42
Customer PO: 30034527
Project ID:

Attn: Jerry Botti
ARCADIS Canada Inc.
308-1080 Mainland Street
Vancouver, BC V6B 2T4

Phone: (604) 632-9941
Fax:
Collected:
Received: 12/30/2019
Analyzed: 1/07/2020

Proj: 30034527

Test Report: Asbestos Analysis in Bulk Material for Occupational Health and Safety British Columbia Regulation 188/2011 via EPA 600/R-93/116 Method

Client Sample ID: A1A **Lab Sample ID:** 691903451-0001
Sample Description: E0183 - ROOM 3/CAULKING

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	1/07/2020	White	0.0%	100.0%	None Detected	

Client Sample ID: A1B **Lab Sample ID:** 691903451-0002
Sample Description: E0183 - ROOM 5/CAULKING

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	1/07/2020	White	0.0%	100.0%	None Detected	

Client Sample ID: A1C **Lab Sample ID:** 691903451-0003
Sample Description: E0183 - ROOM 6/CAULKING

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	1/07/2020	White	0.0%	100.0%	None Detected	

Client Sample ID: A2A **Lab Sample ID:** 691903451-0004
Sample Description: E0183 - EXTERIOR/FIRESTOP PUTTY

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	1/07/2020	Gray	0.0%	100.0%	None Detected	

Client Sample ID: A3A **Lab Sample ID:** 691903451-0005
Sample Description: E0183 - EXTERIOR/CONSTRUCTION PAPER

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	1/07/2020	Brown	90.0%	10.0%	None Detected	

Client Sample ID: A3B **Lab Sample ID:** 691903451-0006
Sample Description: E0183 - EXTERIOR/CONSTRUCTION PAPER

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	1/07/2020	Brown	90.0%	10.0%	None Detected	

Client Sample ID: A3C **Lab Sample ID:** 691903451-0007
Sample Description: E0183 - EXTERIOR/CONSTRUCTION PAPER

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	1/07/2020	Brown	90.0%	10.0%	None Detected	

EMSL Canada Inc.

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http://www.EMSL.com / vancouverlab@EMSL.com

EMSL Canada Order 691903451
Customer ID: 55ACAV42
Customer PO: 30034527
Project ID:

Test Report: Asbestos Analysis in Bulk Material for Occupational Health and Safety British Columbia Regulation 188/2011 via EPA 600/R-93/116 Method

Client Sample ID: A3D ***Lab Sample ID:*** **691903451-0008**

Sample Description: E0183 - EXTERIOR/CONSTRUCTION PAPER

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	1/07/2020	Brown	90.0%	10.0%	None Detected	

Client Sample ID: A3E ***Lab Sample ID:*** **691903451-0009**

Sample Description: E0183 - EXTERIOR/CONSTRUCTION PAPER

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	1/07/2020	Brown	90.0%	10.0%	None Detected	

Analyst(s):

Margaret Lee PLM (6)
Nicole Yeo PLM (3)

Reviewed and approved by:

Nicole Yeo, Laboratory Manager
or Other Approved Signatory

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

Samples analyzed by EMSL Canada Inc. Burnaby, BC

Initial report from: 01/07/202016:28:44

EMSL Canada Inc.
2333 18th Avenue NE, Unit 48, Calgary, AB T2E 8T6
Phone/Fax: (403) 879-1149 / (403) 879-1152
http://www.EMSL.com CalgaryLab@EMSL.com

EMSL Canada Or	651910042
CustomerID:	55ACAV42
CustomerPO:	
ProjectID:	

Attn: **Jerry Botti**
ARCADIS Canada Inc.
308-1080 Mainland Street
Vancouver, BC V6B 2T4

Phone: (604) 632-9941
Fax:
Received: 12/31/19 10:50 AM
Collected: 12/9/2019

Project: **30034527**

Test Report: Lead in Paint Chips by Flame AAS (SW 846 3050B/7000B)*

Client Sample Description	*Lab ID*	*Collected*	*Analyzed*	*Weight*	*Lead Concentration*
L01	*651910042-0001*	12/9/2019	1/6/2020	0.1138 g	<180 ppm
	Site: E0183 - ROOM 15 Insufficient sample to reach reporting limit.				
L02	*651910042-0002*	12/9/2019	1/6/2020	0.1067 g	<190 ppm
	Site: E0183 - ROOM 7 Insufficient sample to reach reporting limit.				
L03	*651910042-0003*	12/9/2019	1/6/2020	0.0741 g	<270 ppm
	Site: E0183 - ROOM 3B Insufficient sample to reach reporting limit.				
L04	*651910042-0004*	12/9/2019	1/6/2020	0.2503 g	170 ppm
	Site: E0183 - ROOM 12				
L05	*651910042-0005*	12/9/2019	1/6/2020	0.2502 g	<80 ppm
	Site: E0183 - EXTERIOR				

Jefferson Salvador, Laboratory Manager
or other approved signatory

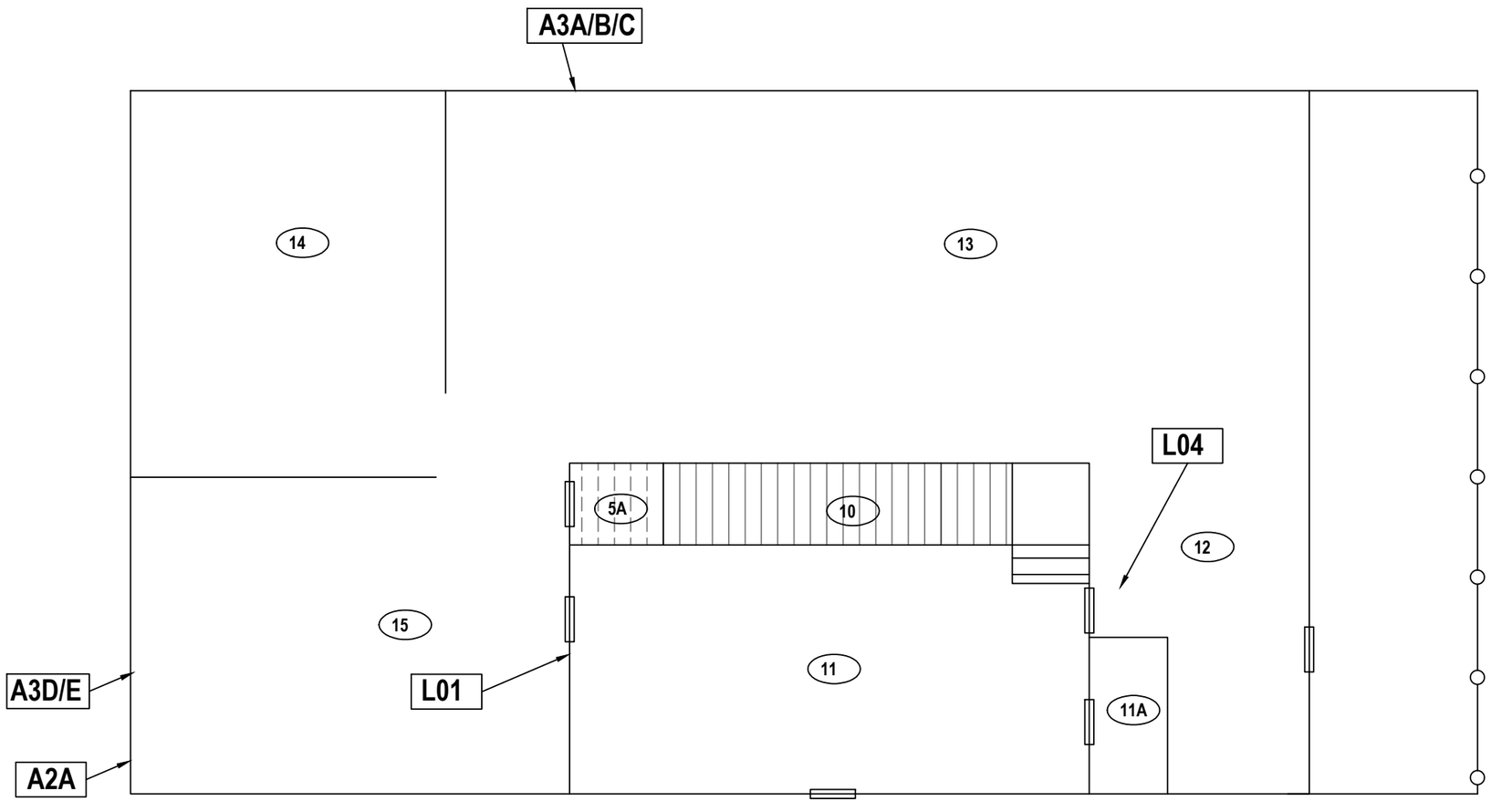
*Analysis following Lead in Paint by EMSL SOP/Determination of Environmental Lead by FLAA. Reporting limit is 0.008 % wt based on the minimum sample weight per our SOP. Unless noted, results in this report are not blank corrected. This report relates only to the samples reported above and may not be 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 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. Calgary, AB CALA Accreditation #A3942

Report Amended: 01/08/2020 08:40:11 Replaces the Inital Report 01/08/2020 08:38:29. Reason Code: Client-Other (see report comment)

APPENDIX C

Floor Plans



LEGEND

A-XXX Asbestos Sample Location

L-XXX Lead Sample Location

X Room Number

N.T.S

Title: **GOVERNMENT OF CANADA HAZARDOUS BUILDING MATERIAL ASSESSMENT - 2019-2020**

Project: BUILDING E0183 - HOUSE 09 FIRST FLOOR

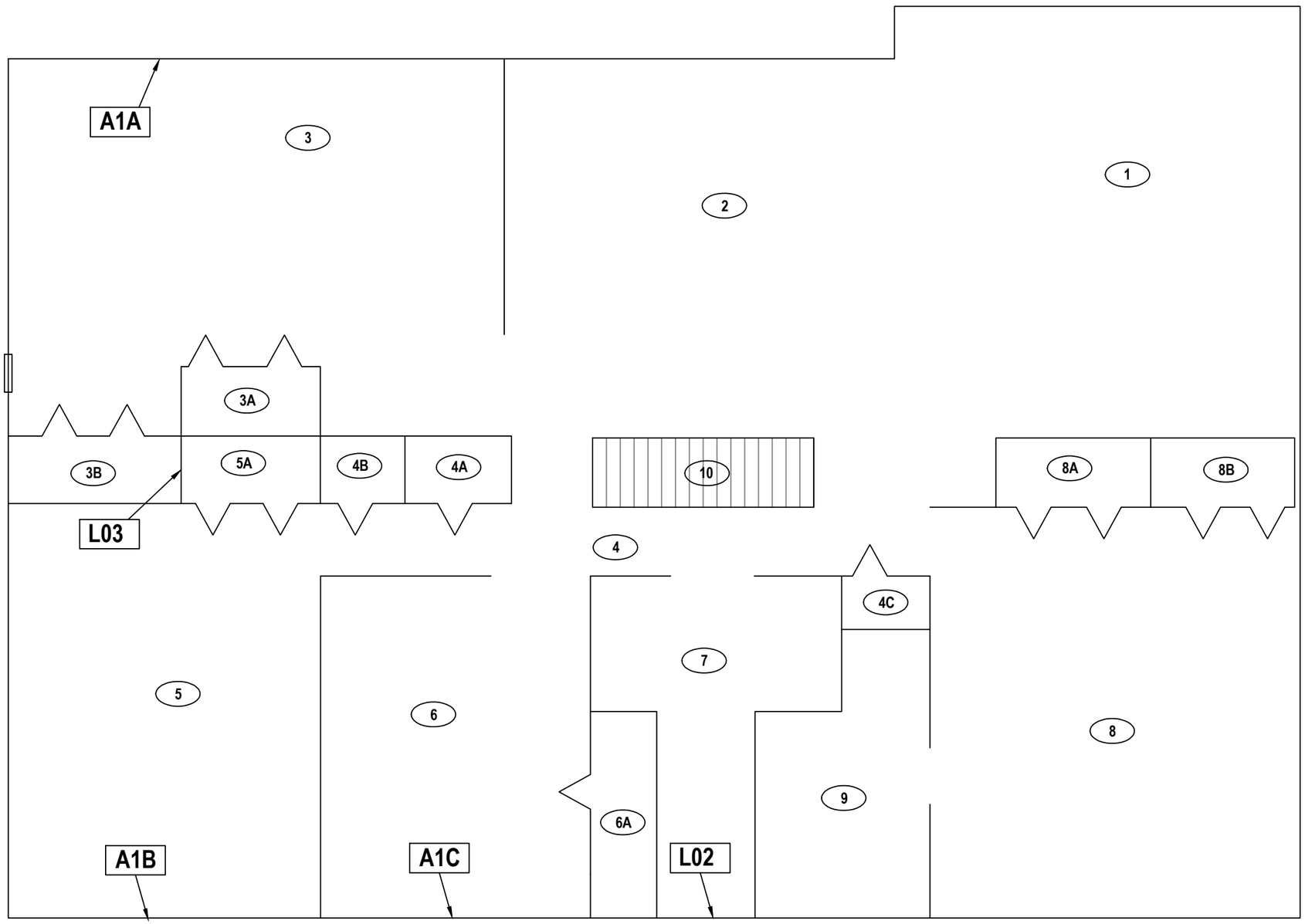
Client: PUBLIC SERVICES AND PROCUREMENT CANADA

Project Number:	Drawn By:	Plot Size:	Date:
30034527	CB	11X17"	JANUARY 2020

ARCADIS

FIGURE C-1

firstfloor G:\PROJECTS\30034527 - RCMP Phase 2 HBMA PSPC\CAD\E0183.dwg



LEGEND

A-XXX Asbestos Sample Location

L-XXX Lead Sample Location

X Room Number

N.T.S

Title: **GOVERNMENT OF CANADA HAZARDOUS BUILDING MATERIAL ASSESSMENT - 2019-2020**

Project: BUILDING E0183 - HOUSE 09 SECOND FLOOR

Client: PUBLIC SERVICES AND PROCUREMENT CANADA

Project Number:	Drawn By:	Plot Size:	Date:
30034527	CB	11X17"	JANUARY 2020

ARCADIS

FIGURE C-2

2ndfloor G:\PROJECTS\30034527 - RCMP Phase 2 HBMA PSPC\CAD\E0183.dwg

APPENDIX D

Regulations and Health Effects

Asbestos

Occupational Health and Safety (OHS) for federal employees is regulated by the Canada Labour Code (CLC) Part II. The *Canada Occupational Health and Safety Regulations (COHSR), Part X, Hazardous Substances* covers specific requirements related to the management and control of asbestos-containing materials (ACM). The COHSR, Part X, Hazardous Substances, states an employee shall be kept free from exposure to a concentration of airborne chrysotile asbestos in excess of 0.1 fibre/cm^3 or f/cc. There are also specific requirements for hazard prevention detailed in the Hazard Prevention Program (HPP) in the CLC.

For the purposes of this report, the following federal requirements will be followed, unless provincial requirements are more stringent. Federal legislation and policy referenced in this report includes:

- Canada Labour Code, August 27, 2018;
- Canada Occupational Health and Safety Regulations Part X, Hazardous Substances; SOR/86-304, August 27, 2018;
- Public Services and Procurement Canada Asbestos Management Standard, June 2017;
- Asbestos Management Plan, Government of Canada, Version 2018-01, February 2018; and,
- Transport Canada, Transport of Dangerous Goods Regulations

The management and requirements for the potential disturbance of asbestos in buildings is also regulated at the provincial level under the *British Columbia Occupational Health and Safety Regulations,296/97, and Safe Work Practices for Handling Asbestos, WorkSafeBC, 2017 Edition*.

The BC Occupational Health and Safety Regulations, 296/97 (BC Reg 296/97), require specific actions when asbestos is a potential health hazard in a workplace. Section 6.1 of the regulation defines an asbestos-containing material as follows:

"asbestos-containing material" means the following:

(a) a manufactured article or other material, other than vermiculite insulation, that would be determined to contain at least 0.5% asbestos if tested in accordance with one of the following methods:

(i) Asbestos, Chrysotile by XRD, Method 9000 (Issue 2, dated August 15, 1994) in the NIOSH Manual of Analytical Methods, published by the United States National Institute for Occupational Safety and Health, Centre for Disease Control;

(ii) Asbestos (bulk) by PLM, Method 9002 (Issue 2, dated August 15, 1994) in the NIOSH Manual of Analytical Methods, published by the United States National Institute for Occupational Safety and Health, Centre for Disease Control;

(iii) Test Method for the Determination of Asbestos in Bulk Building Materials (EPA/600/R-93/116, dated July 1993) published by the United States Environmental Protection Agency;

(b) vermiculite insulation that would be determined to contain any asbestos if tested in accordance with the Research Method for Sampling and Analysis of Fibrous Amphibole in Vermiculite Attic Insulation

(EPA/600/R-04/004, dated January 2004) published by the United States Environmental Protection Agency;

The duties of employers, contractors, or owners include:

- identifying and labeling ACM that can potentially release asbestos fibres;
- keeping a current written record of all ACM present in the workplace;
- conducting regular surveillance and maintenance of asbestos materials to prevent fibre release;
- developing a written exposure control plan if workers may be exposed to harmful levels of asbestos;
- conducting work in a way that prevents the release of asbestos fibres as much as possible;
- notifying, informing, and training workers; and,
- notifying Occupational Health and Safety (OHS) at least 48 hours before beginning an asbestos-abatement.

Disturbance of asbestos during construction and demolition is regulated under section 20.112 of BC Reg 296/97.

The 2017 WorkSafeBC publication Safe Work Practices for Handling Asbestos (Asbestos Guide) is used by Occupational Health and Safety officers as a guide when reviewing abatement work practices and employer codes of practice, and generally meets the requirements of the COHSR.

The Asbestos Guide also provides significant additional background information pertaining to asbestos, along with details on health effects and other applicable legislation within the province of British Columbia (e.g., the federal Hazardous Products Act, the BC Building Code and waste disposal regulations).

Disposal of asbestos waste is governed by the British Columbia Hazardous Waste Regulation (BC Reg. 63/88). The Federal Transportation of Dangerous Goods Regulation and BC Reg. 63/88 set out the requirements for the proper transport of asbestos waste in British Columbia. In general, and for transportation and disposal, the waste must be placed in a double sealed container, properly labeled, free of cuts, tears or punctures and disposed of at a licensed waste station which has been properly notified of the presence of asbestos waste.

Health effects

Undisturbed asbestos within building materials poses no health risks. Asbestos poses a risk when building materials containing asbestos are impacted, or disturbed, thereby releasing the asbestos fibres into the air

Asbestos-related diseases are caused when suspended airborne asbestos fibres are inhaled and the fibres settle into various regions of the lungs and remain for extended periods. Once embedded in the lungs the asbestos fibres cause scarring within the lung tissue, ultimately leading to impaired lung function (asbestosis) and/or various cancers (lung cancer; mesothelioma). These asbestos-related diseases are irreversible and fatal. The risk of lung-related cancers is increased in individuals who smoke.

These asbestos-related diseases most often occur in individuals who have been exposed to high concentrations of airborne asbestos over a long period of time, though mesothelioma has been found in individuals with short-term exposures. Symptoms or the development of these asbestos-related diseases usually occur 10 to 25 years after exposure

Lead

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 (2005) to 90 ppm (2010).

With respect to potential lead exposures associated with disturbance to surfaces coated with lead-containing products, the 2011 WorkSafeBC manual titled Lead-Containing Paint and Coatings: Preventing Exposure in the Construction Industry, indicates the following:

- Improper removal of lead paint containing 600 mg/kg lead results in airborne lead concentrations that exceed half of the exposure limit
    - This potential for exposure exceeding half of the occupational exposure limit would be the trigger for implementation of an exposure control plan.
- Lead concentrations as low as 90 mg/kg may present a risk to pregnant women and children
    - Any risk assessment should include for the presence of high risk individuals within the workplace

The disposal of lead-containing paint is regulated under the Federal *Transportation of Dangerous Goods Act* and by the British Columbia Ministry of Environment. All lead-based paints and associated nonmetal substrate (concrete, plaster, wood, etc.) must undergo Toxicity Characteristic Leachate Properties (TCLP) metals testing to determine disposal procedures. Upon the completion of the test, the total concentration of metals in the waste extract must be compared to Schedule 4, Table 1 of the Hazardous Waste Regulation.

The Federal Transportation of Dangerous Goods Regulation and BC Reg. 63/88 set out the requirements for the proper transport of lead waste in British Columbia.

Health Effects

Elemental lead and inorganic lead compounds are absorbed through ingestion or inhalation and can incorporate into the bone marrow, nerve tissue, brain, and kidneys. In children, symptoms of lead poisoning can include headaches, irritability, abdominal pain, vomiting, anemia, weight loss, poor attention span, noticeable learning difficulty, slowed speech development, and hyperactivity. In adults, symptoms of lead poisoning can include pain, numbness or tingling of the extremities, muscular weakness, headache, abdominal pain, memory loss, unsteady gait, pale skin, weight loss, vomiting, irritability, and anemia. Although adults are susceptible to the toxic effects of lead, children are at high risk due to the nature of a child's activities that involve the introduction of non-food items into their bodies.

Excessive airborne lead and surface contamination can be transferred to employees' hands and may results in lead ingestion. Therefore, work practices intended to minimize surface lead concentrations, such as frequent cleaning of work surfaces should be included in an overall lead exposure control plan

PCB

As of September 5, 2008, under subsection 93(1) of the *Canadian Environmental Protection Act,* (CEPA), Federal PCB regulations were published by the Canada Gazette Part II (SOR/2008-273) that imposed specific deadlines for the elimination of all PCBs in concentrations at or above 50 milligrams/kilogram (mg/kg). This regulation required the elimination of all PCBs and PCB-containing materials currently in-use and in storage and limited the period of time PCB materials could 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.

In British Columbia, PCB equipment becomes PCB wastes as soon as it is removed from service. This is the case even if the intent is to treat, recycle, or reuse the equipment.

When PCB wastes are stored in British Columbia, the full requirements of BC Reg. 63/88 apply to:

- 1.0 kg or more of pure PCB
- 100 L or more of any liquid containing more than 50 ppm of PCB
- 100 kg or more of any material other than a liquid, contaminated with more than 50 ppm of PCB

These amounts are the total of all amounts at a single location owned or controlled by the same person. They include PCB equipment. BC Reg. 63/88 also provides packaging requirements for storage, labeling requirements, waste destruction requirements, and references SOR/2008-273, indicating:

The Federal Transportation of Dangerous Goods Regulation sets out the requirements for the proper transport of PCB waste across provincial boundaries.

In British Columbia, a manifest issued by the Ministry of Environment (or equivalent federal document) must be used for hazardous wastes shipped from sites in British Columbia. A manifest must be used to transport:

- 5 kg or more of PCB solids
- 5 L or more of PCB liquids
- An amount of a PCB solid or PCB liquid containing more than 500 g of PCB within BC
- 500 g or more of solids, liquids, or mixtures of these containing 50 mg/kg of PCB outside of BC

Health effects

PCBs are insoluble in water; however, they readily dissolve in fats and other organic compounds. It is these attributes and fat-solubility that allow PCBs to persist in the environment and bio-accumulate in humans and animals. Exposure to PCBs can affect the immune system, reproductive system, nervous system and endocrine system. In humans, PCBs are potentially cancer-causing.

Mould

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, occupational health and safety regulations typically require employers to take every precaution reasonable in the circumstances for the protection of workers.

The WorkSafeBC Guideline for Part 4 of BC Reg. 296/97 discusses the application of the Regulation to workplaces with mould showing on exposed or hidden surfaces, or where mould may be a factor in complaints regarding indoor air quality. The guideline provides information for investigating indoor air quality complaints with respect to mould contamination, including information on sampling for the

presence of moulds in buildings. Information is also provided on possible health effects and for cleanup personnel involved in the remediation of buildings damaged by water and mould.

Health Effects

There are a number of documented cases of health problems related to exposure to indoor fungi.

Both high-level, short-term exposures and lower-level, long-term exposures can result in illness. The most common symptoms from exposure to mould in indoor environments are runny nose, eye irritation, cough, congestion, aggravation of asthma, headache, flu-like symptoms, fatigue, and skin rash. People with suppressed immune systems may be susceptible to fungal infections as a result of exposure to indoor moulds.

People who are exposed to mould growth on building materials will not necessarily exhibit adverse health effects. However, the mould must still be removed. Humans are at risk from indoor mould when fungal spores, fragments or metabolites are released into the air and inhaled or physically contacted (dermal exposure).

Not everyone experiences allergic reaction; the susceptibility to exposure varies with the individual's genetic predisposition, age, state of health, and concurrent exposures. For these reasons, and because the measurement of exposure is not standardized and biological markers of exposure to fungi are largely unknown, it is not possible to establish "safe" or "unsafe" levels of exposure. However, federal and provincial policies have been written to minimize mould exposure and the elimination of mould indoors.

Mercury

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 disposal should be through a scrap dealer (elemental mercury), recycling firm for mercury vapour and returned to the manufacturer for light tubes and fixtures. Disposal of mercury waste is governed by BC Reg. 63/88.

The Federal Transportation of Dangerous Goods Regulation and BC Reg. 63/88 set out the requirements for the proper transport of mercury waste in British Columbia.

Health Effects

Routes of exposure for mercury and mercury compounds include inhalation, ingestion, skin and/or eye contact. 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.

Elemental (metallic) mercury most often causes health effects through inhalation of its vapour, which can be absorbed through the lungs. This kind of exposure can result when elemental mercury is spilled (or products that contain elemental mercury break) and the mercury is exposed to the air. Vapour concentrations can vary especially in warm or poorly-ventilated indoor spaces where the airborne concentration can exceed the permissible exposure limit (provincially set).

Chronic mercury "poisoning" can be caused by long-term exposure to low airborne concentrations (or low levels) of mercury. Symptoms or effects of mercury exposure include: tremors, emotional changes,

neuromuscular effects, mental changes/disturbances, digestive disturbances, headaches, insomnia, and changes in nervous response.

Silica

Regulations pertaining to silica are provided in BC Reg. 296/97. Included are general provisions (minimizing release; keeping worksite clear of unnecessary accumulations; ensuring methods for decontamination prevent generation of airborne silica), provisions for “restricted areas” (where there is a reasonable chance that the airborne concentration of silica exceeds or may exceed the occupational exposure limit), provisions for use in abrasive blasting, and provisions for health assessments for workers exposed to silica.

Health Effects

Crystalline silica dust particles, which are small enough to be inhaled into the lungs (respirable size), can cause a number of health problems. As with asbestos, silica within building materials poses no threat to human health if left undisturbed.

Exposure to crystalline silica airborne dust my cause scaring of the lungs with coughing and shortness of breath—also known as “silicosis”, a form of disabling, progressive, and sometimes fatal pulmonary fibrosis.

Ozone Depleting Substances (ODS)

ODSs are regulated in British Columbia by the British Columbia *Waste Management Act*—Ozone Depleting Substances and Other Halocarbons Regulation (BC Reg. 387/99 as amended by BC Reg. 109/2002).

On federal land, aboriginal land and federal works, buildings and undertakings, the Federal Halocarbon Regulation 2003 (SOR/2003-289, including associated amendments) 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.

If ODS-containing materials are to be removed and disposed of, all ODSs must be handled, recycled, stored, and/or disposed of in accordance with the requirements of BC Reg. 63/88.

The Federal Transportation of Dangerous Goods Regulation and BC Reg. 63/88 set out the requirements for the proper transport of ODS waste in British Columbia.

Health Effects

Health effects are not typically related to exposure to ODSs directly, but to the consequences of ODS release to the atmosphere, subsequent degradation of the earth’s ozone layer, and implications associated with increased UVB light exposure.

APPENDIX E

Asbestos Classification, Condition and Accessibility

1.1 Spray Applied Fireproofing, Insulation and Texture Finishes

To evaluate the condition of ACM spray applied as fireproofing, thermal insulation, or texture, decorative or acoustic finishes, the following criteria are applied:

GOOD

Surface of material shows no significant signs of damage, deterioration or delamination. Up to 1 percent visible damage to surface is allowed within range of **GOOD**. Evaluation of sprayed fire-proofing requires the surveyor to be familiar with the irregular surface texture typical of sprayed asbestos products. **GOOD** condition includes un-encapsulated 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 1 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 survey or re-assessment form.

NOTE: **FAIR** condition is not utilized in the evaluation of the 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 are advised to be watchful for ACM **DEBRIS** prior to accessing or working above ceilings in areas of buildings with ACM regardless of the reported condition.

1.2 Mechanical Insulation

The evaluation of the condition of mechanical insulation (on boilers, breaching, ductwork, piping, tanks, equipment etc.) utilizes the following criteria:

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 penetrating 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. It is not possible to observe the full length of mechanical insulation from all angles.

1.3 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 should be treated as a friable product.

2. Evaluation of Accessibility

The accessibility of building materials known or suspected of being ACM is rated according to the following criteria:

ACCESS (A)

Areas of the building within reach (from floor level) of all building users. Includes areas such as gymnasiums, workshops, and storage areas where activities of the building users may result in disturbance of ACM not normally within reach from floor level.

ACCESS (B)

Frequently entered maintenance areas within reach of maintenance staff, without the need for a ladder. Includes: frequently entered pipe chases, tunnels and service areas or areas within reach from a fixed ladder or catwalk, e.g. tops of equipment, mezzanines.

ACCESS (C) EXPOSED

Areas of the building above 2.4 metres where use of a ladder is required to reach the ACM. Only refers to ACM that is exposed to view, from the floor or ladder, without the removal or opening of other building components such as ceiling tiles, or service access door or hatch. Does not include infrequently accessed service areas of the building.

ACCESS (C) CONCEALED

Areas of the building which require the removal of a building component, including lay-in ceilings and access panels into solid ceiling systems. Includes rarely entered crawl spaces, attic spaces, etc. Observations will be limited to the extent visible from the access points.

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 ACM. Evaluation of condition and extent of ACM is limited or impossible, depending on the surveyor's ability to visually examine materials in ACCESS D.

3. ACM DEBRIS

3.1 DEBRIS from Friable ACM

The presence of fallen ACM is noted separately from the presumed friable ACM source (sprayed fireproofing, thermal insulation, texture, decorative or acoustic finishes or mechanical insulation) and is referred to as **DEBRIS**.

3.2 DEBRIS from Damaged Non-Friable ACM

The presence of fallen ACM from damaged non-friable ACM is also reported separately from the non-friable ACM source. Only fallen non-friable ACM that has become friable is reported as **DEBRIS**.

The identification of the exact location or presence of **DEBRIS** on the top of ceiling tiles is limited by the number of observations made and the presence of building components such as ducts or full height walls

that obstruct observations. Workers are advised to be watchful for the presence of **DEBRIS** prior to accessing or working in proximity to mechanical insulation or above ceilings in areas of buildings with ACM regardless of the reported presence or absence of **DEBRIS**.

4. Action Matrix and Action Descriptions

The Asbestos Management Plan requires the following responses:

- Immediately clean-up **DEBRIS** that is likely to be disturbed.
- Remove, repair or enclose friable ACM in **POOR** or **FAIR** condition whose continued deterioration will result in **DEBRIS** that is likely to be disturbed.

The following factors shall be considered in making site-specific recommendations for compliance with the existing applicable regulations or codes and the practical implementation of the Asbestos Management Plan:

1. ACM in **POOR** condition is not routinely repairable. If an abatement action is necessary, removal is the recommended action (enclosure is a viable option in unusual circumstances, e.g. where removal is difficult or costly and the asbestos-containing material can be thoroughly enclosed).

2. Mechanical insulation in **FAIR** condition will be repaired or removed based on the following general recommendations, applied on a case-by-case basis:
   - ACM insulation found in **FAIR** condition in ACCESS (B) or ACCESS (C) EXPOSED areas is to be repaired.
   - ACM mechanical insulation found in **FAIR** condition in ACCESS (B) and ACCESS (C) EXPOSED areas, where future damage to the ACM is likely to occur, is to be removed.

3. ACM in **GOOD** condition present in ACCESS (A) can be managed by surveillance, as long as it is not disturbed by future renovation, maintenance, or demolition. Proactive removal of the ACM in ACCESS (A) will be considered where damage is possible by on-going occupant activity (accidental or intentional).

4. Non-friable or manufactured products are considered in the action matrix as follows:
   - Non-friable and manufactured products reported in **POOR** condition, or friable **DEBRIS** resulting from the deterioration of non-friable ACM, are treated as friable materials and the appropriate action, and depending on accessibility is determined from the action matrix for friable ACM.
   - For non-friable or manufactured products reported in **GOOD** condition, Action 7 (surveillance) is recommended regardless of accessibility.

5. All asbestos-containing material from a particular area is to be removed where small quantities of asbestos are present, and removal will negate the need for the use of an Asbestos Management Program in that area.

The action matrix provided below establishes the recommended asbestos control action. The ACTIONS themselves are described in full following the table.

4.1 Action Matrix Tables

FRIABLE ACM				
ACCESS	**CONDITION**			**DEBRIS**
	GOOD	**FAIR**	**POOR**	
(A)	ACTION 5/7[1]	ACTION 5/6[2]	ACTION 3	ACTION 1
(B)	ACTION 7	ACTION 6/5[3]	ACTION 3	ACTION 1
(C) EXPOSED	ACTION 7	ACTION 6	ACTION 4	ACTION 2
(C) CONCEALED	ACTION 7	ACTION 7	ACTION 4	ACTION 2
(D)	ACTION 7	ACTION 7	ACTION 7	ACTION 7

[1] If material in **ACCESS (A)/GOOD** condition is not removed **ACTION 7** is required.

[2] If material in **ACCESS(A)/FAIR** condition is not removed **ACTION 6** is required.

[3] Remove ACM in **ACCESS (B)/FAIR** condition if ACM is likely to be disturbed.

4.2 Action Descriptions

ACTION 1 - Immediate Clean-Up of DEBRIS that is Likely to Be Disturbed

Access that is likely to cause a disturbance of the ACM **DEBRIS** is to be restricted and **clean up ACM DEBRIS is to be done immediately**. Use correct asbestos procedures. This action is required for compliance with regulatory requirements and good practice. The assessor should immediately notify the Asset or Property and Facility Manager, or Regional/Area Asbestos Management Coordinator of this condition.

ACTION 2 - Intermediate risk precautions for Entry into Areas with ACM DEBRIS

At locations where ACM **DEBRIS** can be isolated in lieu of removal or cleaned up, use appropriate means to limit entry to the area. Restrict access to the area to persons using intermediate risk asbestos precautions. The precautions will be required until the ACM **DEBRIS** has been cleaned up, and the source of the **DEBRIS** has been stabilized or removed.

ACTION 3 - ACM Removal Required for Compliance

Remove ACM for compliance with regulatory requirements and good practice. Utilize asbestos procedures appropriate to the scope of the removal work.

ACTION 4 - Access into areas where asbestos-containing material is present and likely to be disturbed by access requires intermediate risk precautions.

Intermediate risk asbestos precautions are to be used when entry or access into an area is likely to disturb the ACM. **ACTION 4** must be used until the ACM is re-moved (Use **ACTION 1** or **2** if **DEBRIS** is present). Intermediate risk or high-risk precautions should be used for removal (depending on extent of removal).

ACTION 5 - Proactive ACM Removal

Removal of ACM in lieu of repair may be considered, even if it is in **GOOD** condition at locations, where ACM is easily accessible, limited in quantity, and removal would be cost-effective.

ACTION 6 - ACM Repair

Repair ACM found in **FAIR** condition, and not likely to be damaged again or disturbed by normal use of the area or room. Upon completion of the re-pair work treat ACM as material **in GOOD** condition and implement **ACTION 7**. If ACM is likely to be damaged or disturbed during normal use of the area or room, **ACTION 5** is to be implemented.

ACTION 7 - Routine Surveillance

Institute routine surveillance of the ACM. Trained workers or contractors must use appropriate asbestos precautions (low, intermediate or high) during disturbance of the remaining ACM.

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APPENDIX 1-10

Hazardous Building Materials Assessment
GOVERNMENT OF CANADA, E0137, Employee Housing, House 10

ARCADIS Design & Consultancy for natural and built assets

Public Services and Procurement Canada

HAZARDOUS BUILDING MATERIALS ASSESSMENT

GOVERNMENT OF CANADA

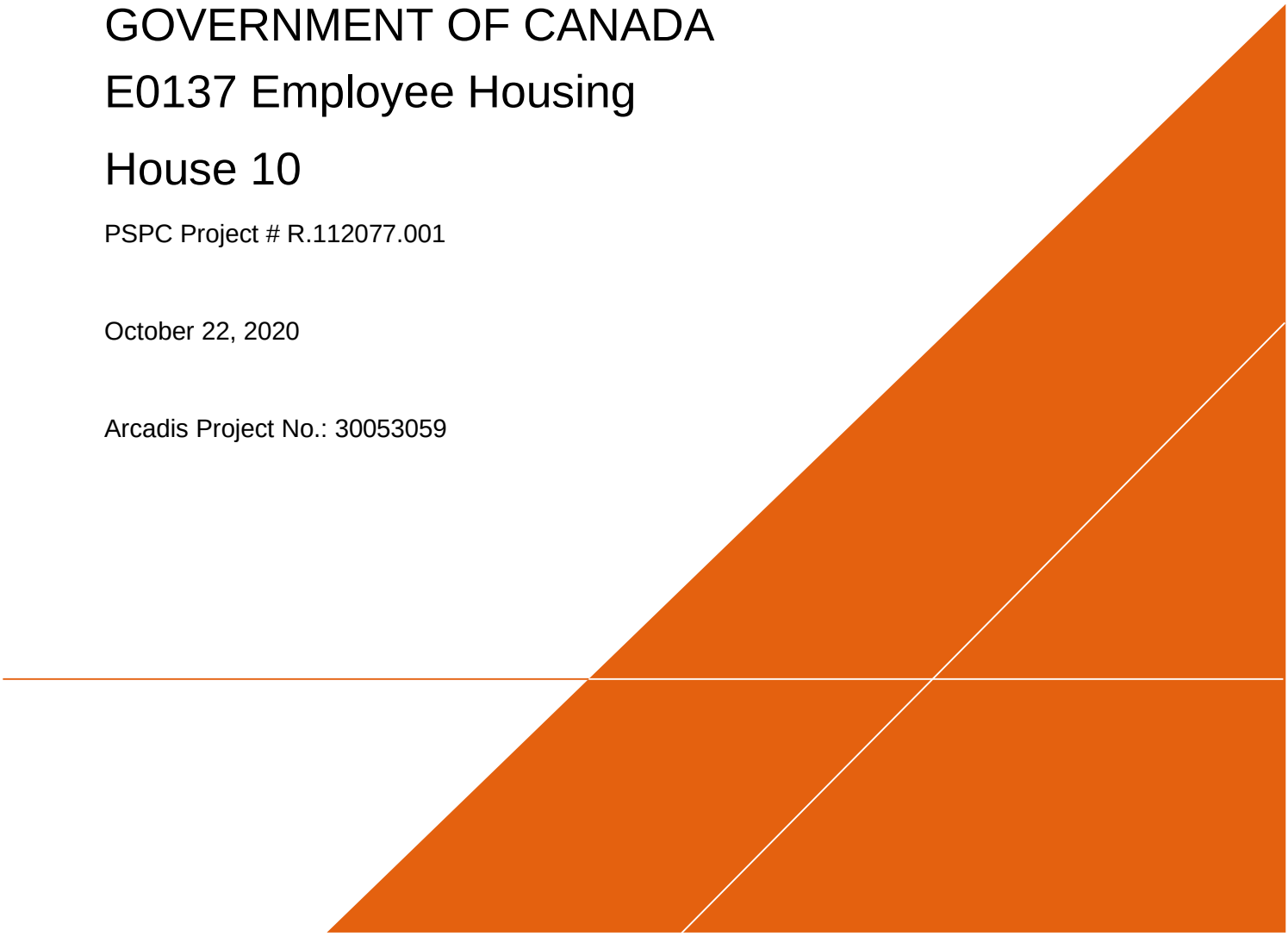
E0137 Employee Housing

House 10

PSPC Project # R.112077.001

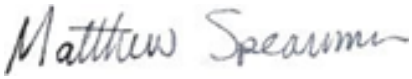
October 22, 2020

Arcadis Project No.: 30053059



HAZARDOUS BUILDING MATERIALS ASSESSMENT

Authored by:



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ACRONYMS AND ABBREVIATIONS

ACM	Asbestos-Containing Materials
Arcadis	Arcadis Canada Inc.
CLC	Canada Labour Code
COHSR	Canada Occupational Health and Safety Regulations
HPP	Hazard Prevention Program
LCB	Lead-Containing Paints
NIOSH	National Institute for Occupational Safety and Health
NJC	National Joint Council
OHS	Occupational Health and Safety
PCBs	Polychlorinated Biphenyls
PLM	Polarized Light Microscopy
PSPC	Public Services and Procurement Canada
TEM	Transmission Electron Microscopy
USEPA	United States Environmental Protection Agency

EXECUTIVE SUMMARY

Arcadis Canada Inc. (Arcadis) was retained by Public Services and Procurement Canada (PSPC, Client) to conduct a hazardous building materials assessment of Building E0137, Employee Housing, House 10, located in British Columbia.

This project consisted of a limited pre-renovation assessment to identify suspect hazardous materials in areas that were excluded from the original survey.

The renovation scope was limited to the part of the building scheduled for renovation, which consisted of replacing exterior windows, doors and vinyl siding as well as replacing deck and stairs.

The hazardous building materials considered during this assessment included the following:

- Asbestos-containing materials (ACMs)
- Lead, including lead-containing paints (LCPs)
- Polychlorinated biphenyls (PCBs) in electrical equipment
- Suspect visible mould
- Mercury materials/products/equipment
- Ozone-depleting substances (ODSs) in heating, ventilation, and air conditioning (HVAC) equipment or fixed fire suppression systems
- Silica in building materials

Arcadis performed the assessment on July 10, 2020. The assessment was conducted by Matthew Spearman, Dipl T (Env), Field Technologist, of Arcadis.

Summary of Findings

Asbestos: Asbestos-containing materials (ACM) were confirmed to be present as follows:

Material	Location(s)	Total Quantity	Condition (action)	Asbestos Type (%)
White Caulking	Exterior at front entrance stairs	2.5 meters	Good (7)	1% Chrysotile
Black weatherproofing*	Exterior – around concrete foundation	43 meters	Good (7)	2% Chrysotile

*Arcadis February 3, 2020 HBMA Report

Lead: Lead is confirmed present in the following paint:

Color (substrate)	Location(s)	Total Quantity	Condition	Concentration (ppm)
White (wood)*	Interior window sills throughout building	48.8 meters	Good	600

*Arcadis February 3, 2020 HBMA Report

Polychlorinated Biphenyls (PCBs): PCBs were not observed in the assessed area.

Suspect Visible Mould: No suspect visible mould was observed in the assessed area.

Mercury: Mercury vapor was observed in the assessed area: one compact fluorescent light bulb at the front entrance.

Ozone Depleting Substances (ODS): ODS were not observed in the assessed area.

Silica: Crystalline silica is a presumed component of the following materials in the assessed area: poured concrete.

Recommendations

The following is a summary of significant recommendations; refer to the body of the report for detailed recommendations.

1. Remove and properly dispose of asbestos-containing materials if disturbed by the planned renovation work.
2. Remove and dispose of mercury-containing items when taken out of service or if disturbed by the planned renovation work.
3. Follow appropriate safe work procedures when handling or disturbing asbestos, lead, and silica.
4. Prepare and update plans and performance specifications regarding hazardous material removal for the planned work. The specifications should include the scope of work, safe work practices, personal protective equipment, respiratory protection, and disposal of waste materials.
5. Provide this report and the detailed plans and specifications to the contractor prior to bidding or commencing work.
6. Retain a qualified consultant to specify, inspect and verify the successful removal of hazardous materials.
7. Update the asbestos inventory upon completion of the abatement and removal of asbestos-containing materials

Findings of this report are subject to our standard Limitations, as outlined in Section 7.

This Executive Summary is subject to the same standard limitations as contained in the report and must be read in conjunction with the entire report.

1 INTRODUCTION

1.1 Purpose

Arcadis Canada Inc. (Arcadis) was retained by Public Services and Procurement Canada (PSPC, Client) to conduct a hazardous building material assessment of building E0137, Employee Housing, House 10, located in British Columbia.

This project consisted of a limited pre-renovation assessment to identify suspect hazardous materials or areas that were excluded from the original survey.

The renovation scope was limited to the part of the building scheduled for renovation, which consisted of replacing exterior windows, doors, siding, deck, and stairs.

Arcadis performed the assessment on July 10, 2020. The assessment was conducted by Matthew Spearman, Dipl T (Env), Field Technologist of Arcadis.

1.2 Scope of Work

The scope of work for the project, as referenced in the Arcadis Workplan dated June 4, 2020 , identifies the requirement to conduct a hazardous building material assessment within Building E0137. Specifically, the scope of work included:

- Review of previous reports, construction specifications and drawings and identify any gaps related to hazardous building materials.
- Development of sampling strategy to address the identified gaps.
- Collect and submit representative suspect asbestos material and lead paint chip samples for analysis.
- Submit samples to accredited laboratories for analysis.
- Evaluation and interpretation of field findings and sample analytical results to develop conclusions and recommendations pertaining to hazardous building materials identified

For the purpose of this assessment, hazardous building materials re defined as follows:

- Asbestos-containing materials (ACMs)
- Lead, including lead-containing paints (LCPs)
- Polychlorinated biphenyls (PCBs) in electrical equipment
- Suspect visible mould
- Mercury materials/products/equipment
- Ozone-depleting substances (ODSs) in heating, ventilation, and air conditioning (HVAC) equipment or fixed fire suppression systems
- Silica in building materials

A general description of the building included in this assessment is provided in the table below:

Table 1. Building Description

Building Number (BU)	Building Name	Total Inside Gross m^2	Year Constructed	Building Description
E0137	House 10	202.10	1987	Two-story building with finished basement. Asphalt shingle roof and concrete foundation. Vinyl exterior siding. Drywall and texture coat interior walls. Texture coat ceilings. Carpet, poured concrete, wood laminate and vinyl sheet flooring. Heating is supplied by gas fired forced air furnace and electric baseboard.

2 BACKGROUND INFORMATION

Arcadis conducted previous assessments of the building and the findings are presented in the following reports:

- Asbestos-Containing Materials Survey, Building E0137, dated March 24, 2019, prepared by Arcadis Canada Inc. and,
- Hazardous Building Materials Assessment, Building E0137, dated, February 3, 2020, prepared by Arcadis Canada Inc.

2.1 Exclusions

The assessment was restricted to accessible locations of the building. Roofing or other material that may cause damage to the building envelope were not included unless specifically impacted by the proposed renovations and sampling would not compromise the building envelope integrity.

3 SURVEY METHODOLOGY

Sampling activities were conducted in accordance with Arcadis' Standard Operation Procedures which take into account current federal and provincial regulations pertaining to such work (i.e., sampling procedures, required number of samples and laboratory analytical procedures). Regulations are presented in Appendix D.

Representative bulk samples were collected of accessible suspect, PCB, lead, and asbestos in sufficient quantities for laboratory analysis. Samples were sealed in polyethylene zip-lock bags labeled with the sample number, suspect material description, and sample location. As part of sampling procedures, sampling tools were cleaned between sample collection events to avoid the potential for cross-contamination of samples.

All sample bags were compiled in order and placed into a single container accompanied with a chain of custody form outlining the project information, date, building location, number of samples, and sample description. Samples were submitted to the analytical laboratory in a sealed container via courier.

3.1 Asbestos-Containing Materials

A separate set of samples was collected of each type of homogenous material suspected to contain asbestos. A homogenous material is defined by the US EPA as material that is uniform in texture and appearance, was installed at one time, and is unlikely to consist of more than one type or formulation of material. The homogeneous materials are determined by visual examination, available information on the phases of the construction and prior renovations.

Bulk sampling protocols followed the ASTM E2356 Standard, which indicates requirements for the number of samples to collect for each homogeneous material. The table below provides an outline of the minimum number of samples to be collected from the ASTM E2356 Standard.

Table 2. Bulk Material Sample Quantities

Type of Material	Size of Area of Homogeneous Material	Minimum Number of Samples Collected
Any homogeneous material, including but not limited to fireproofing, drywall joint compound, ceiling tile stucco, acoustical and stipple finishes, and visually similar floor tiles	Less than 90 m^2 (<1,000 ft^2)	3
	90 m^2 or more, but less than 450 m^2 (1,000-5,000 ft^2)	5
	450 m^2 or more (>5,000 ft^2)	7

In some cases, manufactured products such as asbestos cement pipe were visually identified without sample confirmation.

Flooring mastic/adhesive are only sampled and analyzed if present on the underside of flooring samples (vinyl floor tile and vinyl sheet flooring) in sufficient quantity for laboratory analysis.

Attempts to distinguish and delineate asbestos-containing drywall compound from new non-asbestos drywall compound is often unachievable. Arcadis collected drywall joint compound samples from exterior walls, columns or other locations which are unlikely to have been renovated in an attempt to determine the presence of asbestos in the original drywall compound.

Arcadis submitted the bulk samples to a NVLAP accredited laboratory for analysis. The analysis is performed in accordance with Test Method EPA/600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials, July 1993.

EPA Method 600 states that materials characterized by interfering binder/matrix or low asbestos content may require additional gravimetric reduction sample treatment beyond routine polarized light microscopy (PLM) analysis (e.g. dissolution with hydrochloric acid, treatment with organic solvents or ashing in a muffle furnace or low temperature plasma asher to remove unwanted components).

Arcadis submitted one sample of each sample set (3) of vinyl floor tiles be analyzed by transmission electron microscopy (TEM) if the first two samples are reported negative by PLM.

The asbestos analysis was completed using a stop positive approach. Only one result of greater than the regulated criteria is required to determine that a material is asbestos-containing, but all samples must be analyzed to conclusively determine that a material is non-asbestos. The laboratory stopped analyzing samples from a homogeneous material once greater than the criteria was detected in any of the samples of that material. All samples of a homogeneous material were analyzed if no asbestos was detected. Where building materials are described in this report as non-asbestos, or described as containing no asbestos,

this is subject to the limitations of the analytical method used and should be understood to mean no asbestos was detected.

The classification, condition, and accessibility were assessed for the materials which could contain asbestos. To determine these factors, Arcadis followed the methodology outlined in the ASTM E356 Standard. The Standard provides definitions and criteria for the assessment of ACM. The classification, conditions, and accessibility information are provided in Appendix E.

Bulk samples of materials which could contain asbestos were collected and submitted to EMSL Canada Inc. (EMSL) for analysis of asbestos content. Asbestos-containing materials are defined as 0.5% or greater, or any amount if vermiculite.

3.2 Lead

Arcadis collected samples of distinctive paint finishes and surface coatings present in more than a limited application, where removal of the paint is possible. Arcadis collects samples by scraping the painted finish to include base and covering applications. 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. 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 were presumed to be the same, regardless of differing sub surface paints, if any.

The 2017 WorkSafeBC publication *Safe Work Practices for Handling Lead* (Lead Guideline) indicates the following:

> *Unlike for asbestos-containing material, WorkSafeBC does not numerically define what would be considered a lead-containing paint or coating. All suspected paints or coatings should be tested for lead because, depending on the nature of the work, even a small amount could pose a risk to workers. In order to determine which controls and personal protective equipment would be required for a particular job, a qualified person must consider this information as part of the risk assessment.*

- Improper removal of lead paint containing 600 mg/kg lead results in airborne lead concentrations that exceed half of the exposure limit
  - Exposure limit indicated in both the COHSR and BC Reg. 296/97 is 0.05 mg/m^3
  - Potential for exposure exceeding half of the occupational exposure limit would be the trigger for implementation of an exposure control plan.
- Lead concentrations as low as 90 mg/kg may present a risk to pregnant women and children
  - Any risk assessment should include for the presence of high risk individuals within the workplace

When reviewing the above, “high risk” individuals are not expected to be present in the workplace associated with this building during building material alteration activities (i.e., demolition) that would create significant disturbance to paint with such individuals present. As such, paints containing 600 ppm lead or more will be considered “lead-containing” for the purpose of this report, such that appropriate risk assessments can be completed for demolition planning. However, information regarding the lead content of all paints tested is provided herein, for reference and risk assessment should the consideration of high risk individuals be necessary, based on the requirements of a particular situation.

Although a concentration of 600 ppm lead has been used to define paint coatings as LCPs, it should be noted that this is related to painted surfaces and the determination of appropriate provisions to protect occupants and employees from exposure to elevated concentrations of lead during typical operations and maintenance or simple renovation. This does not include painted metal surfaces that are to be welded, burned or torch-cut.

Using an arc welder or oxyacetylene torch on steel that is coated with lead-containing paint can create hazardous lead fumes and is prohibited by section 12.115 of BC Reg. 296/97.

> Regulatory excerpt: **12.115 Coatings on metals**
>
> *A coating on metal which could emit harmful contaminants (such as lead, chromium, organic materials, or toxic combustion products) must be removed from the base metal, whenever practicable, before welding or cutting begins.*

In addition, the following information is provided in the Lead Guideline:

- Welding or torch cutting of paints or coatings on metal can create very high concentrations of airborne lead fumes. Torch cutting structural steel, coated with paint containing as little as 130 mg/kg (equivalent to ppm) lead, can release airborne levels of lead as high as 0.8 mg/m^3 (16 times the exposure limit).

Given this information and that the analytical detection limit for lead paint analysis is approximately 80– 90 ppm (not significantly different than 130 ppm, which, per above, may release airborne lead levels 16 times the exposure limit), any paint coating on a metal surface to be welded, burned or torch-cut must be removed prior to that action being undertaken, unless a project-specific or tasks-specific risk assessment and safe work practices are developed by a qualified person.

Paint and surface coatings are evaluated for condition. The criteria for condition evaluation pertaining to LCPs described herein are generally based on the United States Housing and Urban Development (HUD) 2012 *Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing*.

When evaluating the condition of LCPs, an attempt should be made to determine whether the deterioration is due to a moisture problem or some other existing building deficiency. **"Poor"** surfaces are considered to be a hazard and should be corrected. "**Fair"** surfaces should be repaired but are not yet considered to be a hazard; if not repaired, they should be monitored frequently. "**Good/intact"** surfaces should be monitored to ensure that they remain in a nonhazardous condition.

In addition, the presence of paint debris must be considered in evaluating condition. Given the variety of paint uses, there are many applications that can have a tendency for the paint to "wear" from the surface slowly, over an extended period of time. Conditions where paint has worn from a surface are worth noting for maintenance discussions (i.e., related to re-coating the surface should, for example, the coating provide weather protection), however, in the absence of loose paint chip debris/dust, such conditions would not represent a potential exposure situation related to lead.

The condition evaluation criteria for LCPs are summarized in the table below.

Table 3. Lead-Containing Paint Condition Categories

Type of Building Component[1]	Total Area of Deteriorated Paint on Each Component		
	Good/Intact	Fair[2]	Poor[3]
Exterior components with large surface areas.	Entire surface is intact.	Less than or equal to 10 square feet	More than 10 square feet
Interior components with large surface areas (walls, ceilings, floors, doors.	Entire surface is intact.	Less than or equal to 2 square feet	More than 2 square feet
Interior and exterior components with small surface areas (windowsills, baseboards, soffits, trim).	Entire surface is intact.	Less than or equal to 10% of the total surface area of the component.	More than 10% of the total surface area of the component

NOTES:

1. Building component in this table refers to each individual component or side of building, not the combined surface area of all similar components in a room (e.g., a wall with 1 square foot of deteriorated paint is in "fair" condition, even if the other three walls in a room are intact).
2. Surfaces in "fair" condition should be repaired and/or monitored but are not considered to be "lead-containing paint hazards".
3. Surfaces in "poor" condition are considered to be "lead-containing paint hazards" and should be addressed through abatement or interim controls.

Analysis for lead in paints or surface coatings was performed in accordance with EPA Method No. 3050B/Method No. 7420; flame atomic absorption at laboratory accredited by the American Industrial Hygiene Association (AIHA).

3.3 Polychlorinated Biphenyls (PCBs)

The presence or absence of fluorescent lights was documented during the course of our investigation to determine whether there were any of the T12 type. T12 fluorescent lamps, with a diameter of 1.5 inches, utilize transformer type magnetic ballasts, which may contain PCBs. The use of T12s has been discontinued and replaced with new high-efficiency 1-inch T8 lamps (and other types) which use electronic ballasts which do not contain PCBs.

Wet transformers were assessed for PCBs based on the age of the building, a review of maintenance records and examination of labels or nameplates on equipment, where present and accessible. The information is compared to known ban dates of PCBs and Environment Canada publications.

Dry type transformers are presumed to be free of dielectric fluids and hence non-PCB. Caulking's were not sampled for PCB content unless specifically impacted by the proposed renovation scope. The material is considered a PCB solid if PCB content is 50ppm or greater based on the threshold given in SOR/2008-273.

3.4 Suspect Visible Mould

Arcadis identified the presence of any suspect mould and/or moisture-impacted building materials by visual inspection during the course of our site investigation. Suspect mould is typically a coloured, textured substance or discolouration/staining on a building material surface which, based on our experience, may be mould growth. If any mould growth is concealed within wall, ceiling, or floor cavities, it is not addressed in this assessment. No mould sampling or moisture testing is performed unless directed by the Client. The adjective *suspect* is used where the presence of mould has not been confirmed by laboratory analysis.

3.5 Mercury

Building materials/products/equipment (e.g. thermostats, barometers, pressure gauges, light tubes), suspected to contain mercury were identified by visually inspection only. Dismantling of equipment suspected of containing mercury was not performed. Sampling of these materials for laboratory analysis of mercury content was not performed.

Mercury spills or damaged mercury-containing equipment was recorded where observed.

3.6 Ozone Depleting Substances (ODS)

Arcadis determined the potential presence of ODS (chlorofluorocarbons, hydrochlorofluorocarbons, hydrofluorocarbons, halons, etc.) in air conditioning units, chillers, commercial coolers, and fire suppression systems by visual inspection of manufactures' labels or plates, maintenance records, or logbooks, etc.

3.7 Silica

Arcadis identified building materials suspected of containing crystalline silica (e.g. concrete, cement, tile, brick, masonry, mortar) by knowledge of current and historic applications and visual inspection only. Arcadis did not perform sampling of these materials for laboratory analysis of crystalline silica content.

4 RESULTS

4.1 Asbestos

During the course of our assessment, representative bulk samples of material were collected by Arcadis staff. The samples were forwarded to EMSL in Burnaby, British Columbia (BC) for asbestos analyses. EMSL holds a current Certificate of Accreditation for Bulk Asbestos Fibre Analysis under the Voluntary Accreditation Program (NVLAP). Bulk sampling was performed in general accordance with the requirements specified in ASTM E2356 Standard, BC Reg. 296/97 and in the WorkSafe BC publication Safe Work Practices for Handling Asbestos.

Results of bulk sample analysis for asbestos content are provided in the table below. Samples that exceed the criteria are highlighted in yellow.

Site Photographs provided in Appendix A. Laboratory certificates of analysis have been provided in Appendix B. Floor plans indicating sample locations and room numbers are provided in Appendix C.

Table 4. Results of Bulk Sample Analysis for Asbestos

Sample Number	Sample Description	Sample Location	Asbestos Type %
S-01A	Building Paper	Exterior – North Face	None Detected
S-01B	Building Paper	Exterior – North Face	None Detected
S-01C	Building Paper	Exterior – West Face	None Detected
S-01D	Building Paper	Exterior – South Face	None Detected
S-01E	Building Paper	Exterior – East Face	None Detected
S-02A	White Caulking	Exterior – Front entrance stairs	1% Chrysotile
S-02B	White Caulking	Exterior – Front entrance stairs	Stop Positive
S-02C	White Caulking	Exterior – Front entrance stairs	Stop Positive

The following building materials were common in the building: however, these materials do not contain asbestos and were not sampled during the survey:

- UPDATE AS NEEDED Vinyl siding, wood, and concrete.

Asbestos-containing materials were confirmed present in the following table:

Table 5. Summary of Confirmed Asbestos-Containing Materials

Material	Location(s)	Total Quantity	Condition	Asbestos Type (%)
White Caulking	Exterior at front entrance stairs	2.5 meters	Good (7)	1% Chrysotile
Black weatherproofing*	Exterior – around concrete foundation	43 meters	Good (7)	2% Chrysotile

*Arcadis February 3, 2020 HBMA Report

Presumed Materials

No presumed materials that may contain asbestos are suspected to be present in the way of planned work.

4.2 Lead

During the course of our site investigation, representative bulk samples of predominant paint types were collected by Arcadis staff. The samples were forwarded to EMSL for lead analyses. Results of bulk sample analysis for lead content are provided in the table below. Results that exceed the criteria re highlighted in yellow.

The laboratory report is provided in Appendix B.

Table 6. Results of Analyses of Bulk Samples for Paint for Lead

Sample No.	Sample Location(s)	Sample Description	Lead Content (ppm)
L-01	Exterior – perimeter of building	White paint on metal gutter	<110
*	Room 12 (throughout all windows in building)	White paint on wood window sill	600

*Arcadis February 3, 2020 HBMA Report

Lead was detected at a level above the definition of lead paint (600 ppm) in the Arcadis February 3, 2020 HBMA report. Where one colour of paint is indicated in the sample descriptions in the table above, only one layer of paint was observed. Where multiple colours are indicated in the sample description, multiple layers of paint were observed.

All paint applications were noted to be generally in good condition.

4.3 Polychlorinated Biphenyls (PCBs)

PCBs were not observed in the assessed area.

4.4 Suspect Visible Mould

Suspect visible mould was not observed in the assessed area.

4.5 Mercury

Mercury vapor was observed in the assessed area: one compact fluorescent light bulb at the front entrance.

4.6 Ozone Depleting Substances

Ozone Depleting Substances (ODS) were not observed in the assessed area.

4.7 Silica

Crystalline silica is a presumed component of the following materials where present in the assessed area:

- poured concrete

5 RECOMMENDATIONS

If future building renovation or demolition is required beyond the scope of this project, a detailed intrusive assessment must be conducted. The assessment should include destructive testing (i.e. coring and/or removal of building finishes and components), and sampling of materials not previously tested (i.e. roofing materials, mastics etc.).

All hazardous building materials were reported in good condition. All ACM observed were considered to fall under a recommended Action Level 7 (routine surveillance).

5.1 Building Renovation Work

The following specific recommendations are made regarding renovation involving the hazardous materials identified.

1. Prepare plans and update performance specifications for hazardous material removal required for the planned work. The specifications should include the scope of work, personal protective equipment, respiratory protection, and disposal of waste materials.
2. Provide this report and the detailed plans and specifications to the contractor prior to bidding or commencing work.
3. Retain a qualified consultant to specify, inspect and verify the successful removal of hazardous materials.
4. Update the asbestos inventory upon completion of the abatement and removal of asbestos-containing materials.

The following general recommendations are made regarding renovation involving the hazardous materials identified.

Asbestos

Remove all asbestos-containing materials (ACM) prior to renovation, alteration, maintenance, or demolition work or if ACM may be disturbed by the work.

If the identified ACM will not be removed prior to commencement of the work, disturbance of ACM must follow the appropriate asbestos precautions for the classification of work being performed.

Asbestos-containing materials must be disposed of at a landfill approved to accept asbestos waste.

Lead

Construction disturbance of lead in paint and coatings (or other materials) may result in over-exposure to lead dust or fumes. The need for work procedures, engineering controls and personal protective equipment will need to be assessed on a project-by-project basis and must comply with provincial standards or guidelines. Performing an exposure assessment during work that disturbs lead in paints and coatings may be able to alleviate the use of some of the precautions specified by these standards or guidelines.

For building materials that are to be disposed at a landfill, all lead-based paints and associated substrate (concrete, plaster, wood, etc.) must undergo Toxicity Characteristic Leachate Properties (TCLP) metals testing to determine disposal procedures. Upon the completion of the test, the total concentration of metals in the waste extract must be compared to Schedule 4, Table 1 of the Hazardous Waste Regulation. The disposal of lead-containing paint is regulated under the Federal *Transportation of Dangerous Goods Act* and by the British Columbia Ministry of Environment

Suspect Visible Mould

No mould was observed; if mould is uncovered during renovations, use appropriate precautions, and protect workers using methods that comply with provincial guidelines.

Mercury

Do not break compact fluorescent light bulb. Recycle in accordance with local regulations.

Silica

Construction disturbance of silica-containing products may result in excessive exposures to airborne silica, especially if performed indoors and dry. Cutting, grinding, drilling or demolition of materials containing silica should be completed only with proper respiratory protection and other worker safety precautions that comply with provincial standards or guidelines.

6 REFERENCES

The following legislation and documents were referenced in completing the assessment and this report:

1. Occupational Health and Safety Regulation, B.C. Reg. 296/97, WorkSafe BC.
2. Safe Work Practices for Handling Asbestos, WorkSafe BC, 2017 Edition.
3. Hazardous Waste Regulation, B.C. Reg. 63/88, November 2017, BC Environmental Management Act.
4. Ozone Depleting Substances and Other Halocarbons Regulation, B.C. Reg. 317/2012 Environmental Management Act.
5. PCB Regulations, SOR/2008-273, Canadian Environmental Protection Act.
6. Lead-Containing Paint and Coatings, Preventing Exposure in the Construction Industry, WorkSafe BC, June 2017.
7. Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing, United States Housing and Urban Development (HUD) 2012.
8. Mould Guidelines for the Canadian Construction Industry, Standard Construction Document 2018, Canadian Construction Association.
9. Minister of Justice Canada Labour Code. R.S.C., 1985, c. L-2. March 2020.
10. Minister of Justice. 2018. Canada Occupational Health and Safety Regulations. SOR/86-304, June 2019.
11. Public Services and Procurement Canada Asbestos Management Standard. June 2019.
12. Transport Canada Consolidated Transport of Dangerous Goods Regulations including Amendment SOR/2019-101.
13. ASTM E2356 Standard Practice for Comprehensive Buildings Asbestos Surveys.

7 LIMITATIONS

This report, prepared for Public Services and Procurement Canada on behalf of The Government of Canada, does not provide certification or warranty, expressed or implied, that the investigation conducted by Arcadis identified all hazardous materials associated with the subject building. The work undertaken by Arcadis was directed to provide information on the presence of hazardous materials in construction materials based on visual inspection of readily accessible areas of the subject building, and on the results

of laboratory analysis of a limited number of bulk samples. The material in this report reflects Arcadis' best judgment in light of the information available at the time of the investigation, which was performed on July 10, 2020. This report is not intended to be used as a scope of work or technical specification for remediation of hazardous materials. Any use which any other party makes of the report, or reliance on, or decisions to be based on it, is the responsibility of such parties.

APPENDIX A

Site Photographs

Project Photographs

Public Services and Procurement Canada
Government of Canada, Building E0137, House 10

Photo: 1

Date:
July 10, 2020

Description:
View of Employee Housing, Front

Photo: 2

Date:
July 10, 2020

Description:
View of Employee Housing, Rear

Project Photographs

Public Services and Procurement Canada
Government of Canada, Building E0137, House 10

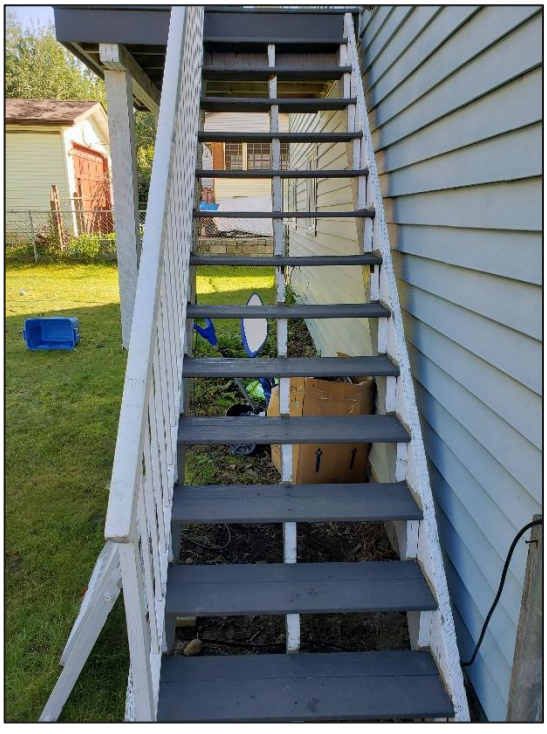


Photo: 3

Date:
July 10, 2020

Description:
Wood composite stairs on non lead white painted wood.

Photo: 4

Date:
July 10, 2020

Description:
Asbestos-containing white caulking on concrete where it abuts vinyl siding.

APPENDIX B

Laboratory Certificates of Analysis

EMSL Canada Inc.
2333 18th Avenue NE, Unit 48, Calgary, AB T2E 8T6
Phone/Fax: (403) 879-1149 / (403) 879-1152
http://www.EMSL.com CalgaryLab@EMSL.com

EMSL Canada Or	652005044
CustomerID:	55ACAV42
CustomerPO:	30053059
ProjectID:	

Attn: **Jerry Botti**
ARCADIS Canada Inc.
308-1080 Mainland Street
Vancouver, BC V6B 2T4

Phone: (604) 632-9941
Fax:
Received: 7/20/2020 08:30 AM
Collected: 7/10/2020

Project: **30053059 / E0137 / House 10**

Test Report: Lead in Paint Chips by Flame AAS (SW 846 3050B/7000B)*

Client Sample Description	*Lab ID*	*Collected*	*Analyzed*	*Weight*	*Lead Concentration*
L-01	*652005044-0001*	7/10/2020	7/21/2020	0.1780 g	<110 ppm
	Site: EXTERIOR - WHITE PAINT ON METAL GUTTER Insufficient sample to reach reporting limit.				

Client request: Remove address from project name.

Jefferson Salvador, Laboratory Manager
or other approved signatory

Report Amended: 10/22/2020 10:06:38 Replaces the Inital Report 07/24/2020 15:59:12. Reason Code: Client-Other (see report comment)

EMSL Canada Inc.

4506 Dawson Street Burnaby, BC V5C 4C1
Phone/Fax: (604) 757-3158 / (604) 757-4731
http://www.EMSL.com / vancouverlab@EMSL.com

EMSL Canada Order 692001634
Customer ID: 55ACAV42
Customer PO: 30053059
Project ID:

Attn: Jerry Botti
ARCADIS Canada Inc.
308-1080 Mainland Street
Vancouver, BC V6B 2T4

Phone: (604) 632-9941
Fax:
Collected: 7/10/2020
Received: 7/16/2020
Analyzed: 7/23/2020

Proj: 30053059 / E0137 / House 10

Test Report: Asbestos Analysis in Bulk Material for Occupational Health and Safety British Columbia Regulation 188/2011 via EPA 600/R-93/116 Method

Client Sample ID: S-01A ***Lab Sample ID:*** **692001634-0001**
Sample Description: EXTERIOR - NORTH/BUILDING PAPER

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	7/21/2020	Brown	90.0%	10.0%	None Detected	

Client Sample ID: S-01B ***Lab Sample ID:*** **692001634-0002**
Sample Description: EXTERIOR - NORTH/BUILDING PAPER

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	7/21/2020	Brown	90.0%	10.0%	None Detected	

Client Sample ID: S-01C ***Lab Sample ID:*** **692001634-0003**
Sample Description: EXTERIOR - WEST/BUILDING PAPER

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	7/21/2020	Brown	90.0%	10.0%	None Detected	

Client Sample ID: S-01D ***Lab Sample ID:*** **692001634-0004**
Sample Description: EXTERIOR - SOUTH/BUILDING PAPER

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	7/21/2020	Brown	90.0%	10.0%	None Detected	

Client Sample ID: S-01E ***Lab Sample ID:*** **692001634-0005**
Sample Description: EXTERIOR - EAST/BUILDING PAPER

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	7/21/2020	Brown	90.0%	10.0%	None Detected	

Client Sample ID: S-02A ***Lab Sample ID:*** **692001634-0006**
Sample Description: EXTERIOR - FRONT ENTRANCE STAIRS/CAULKING

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	7/23/2020	White	0.0%	99.0%	**1% Chrysotile**	

Client Sample ID: S-02B ***Lab Sample ID:*** **692001634-0007**
Sample Description: EXTERIOR - FRONT ENTRANCE STAIRS/CAULKING

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	7/23/2020				Positive Stop (Not Analyzed)	

EMSL Canada Inc.

4506 Dawson Street Burnaby, BC V5C 4C1
Phone/Fax: (604) 757-3158 / (604) 757-4731
http://www.EMSL.com / vancouverlab@EMSL.com

EMSL Canada Order 692001634
Customer ID: 55ACAV42
Customer PO: 30053059
Project ID:

Test Report: Asbestos Analysis in Bulk Material for Occupational Health and Safety British Columbia Regulation 188/2011 via EPA 600/R-93/116 Method

Client Sample ID: S-02C ***Lab Sample ID:*** **692001634-0008**

Sample Description: EXTERIOR - FRONT ENTRANCE STAIRS/CAULKING

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	7/23/2020				Positive Stop (Not Analyzed)	

Analyst(s):

Margaret Lee PLM (5)
Nicole Yeo PLM (1)

Reviewed and approved by:

Nicole Yeo, Laboratory Manager
or Other Approved Signatory

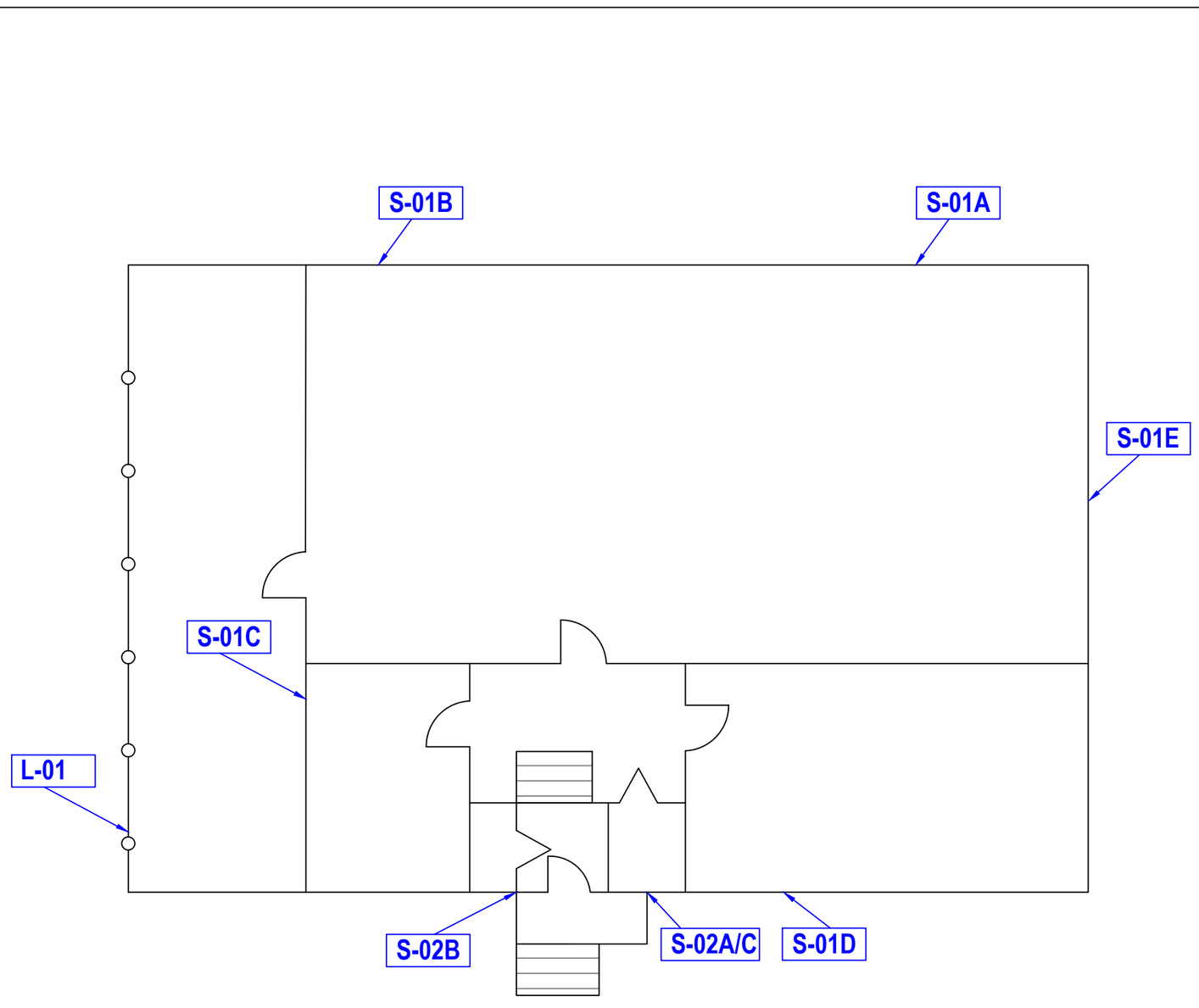
None Detected = <0.1%. EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations.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

Samples analyzed by EMSL Canada Inc. Burnaby, BC

Report amended: 10/21/202016:55:31 Replaces initial report from: 07/23/202011:41:47 Reason Code: Client-Change to Project

APPENDIX C

Floor Plans



LEGEND

S-XXX Bulk Asbestos Sample

L-XXX Bulk Lead Paint Sample

N.T.S

Title: **GOVERNMENT OF CANADA**
HAZARDOUS BUILDING MATERIAL ASSESSMENT - 2020

Project: BUILDING E0137 - HOUSE 10
FIRST FLOOR

Client: PUBLIC SERVICES AND PROCUREMENT CANADA

Project Number:	Drawn By:	Plot Size:	Date:
30053059	CB	11X17"	JULY 2020

ARCADIS

FIGURE 1

firstfloor G:\PROJECTS\30053059 - PSPC_RCMP Construction 2020\CAD\30053059-Minmaker.dwg

APPENDIX D

Regulations and Health Effects

Asbestos

Occupational Health and Safety (OHS) for federal employees is regulated by the Canada Labour Code (CLC) Part II. The *Canada Occupational Health and Safety Regulations (COHSR), Part X, Hazardous Substances* covers specific requirements related to the management and control of asbestos-containing materials (ACM). The COHSR, Part X, Hazardous Substances, states an employee shall be kept free from exposure to a concentration of airborne chrysotile asbestos in excess of 0.1 fibre/cm^3 or f/cc. There are also specific requirements for hazard prevention detailed in the Hazard Prevention Program (HPP) in the CLC.

For the purposes of this report, the following federal requirements will be followed, unless provincial requirements are more stringent. Federal legislation and policy referenced in this report includes:

- Canada Labour Code, March 2020;
- Canada Occupational Health and Safety Regulations Part X, Hazardous Substances; SOR/86-304, June 2019;
- Public Services and Procurement Canada Asbestos Management Standard, June 2019;
- Asbestos Management Plan, The Government of Canada, Version 2020-01, January 2020; and,
- Transport Canada, Transport of Dangerous Goods Regulations

The management and requirements for the potential disturbance of asbestos in buildings is also regulated at the provincial level under the *British Columbia Occupational Health and Safety Regulations,296/97, and Safe Work Practices for Handling Asbestos, WorkSafeBC, 2017 Edition*.

The BC Occupational Health and Safety Regulations, 296/97 (BC Reg 296/97), require specific actions when asbestos is a potential health hazard in a workplace. Section 6.1 of the regulation defines an asbestos-containing material as follows:

"asbestos-containing material" means the following:

(a) a manufactured article or other material, other than vermiculite insulation, that would be determined to contain at least 0.5% asbestos if tested in accordance with one of the following methods:

(i) Asbestos, Chrysotile by XRD, Method 9000 (Issue 2, dated August 15, 1994) in the NIOSH Manual of Analytical Methods, published by the United States National Institute for Occupational Safety and Health, Centre for Disease Control;

(ii) Asbestos (bulk) by PLM, Method 9002 (Issue 2, dated August 15, 1994) in the NIOSH Manual of Analytical Methods, published by the United States National Institute for Occupational Safety and Health, Centre for Disease Control;

(iii) Test Method for the Determination of Asbestos in Bulk Building Materials (EPA/600/R-93/116, dated July 1993) published by the United States Environmental Protection Agency;

(b) vermiculite insulation that would be determined to contain any asbestos if tested in accordance with the Research Method for Sampling and Analysis of Fibrous Amphibole in Vermiculite Attic Insulation (EPA/600/R-04/004, dated January 2004) published by the United States Environmental Protection Agency;

The duties of employers, contractors, or owners include:

- identifying and labeling ACM that can potentially release asbestos fibres;
- keeping a current written record of all ACM present in the workplace;
- conducting regular surveillance and maintenance of asbestos materials to prevent fibre release;
- developing a written exposure control plan if workers may be exposed to harmful levels of asbestos;
- conducting work in a way that prevents the release of asbestos fibres as much as possible;
- notifying, informing, and training workers; and,
- notifying Occupational Health and Safety (OHS) at least 48 hours before beginning an asbestos-abatement.

Disturbance of asbestos during construction and demolition is regulated under section 20.112 of BC Reg 296/97.

The 2017 WorkSafeBC publication Safe Work Practices for Handling Asbestos (Asbestos Guide) is used by Occupational Health and Safety officers as a guide when reviewing abatement work practices and employer codes of practice, and generally meets the requirements of the COHSR.

The Asbestos Guide also provides significant additional background information pertaining to asbestos, along with details on health effects and other applicable legislation within the province of British Columbia (e.g., the federal Hazardous Products Act, the BC Building Code and waste disposal regulations).

Disposal of asbestos waste is governed by the British Columbia Hazardous Waste Regulation (BC Reg. 63/88). The Federal Transportation of Dangerous Goods Regulation and BC Reg. 63/88 set out the requirements for the proper transport of asbestos waste in British Columbia. In general, and for transportation and disposal, the waste must be placed in a double sealed container, properly labeled, free of cuts, tears or punctures and disposed of at a licensed waste station which has been properly notified of the presence of asbestos waste.

Health effects

Undisturbed asbestos within building materials poses no health risks. Asbestos poses a risk when building materials containing asbestos are impacted, or disturbed, thereby releasing the asbestos fibres into the air

Asbestos-related diseases are caused when suspended airborne asbestos fibres are inhaled and the fibres settle into various regions of the lungs and remain for extended periods. Once embedded in the lungs the asbestos fibres cause scarring within the lung tissue, ultimately leading to impaired lung function (asbestosis) and/or various cancers (lung cancer; mesothelioma). These asbestos-related diseases are irreversible and fatal. The risk of lung-related cancers is increased in individuals who smoke.

These asbestos-related diseases most often occur in individuals who have been exposed to high concentrations of airborne asbestos over a long period of time, though mesothelioma has been found in individuals with short-term exposures. Symptoms or the development of these asbestos-related diseases usually occur 10 to 25 years after exposure

Lead

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 (2005) to 90 ppm (2010).

With respect to potential lead exposures associated with disturbance to surfaces coated with lead-containing products, the 2017 WorkSafeBC manual titled Lead-Containing Paint and Coatings: Preventing Exposure in the Construction Industry, indicates the following:

- Improper removal of lead paint containing 600 mg/kg lead results in airborne lead concentrations that exceed half of the exposure limit
    - This potential for exposure exceeding half of the occupational exposure limit would be the trigger for implementation of an exposure control plan.
- Lead concentrations as low as 90 mg/kg may present a risk to pregnant women and children
    - Any risk assessment should include for the presence of high risk individuals within the workplace

The disposal of lead-containing paint is regulated under the Federal *Transportation of Dangerous Goods Act* and by the British Columbia Ministry of Environment. All lead-based paints and associated nonmetal substrate (concrete, plaster, wood, etc.) must undergo Toxicity Characteristic Leachate Properties (TCLP) metals testing to determine disposal procedures. Upon the completion of the test, the total concentration of metals in the waste extract must be compared to Schedule 4, Table 1 of the Hazardous Waste Regulation.

The Federal Transportation of Dangerous Goods Regulation and BC Reg. 63/88 set out the requirements for the proper transport of lead waste in British Columbia.

Health Effects

Elemental lead and inorganic lead compounds are absorbed through ingestion or inhalation and can incorporate into the bone marrow, nerve tissue, brain, and kidneys. In children, symptoms of lead poisoning can include headaches, irritability, abdominal pain, vomiting, anemia, weight loss, poor attention span, noticeable learning difficulty, slowed speech development, and hyperactivity. In adults, symptoms of lead poisoning can include pain, numbness or tingling of the extremities, muscular weakness, headache, abdominal pain, memory loss, unsteady gait, pale skin, weight loss, vomiting, irritability, and anemia. Although adults are susceptible to the toxic effects of lead, children are at high risk due to the nature of a child's activities that involve the introduction of non-food items into their bodies.

Excessive airborne lead and surface contamination can be transferred to employees' hands and may results in lead ingestion. Therefore, work practices intended to minimize surface lead concentrations, such as frequent cleaning of work surfaces should be included in an overall lead exposure control plan

PCB

As of September 5, 2008, under subsection 93(1) of the *Canadian Environmental Protection Act,* (CEPA), Federal PCB regulations were published by the Canada Gazette Part II (SOR/2008-273) that imposed specific deadlines for the elimination of all PCBs in concentrations at or above 50 milligrams/kilogram (mg/kg). This regulation required the elimination of all PCBs and PCB-containing materials currently in-use and in storage and limited the period of time PCB materials could 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.

In British Columbia, PCB equipment becomes PCB wastes as soon as it is removed from service. This is the case even if the intent is to treat, recycle, or reuse the equipment.

When PCB wastes are stored in British Columbia, the full requirements of BC Reg. 63/88 apply to:

- 1.0 kg or more of pure PCB
- 100 L or more of any liquid containing more than 50 ppm of PCB
- 100 kg or more of any material other than a liquid, contaminated with more than 50 ppm of PCB

These amounts are the total of all amounts at a single location owned or controlled by the same person. They include PCB equipment. BC Reg. 63/88 also provides packaging requirements for storage, labeling requirements, waste destruction requirements, and references SOR/2008-273, indicating:

The Federal Transportation of Dangerous Goods Regulation sets out the requirements for the proper transport of PCB waste across provincial boundaries.

In British Columbia, a manifest issued by the Ministry of Environment (or equivalent federal document) must be used for hazardous wastes shipped from sites in British Columbia. A manifest must be used to transport:

- 5 kg or more of PCB solids
- 5 L or more of PCB liquids
- An amount of a PCB solid or PCB liquid containing more than 500 g of PCB within BC
- 500 g or more of solids, liquids, or mixtures of these containing 50 mg/kg of PCB outside of BC

Health effects

PCBs are insoluble in water; however, they readily dissolve in fats and other organic compounds. It is these attributes and fat-solubility that allow PCBs to persist in the environment and bio-accumulate in humans and animals. Exposure to PCBs can affect the immune system, reproductive system, nervous system, and endocrine system. In humans, PCBs are potentially cancer-causing.

Mould

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, occupational health and safety regulations typically require employers to take every precaution reasonable in the circumstances for the protection of workers.

The WorkSafeBC Guideline for Part 4 of BC Reg. 296/97 discusses the application of the Regulation to workplaces with mould showing on exposed or hidden surfaces, or where mould may be a factor in complaints regarding indoor air quality. The guideline provides information for investigating indoor air quality complaints with respect to mould contamination, including information on sampling for the

presence of moulds in buildings. Information is also provided on possible health effects and for cleanup personnel involved in the remediation of buildings damaged by water and mould.

Health Effects

There are a number of documented cases of health problems related to exposure to indoor fungi.

Both high-level, short-term exposures and lower-level, long-term exposures can result in illness. The most common symptoms from exposure to mould in indoor environments are runny nose, eye irritation, cough, congestion, aggravation of asthma, headache, flu-like symptoms, fatigue, and skin rash. People with suppressed immune systems may be susceptible to fungal infections as a result of exposure to indoor moulds.

People who are exposed to mould growth on building materials will not necessarily exhibit adverse health effects. However, the mould must still be removed. Humans are at risk from indoor mould when fungal spores, fragments or metabolites are released into the air and inhaled or physically contacted (dermal exposure).

Not everyone experiences allergic reaction; the susceptibility to exposure varies with the individual's genetic predisposition, age, state of health, and concurrent exposures. For these reasons, and because the measurement of exposure is not standardized and biological markers of exposure to fungi are largely unknown, it is not possible to establish "safe" or "unsafe" levels of exposure. However, federal, and provincial policies have been written to minimize mould exposure and the elimination of mould indoors.

Mercury

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 disposal should be through a scrap dealer (elemental mercury), recycling firm for mercury vapour and returned to the manufacturer for light tubes and fixtures. Disposal of mercury waste is governed by BC Reg. 63/88.

The Federal Transportation of Dangerous Goods Regulation and BC Reg. 63/88 set out the requirements for the proper transport of mercury waste in British Columbia.

Health Effects

Routes of exposure for mercury and mercury compounds include inhalation, ingestion, skin and/or eye contact. 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.

Elemental (metallic) mercury most often causes health effects through inhalation of its vapour, which can be absorbed through the lungs. This kind of exposure can result when elemental mercury is spilled (or products that contain elemental mercury break) and the mercury is exposed to the air. Vapour concentrations can vary especially in warm or poorly-ventilated indoor spaces where the airborne concentration can exceed the permissible exposure limit (provincially set).

Chronic mercury "poisoning" can be caused by long-term exposure to low airborne concentrations (or low levels) of mercury. Symptoms or effects of mercury exposure include: tremors, emotional changes,

neuromuscular effects, mental changes/disturbances, digestive disturbances, headaches, insomnia, and changes in nervous response.

Silica

Regulations pertaining to silica are provided in BC Reg. 296/97. Included are general provisions (minimizing release; keeping worksite clear of unnecessary accumulations; ensuring methods for decontamination prevent generation of airborne silica), provisions for "restricted areas" (where there is a reasonable chance that the airborne concentration of silica exceeds or may exceed the occupational exposure limit), provisions for use in abrasive blasting, and provisions for health assessments for workers exposed to silica.

Health Effects

Crystalline silica dust particles, which are small enough to be inhaled into the lungs (respirable size), can cause a number of health problems. As with asbestos, silica within building materials poses no threat to human health if left undisturbed.

Exposure to crystalline silica airborne dust my cause scaring of the lungs with coughing and shortness of breath—also known as "silicosis", a form of disabling, progressive, and sometimes fatal pulmonary fibrosis.

Ozone Depleting Substances (ODS)

ODSs are regulated in British Columbia by the British Columbia *Waste Management Act*—Ozone Depleting Substances and Other Halocarbons Regulation (BC Reg. 387/99 as amended by BC Reg. 317/2012).

On federal land, aboriginal land and federal works, buildings and undertakings, the Federal Halocarbon Regulation 2003 (SOR/2003-289, including associated amendments) 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.

If ODS-containing materials are to be removed and disposed of, all ODSs must be handled, recycled, stored, and/or disposed of in accordance with the requirements of BC Reg. 63/88.

The Federal Transportation of Dangerous Goods Regulation and BC Reg. 63/88 set out the requirements for the proper transport of ODS waste in British Columbia.

Health Effects

Health effects are not typically related to exposure to ODSs directly, but to the consequences of ODS release to the atmosphere, subsequent degradation of the earth's ozone layer, and implications associated with increased UVB light exposure.

APPENDIX E

Classification, Condition and Accessibility

1.1 Spray Applied Fireproofing, Insulation and Texture Finishes

To evaluate the condition of ACM spray applied as fireproofing, thermal insulation, or texture, decorative or acoustic finishes, the following criteria are applied:

GOOD

Surface of material shows no significant signs of damage, deterioration, or delamination. Up to 1 percent visible damage to surface is allowed within range of **GOOD**. Evaluation of sprayed fireproofing requires the surveyor to be familiar with the irregular surface texture typical of sprayed asbestos products. **GOOD** condition includes un-encapsulated 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 1 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 survey or re-assessment form.

NOTE: **FAIR** condition is not utilized in the evaluation of the 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 are advised to be watchful for ACM **DEBRIS** prior to accessing or working above ceilings in areas of buildings with ACM regardless of the reported condition.

1.2 Mechanical Insulation

The evaluation of the condition of mechanical insulation (on boilers, breaching, ductwork, piping, tanks, equipment etc.) utilizes the following criteria:

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 penetrating 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. It is not possible to observe the full length of mechanical insulation from all angles.

1.3 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 should be treated as a friable product.

2. Evaluation of Accessibility

The accessibility of building materials known or suspected of being ACM is rated according to the following criteria:

ACCESS (A)

Areas of the building within reach (from floor level) of all building users. Includes areas such as gymnasiums, workshops, and storage areas where activities of the building users may result in disturbance of ACM not normally within reach from floor level.

ACCESS (B)

Frequently entered maintenance areas within reach of maintenance staff, without the need for a ladder. Includes: frequently entered pipe chases, tunnels and service areas or areas within reach from a fixed ladder or catwalk, e.g. tops of equipment, mezzanines.

ACCESS (C) EXPOSED

Areas of the building above 2.4 metres where use of a ladder is required to reach the ACM. Only refers to ACM that is exposed to view, from the floor or ladder, without the removal or opening of other building components such as ceiling tiles, or service access door or hatch. Does not include infrequently accessed service areas of the building.

ACCESS (C) CONCEALED

Areas of the building which require the removal of a building component, including lay-in ceilings and access panels into solid ceiling systems. Includes rarely entered crawl spaces, attic spaces, etc. Observations will be limited to the extent visible from the access points.

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 ACM. Evaluation of condition and extent of ACM is limited or impossible, depending on the surveyor's ability to visually examine materials in ACCESS D.

3. ACM DEBRIS

3.1 DEBRIS from Friable ACM

The presence of fallen ACM is noted separately from the presumed friable ACM source (sprayed fireproofing, thermal insulation, texture, decorative or acoustic finishes or mechanical insulation) and is referred to as **DEBRIS**.

3.2 DEBRIS from Damaged Non-Friable ACM

The presence of fallen ACM from damaged non-friable ACM is also reported separately from the non-friable ACM source. Only fallen non-friable ACM that has become friable is reported as **DEBRIS**.

The identification of the exact location or presence of **DEBRIS** on the top of ceiling tiles is limited by the number of observations made and the presence of building components such as ducts or full height walls

that obstruct observations. Workers are advised to be watchful for the presence of **DEBRIS** prior to accessing or working in proximity to mechanical insulation or above ceilings in areas of buildings with ACM regardless of the reported presence or absence of **DEBRIS**.

4. Action Matrix and Action Descriptions

The Asbestos Management Plan requires the following responses:

- Immediately clean-up **DEBRIS** that is likely to be disturbed.
- Remove, repair, or enclose friable ACM in **POOR** or **FAIR** condition whose continued deterioration will result in **DEBRIS** that is likely to be disturbed.

The following factors shall be considered in making site-specific recommendations for compliance with the existing applicable regulations or codes and the practical implementation of the Asbestos Management Plan:

1. ACM in **POOR** condition is not routinely repairable. If an abatement action is necessary, removal is the recommended action (enclosure is a viable option in unusual circumstances, e.g. where removal is difficult or costly and the asbestos-containing material can be thoroughly enclosed).

2. Mechanical insulation in **FAIR** condition will be repaired or removed based on the following general recommendations, applied on a case-by-case basis:
   - ACM insulation found in **FAIR** condition in ACCESS (B) or ACCESS (C) EXPOSED areas is to be repaired.
   - ACM mechanical insulation found in **FAIR** condition in ACCESS (B) and ACCESS (C) EXPOSED areas, where future damage to the ACM is likely to occur, is to be removed.

3. ACM in **GOOD** condition present in ACCESS (A) can be managed by surveillance, as long as it is not disturbed by future renovation, maintenance, or demolition. Proactive removal of the ACM in ACCESS (A) will be considered where damage is possible by on-going occupant activity (accidental or intentional).

4. Non-friable or manufactured products are considered in the action matrix as follows:
   - Non-friable and manufactured products reported in **POOR** condition, or friable **DEBRIS** resulting from the deterioration of non-friable ACM, are treated as friable materials and the appropriate action, and depending on accessibility is determined from the action matrix for friable ACM.
   - For non-friable or manufactured products reported in **GOOD** condition, Action 7 (surveillance) is recommended regardless of accessibility.

5. All asbestos-containing material from a particular area is to be removed where small quantities of asbestos are present, and removal will negate the need for the use of an Asbestos Management Program in that area.

The action matrix provided below establishes the recommended asbestos control action. The ACTIONS themselves are described in full following the table.

4.1 Action Matrix Tables

FRIABLE ACM				
ACCESS	**CONDITION**			**DEBRIS**
	GOOD	**FAIR**	**POOR**	
(A)	ACTION 5/7[1]	ACTION 5/6[2]	ACTION 3	ACTION 1
(B)	ACTION 7	ACTION 6/5[3]	ACTION 3	ACTION 1
(C) EXPOSED	ACTION 7	ACTION 6	ACTION 4	ACTION 2
(C) CONCEALED	ACTION 7	ACTION 7	ACTION 4	ACTION 2
(D)	ACTION 7	ACTION 7	ACTION 7	ACTION 7

[1] If material in **ACCESS (A)/GOOD** condition is not removed **ACTION 7** is required.

[2] If material in **ACCESS(A)/FAIR** condition is not removed **ACTION 6** is required.

[3] Remove ACM in **ACCESS (B)/FAIR** condition if ACM is likely to be disturbed.

4.2 Action Descriptions

ACTION 1 - Immediate Clean-Up of DEBRIS that is Likely to Be Disturbed

Access that is likely to cause a disturbance of the ACM **DEBRIS** is to be restricted and **clean up ACM DEBRIS is to be done immediately**. Use correct asbestos procedures. This action is required for compliance with regulatory requirements and good practice. The assessor should immediately notify the Asset or Property and Facility Manager, or Regional/Area Asbestos Management Coordinator of this condition.

ACTION 2 - Intermediate risk precautions for Entry into Areas with ACM DEBRIS

At locations where ACM **DEBRIS** can be isolated in lieu of removal or cleaned up, use appropriate means to limit entry to the area. Restrict access to the area to persons using intermediate risk asbestos precautions. The precautions will be required until the ACM **DEBRIS** has been cleaned up, and the source of the **DEBRIS** has been stabilized or removed.

ACTION 3 - ACM Removal Required for Compliance

Remove ACM for compliance with regulatory requirements and good practice. Utilize asbestos procedures appropriate to the scope of the removal work.

ACTION 4 - Access into areas where asbestos-containing material is present and likely to be disturbed by access requires intermediate risk precautions.

Intermediate risk asbestos precautions are to be used when entry or access into an area is likely to disturb the ACM. **ACTION 4** must be used until the ACM is re-moved (Use **ACTION 1** or **2** if **DEBRIS** is present). Intermediate risk or high-risk precautions should be used for removal (depending on extent of removal).

ACTION 5 - Proactive ACM Removal

Removal of ACM in lieu of repair may be considered, even if it is in **GOOD** condition at locations, where ACM is easily accessible, limited in quantity, and removal would be cost-effective.

ACTION 6 - ACM Repair

Repair ACM found in **FAIR** condition, and not likely to be damaged again or disturbed by normal use of the area or room. Upon completion of the re-pair work treat ACM as material **in GOOD** condition and implement **ACTION 7**. If ACM is likely to be damaged or disturbed during normal use of the area or room, **ACTION 5** is to be implemented.

ACTION 7 - Routine Surveillance

Institute routine surveillance of the ACM. Trained workers or contractors must use appropriate asbestos precautions (low, intermediate, or high) during disturbance of the remaining ACM.

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APPENDIX 1-11

Hazardous Building Materials Assessment
Government of Canada, Building E0187, Employee Housing, House 11, British Columbia

ARCADIS Design & Consultancy for natural and built assets

Public Services and Procurement Canada

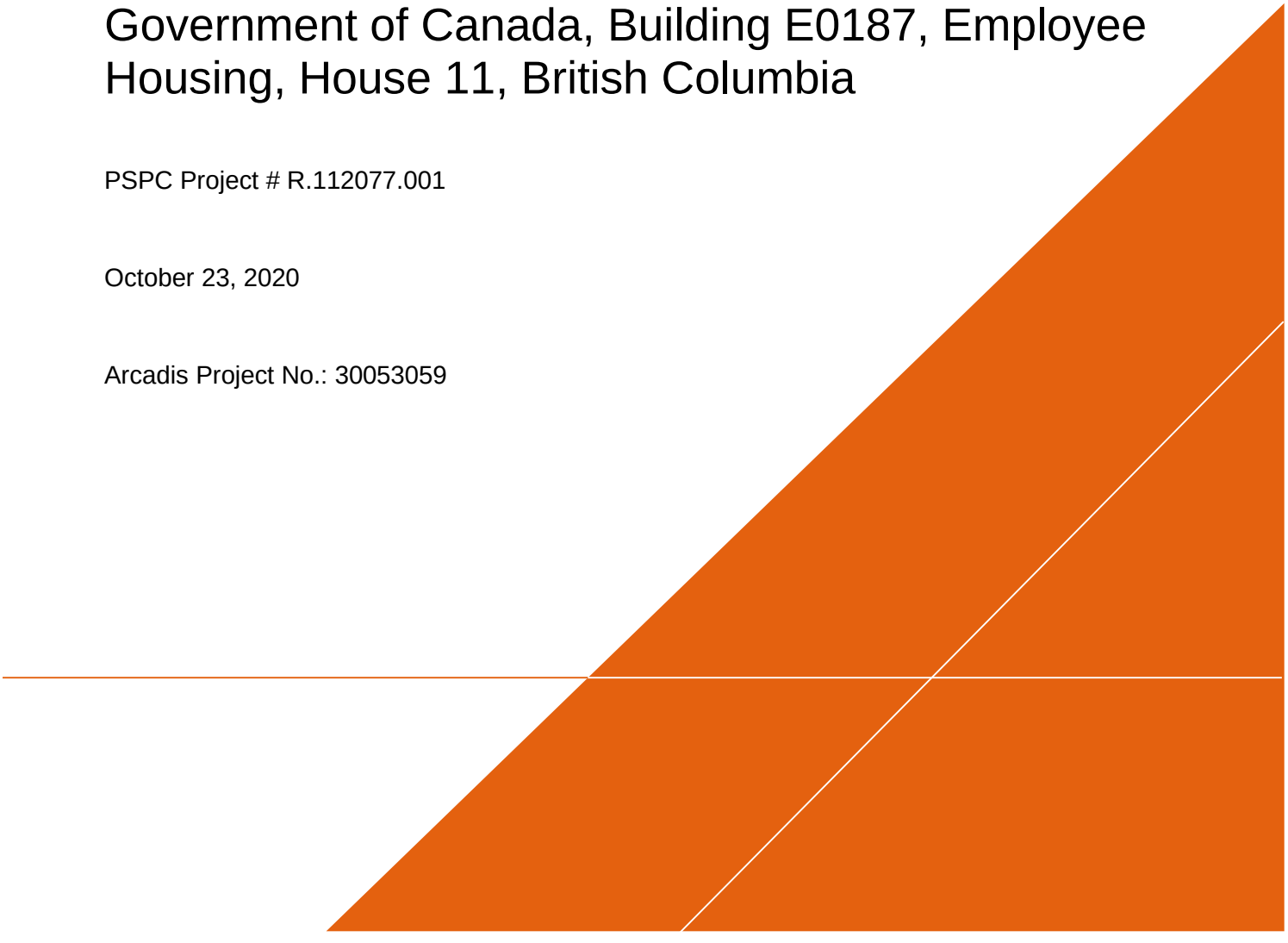
HAZARDOUS BUILDING MATERIALS ASSESSMENT

Government of Canada, Building E0187, Employee Housing, House 11, British Columbia

PSPC Project # R.112077.001

October 23, 2020

Arcadis Project No.: 30053059



HAZARDOUS BUILDING MATERIALS ASSESSMENT

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ACRONYMS AND ABBREVIATIONS

ACM	Asbestos-Containing Materials
Arcadis	Arcadis Canada Inc.
CLC	Canada Labour Code
COHSR	Canada Occupational Health and Safety Regulations
HPP	Hazard Prevention Program
LCB	Lead-Containing Paints
NIOSH	National Institute for Occupational Safety and Health
NJC	National Joint Council
OHS	Occupational Health and Safety
PCBs	Polychlorinated Biphenyls
PLM	Polarized Light Microscopy
PSPC	Public Services and Procurement Canada
TEM	Transmission Electron Microscopy
USEPA	United States Environmental Protection Agency

EXECUTIVE SUMMARY

Arcadis Canada Inc. (Arcadis) was retained by Public Services and Procurement Canada (PSPC, Client) to conduct a hazardous building materials assessment of Building E0187, House 11, located in British Columbia.

This project consisted of a limited pre-renovation assessment to identify suspect hazardous materials in areas that were excluded from the original surveys.

The renovation scope was limited to the part of the building scheduled for renovation, which consisted of replacing exterior windows, doors, vinyl siding as well as the deck and stairs.

The hazardous building materials considered during this assessment included the following:

- Asbestos-containing materials (ACMs)
- Lead, including lead-containing paints (LCPs)
- Polychlorinated biphenyls (PCBs) in electrical equipment
- Suspect visible mould
- Mercury materials/products/equipment
- Ozone-depleting substances (ODSs) in heating, ventilation, and air conditioning (HVAC) equipment or fixed fire suppression systems
- Silica in building materials

Arcadis performed the assessment on July 10, 2020. The assessment was conducted by Matthew Spearman, Dipl T (Env), Field Technologist of Arcadis.

Summary of Findings

Asbestos: No asbestos-containing materials (ACM) were confirmed to be present in the assessed area.

Lead: Confirmed lead is not present in assessed area.

Polychlorinated Biphenyls (PCBs): No PCBs were observed in the assessed area.

Suspect Visible Mould: No suspect visible mould was observed in the assessed area.

Mercury: No mercury vapour was visually confirmed in the assessed area.

Ozone Depleting Substances (ODS): ODS were not observed in the assessed area.

Silica: Crystalline silica is a presumed component of the following materials in the assessed area: poured concrete.

Recommendations

The following is a summary of significant recommendations; refer to the body of the report for detailed recommendations.

1. Follow appropriate safe work procedures when handling or disturbing silica.
2. Provide this report and the detailed plans and specifications to the contractor prior to bidding or commencing work.

Findings of this report are subject to our standard Limitations, as outlined in Section 7.

This Executive Summary is subject to the same standard limitations as contained in the report and must be read in conjunction with the entire report.

1 INTRODUCTION

1.1 Purpose

Arcadis Canada Inc. (Arcadis) was retained by Public Services and Procurement Canada (PSPC, Client) to conduct a hazardous building materials assessment of Building E0187, House 11, located in British Columbia.

This project consisted of a limited pre-renovation assessment to identify suspect hazardous materials in areas that were excluded from the original survey.

The renovation scope was limited to the part of the building scheduled for renovation, which consisted of replacing exterior windows, doors, vinyl siding as well as the deck and stairs.

Arcadis performed the assessment on July 10, 2020. The assessment was conducted by Matthew Spearman, Dipl T (Env), Field Technologist of Arcadis.

1.2 Scope of Work

The scope of work for the project, as referenced in the Arcadis Workplan dated June 4, 2020, identifies the requirement to conduct a hazardous building material assessment within building E0187. Specifically, the scope of work included:

- Review of previous reports, construction specifications and drawings and identify any gaps related to hazardous building materials.
- Development of sampling strategy to address the identified gaps.
- Collect and submit representative suspect asbestos material and lead paint chip samples for analysis.
- Collect and submit representative samples of caulking for PCBs where impacted by the proposed renovations.
- Submit samples to accredited laboratories for analysis.
- Evaluation and interpretation of field findings and sample analytical results to develop conclusions and recommendations pertaining to hazardous building materials identified

For the purpose of this assessment, hazardous building materials re defined as follows:

- Asbestos-containing materials (ACMs)
- Lead, including lead-containing paints (LCPs)
- Polychlorinated biphenyls (PCBs) in electrical equipment
- Suspect visible mould
- Mercury materials/products/equipment
- Ozone-depleting substances (ODSs) in heating, ventilation, and air conditioning (HVAC) equipment or fixed fire suppression systems

- Silica in building materials

A general description of the building included in this assessment is provided in the table below:

Table 1. Building Description

Building Number (BU)	Building Name	Total Inside Gross m^2	Year Constructed	Building Description
E0187	House 11	239.70	1987	Two-story building with a below grade basement. Asphalt shingle roof and concrete foundation with cement parging. Drywall, ceramic tile, plywood and OSB board interior walls. Drywall, texture coat, OSB board and plywood ceilings. Wood laminate, poured concrete, plywood, peel and stick tile and vinyl sheet flooring. Heating is supplied by gas fired forced air furnace and electric baseboard heaters.

2 BACKGROUND INFORMATION

Arcadis conducted previous assessments of the building and the findings are presented in the following reports:

- Asbestos-Containing Materials Survey, Building E0187, dated March 24, 2019, prepared by Arcadis Canada Inc. and,
- Hazardous Building Material Assessment, Building E0187, dated February 6, 2020, prepared by Arcadis Canada Inc.

2.1 Exclusions

The assessment was restricted to accessible locations of the building. Roofing or other material that may cause damage to the building envelope were not included unless specifically impacted by the proposed renovations and sampling would not compromise the building envelope integrity. Concrete block walls were not investigated for vermiculite insulation unless specifically impacted by the proposed renovations

3 SURVEY METHODOLOGY

Sampling activities were conducted in accordance with Arcadis' Standard Operation Procedures which take into account current federal and provincial regulations pertaining to such work (i.e., sampling procedures, required number of samples and laboratory analytical procedures). Regulations are presented in Appendix D.

Representative bulk samples were collected of accessible suspect, PCB, lead, and asbestos in sufficient quantities for laboratory analysis. Samples were sealed in polyethylene zip-lock bags labeled with the sample number, suspect material description, and sample location. As part of sampling procedures, sampling tools were cleaned between sample collection events to avoid the potential for cross-contamination of samples.

All sample bags were compiled in order and placed into a single container accompanied with a chain of custody form outlining the project information, date, building location, number of samples, and sample description. Samples were submitted to the analytical laboratory in a sealed container via courier.

3.1 Asbestos-Containing Materials

A separate set of samples was collected of each type of homogenous material suspected to contain asbestos. A homogenous material is defined by the US EPA as material that is uniform in texture and appearance, was installed at one time, and is unlikely to consist of more than one type or formulation of material. The homogeneous materials are determined by visual examination, available information on the phases of the construction and prior renovations.

Bulk sampling protocols followed the ASTM E2356 Standard, which indicates requirements for the number of samples to collect for each homogeneous material. The table below provides an outline of the minimum number of samples to be collected from the ASTM E2356 Standard.

Table 2. Bulk Material Sample Quantities

Type of Material	Size of Area of Homogeneous Material	Minimum Number of Samples Collected
Any homogeneous material, including but not limited to fireproofing, drywall joint compound, ceiling tile stucco, acoustical and stipple finishes, and visually similar floor tiles	Less than 90 m^2 (<1,000 ft^2)	3
	90 m^2 or more, but less than 450 m^2 (1,000-5,000 ft^2)	5
	450 m^2 or more (>5,000 ft^2)	7

In some cases, manufactured products such as asbestos cement pipe were visually identified without sample confirmation.

Flooring mastic/adhesive are only sampled and analyzed if present on the underside of flooring samples (vinyl floor tile and vinyl sheet flooring) in sufficient quantity for laboratory analysis.

Attempts to distinguish and delineate asbestos-containing drywall compound from new non-asbestos drywall compound is often unachievable. Arcadis collected drywall joint compound samples from exterior walls, columns or other locations which are unlikely to have been renovated in an attempt to determine the presence of asbestos in the original drywall compound.

Arcadis submitted the bulk samples to a NVLAP accredited laboratory for analysis. The analysis is performed in accordance with Test Method EPA/600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials, July 1993.

EPA Method 600 states that materials characterized by interfering binder/matrix or low asbestos content may require additional gravimetric reduction sample treatment beyond routine polarized light microscopy (PLM) analysis (e.g. dissolution with hydrochloric acid, treatment with organic solvents or ashing in a muffle furnace or low temperature plasma asher to remove unwanted components).

Arcadis submitted one sample of each sample set (3) of vinyl floor tiles be analyzed by transmission electron microscopy (TEM) if the first two samples are reported negative by PLM.

The asbestos analysis was completed using a stop positive approach. Only one result of greater than the regulated criteria is required to determine that a material is asbestos-containing, but all samples must be

analyzed to conclusively determine that a material is non-asbestos. The laboratory stopped analyzing samples from a homogeneous material once greater than the criteria was detected in any of the samples of that material. All samples of a homogeneous material were analyzed if no asbestos was detected. Where building materials are described in this report as non-asbestos, or described as containing no asbestos, this is subject to the limitations of the analytical method used and should be understood to mean no asbestos was detected.

The classification, condition, and accessibility were assessed for the materials which could contain asbestos. To determine these factors, Arcadis followed the methodology outlined in the ASTM E356 Standard. The Standard provides definitions and criteria for the assessment of ACM. The classification, conditions, and accessibility information are provided in Appendix E.

Bulk samples of materials which could contain asbestos were collected and submitted to EMSL Canada Inc. (EMSL) for analysis of asbestos content. Asbestos-containing materials are defined as 0.5% or greater, or any amount if vermiculite.

3.2 Lead

Arcadis collected samples of distinctive paint finishes and surface coatings present in more than a limited application, where removal of the paint is possible. Arcadis collects samples by scraping the painted finish to include base and covering applications. 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. 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 were presumed to be the same, regardless of differing sub surface paints, if any.

The 2017 WorkSafeBC publication *Safe Work Practices for Handling Lead* (Lead Guideline) indicates the following:

> *Unlike for asbestos-containing material, WorkSafeBC does not numerically define what would be considered a lead-containing paint or coating. All suspected paints or coatings should be tested for lead because, depending on the nature of the work, even a small amount could pose a risk to workers. In order to determine which controls and personal protective equipment would be required for a particular job, a qualified person must consider this information as part of the risk assessment.*

- Improper removal of lead paint containing 600 mg/kg lead results in airborne lead concentrations that exceed half of the exposure limit
  - Exposure limit indicated in both the COHSR and BC Reg. 296/97 is 0.05 mg/m^3
  - Potential for exposure exceeding half of the occupational exposure limit would be the trigger for implementation of an exposure control plan.
- Lead concentrations as low as 90 mg/kg may present a risk to pregnant women and children
  - Any risk assessment should include for the presence of high risk individuals within the workplace

When reviewing the above, “high risk” individuals are not expected to be present in the workplace associated with this building during building material alteration activities (i.e., demolition) that would create significant disturbance to paint with such individuals present. As such, paints containing 600 ppm lead or

more will be considered “lead-containing” for the purpose of this report, such that appropriate risk assessments can be completed for demolition planning. However, information regarding the lead content of all paints tested is provided herein, for reference and risk assessment should the consideration of high risk individuals be necessary, based on the requirements of a particular situation.

Although a concentration of 600 ppm lead has been used to define paint coatings as LCPs, it should be noted that this is related to painted surfaces and the determination of appropriate provisions to protect occupants and employees from exposure to elevated concentrations of lead during typical operations and maintenance or simple renovation. This does not include painted metal surfaces that are to be welded, burned or torch-cut.

Using an arc welder or oxyacetylene torch on steel that is coated with lead-containing paint can create hazardous lead fumes and is prohibited by section 12.115 of BC Reg. 296/97.

> Regulatory excerpt: **12.115 Coatings on metals**
>
> *A coating on metal which could emit harmful contaminants (such as lead, chromium, organic materials, or toxic combustion products) must be removed from the base metal, whenever practicable, before welding or cutting begins.*

In addition, the following information is provided in the Lead Guideline:

- Welding or torch cutting of paints or coatings on metal can create very high concentrations of airborne lead fumes. Torch cutting structural steel, coated with paint containing as little as 130 mg/kg (equivalent to ppm) lead, can release airborne levels of lead as high as 0.8 mg/m^3 (16 times the exposure limit).

Given this information and that the analytical detection limit for lead paint analysis is approximately 80– 90 ppm (not significantly different than 130 ppm, which, per above, may release airborne lead levels 16 times the exposure limit), any paint coating on a metal surface to be welded, burned or torch-cut must be removed prior to that action being undertaken, unless a project-specific or tasks-specific risk assessment and safe work practices are developed by a qualified person.

Paint and surface coatings are evaluated for condition. The criteria for condition evaluation pertaining to LCPs described herein are generally based on the United States Housing and Urban Development (HUD) 2012 *Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing*.

When evaluating the condition of LCPs, an attempt should be made to determine whether the deterioration is due to a moisture problem or some other existing building deficiency. **“Poor”** surfaces are considered to be a hazard and should be corrected. “**Fair”** surfaces should be repaired but are not yet considered to be a hazard; if not repaired, they should be monitored frequently. “**Good/intact”** surfaces should be monitored to ensure that they remain in a nonhazardous condition.

In addition, the presence of paint debris must be considered in evaluating condition. Given the variety of paint uses, there are many applications that can have a tendency for the paint to “wear” from the surface

slowly, over an extended period of time. Conditions where paint has worn from a surface are worth noting for maintenance discussions (i.e., related to re-coating the surface should, for example, the coating provide weather protection), however, in the absence of loose paint chip debris/dust, such conditions would not represent a potential exposure situation related to lead.

The condition evaluation criteria for LCPs are summarized in the table below.

Table 3. Lead-Containing Paint Condition Categories

Type of Building Component[1]	Total Area of Deteriorated Paint on Each Component		
	Good/Intact	Fair[2]	Poor[3]
Exterior components with large surface areas.	Entire surface is intact.	Less than or equal to 10 square feet	More than 10 square feet
Interior components with large surface areas (walls, ceilings, floors, doors.	Entire surface is intact.	Less than or equal to 2 square feet	More than 2 square feet
Interior and exterior components with small surface areas (windowsills, baseboards, soffits, trim).	Entire surface is intact.	Less than or equal to 10% of the total surface area of the component.	More than 10% of the total surface area of the component

NOTES:

1. Building component in this table refers to each individual component or side of building, not the combined surface area of all similar components in a room (e.g., a wall with 1 square foot of deteriorated paint is in "fair" condition, even if the other three walls in a room are intact).
2. Surfaces in "fair" condition should be repaired and/or monitored but are not considered to be "lead-containing paint hazards".
3. Surfaces in "poor" condition are considered to be "lead-containing paint hazards" and should be addressed through abatement or interim controls.

Analysis for lead in paints or surface coatings was performed in accordance with EPA Method No. 3050B/Method No. 7420; flame atomic absorption at laboratory accredited by the American Industrial Hygiene Association (AIHA).

3.3 Polychlorinated Biphenyls (PCBs)

The presence or absence of fluorescent lights was documented during the course of our investigation to determine whether there were any of the T12 type. T12 fluorescent lamps, with a diameter of 1.5 inches, utilize transformer type magnetic ballasts, which may contain PCBs. The use of T12s has been discontinued and replaced with new high-efficiency 1-inch T8 lamps (and other types) which use electronic ballasts which do not contain PCBs.

Wet transformers were assessed for PCBs based on the age of the building, a review of maintenance records and examination of labels or nameplates on equipment, where present and accessible. The information is compared to known ban dates of PCBs and Environment Canada publications.

Dry type transformers are presumed to be free of dielectric fluids and hence non-PCB. Caulking's were not sampled for PCB content unless specifically impacted by the proposed renovation scope. The material is considered a PCB solid if PCB content is 50ppm or greater based on the threshold given in SOR/2008-273.

3.4 Suspect Visible Mould

Arcadis identified the presence of any suspect mould and/or moisture-impacted building materials by visual inspection during the course of our site investigation. Suspect mould is typically a coloured, textured substance or discolouration/staining on a building material surface which, based on our experience, may be mould growth. If any mould growth is concealed within wall, ceiling, or floor cavities, it is not addressed in this assessment. No mould sampling or moisture testing is performed unless directed by the Client. The adjective *suspect* is used where the presence of mould has not been confirmed by laboratory analysis.

3.5 Mercury

Building materials/products/equipment (e.g. thermostats, barometers, pressure gauges, light tubes), suspected to contain mercury were identified by visually inspection only. Dismantling of equipment suspected of containing mercury was not performed. Sampling of these materials for laboratory analysis of mercury content was not performed.

Mercury spills or damaged mercury-containing equipment was recorded where observed.

3.6 Ozone Depleting Substances (ODS)

Arcadis determined the potential presence of ODS (chlorofluorocarbons, hydrochlorofluorocarbons, hydrofluorocarbons, halons, etc.) in air conditioning units, chillers, commercial coolers, and fire suppression systems by visual inspection of manufactures' labels or plates, maintenance records, or logbooks, etc.

3.7 Silica

Arcadis identified building materials suspected of containing crystalline silica (e.g. concrete, cement, tile, brick, masonry, mortar) by knowledge of current and historic applications and visual inspection only. Arcadis did not perform sampling of these materials for laboratory analysis of crystalline silica content.

4 RESULTS

4.1 Asbestos

During the course of our assessment, representative bulk samples of material were collected by Arcadis staff. The samples were forwarded to EMSL in Burnaby, British Columbia (BC) for asbestos analyses. EMSL holds a current Certificate of Accreditation for Bulk Asbestos Fibre Analysis under the Voluntary Accreditation Program (NVLAP). Bulk sampling was performed in general accordance with the requirements specified in ASTM E2356 Standard, BC Reg. 296/97 and in the WorkSafe BC publication Safe Work Practices for Handling Asbestos.

Results of bulk sample analysis for asbestos content are provided in the table below. Samples that exceed the criteria are highlighted in yellow.

Site Photographs provided in Appendix A. Laboratory certificates of analysis have been provided in Appendix B. Floor plans indicating sample locations and room numbers are provided in Appendix C.

Table 4. Results of Bulk Sample Analysis for Asbestos

Sample Number	Sample Description	Sample Location	Asbestos Type %
S-01A	Building Paper	Exterior – North Face	None Detected
S-01B	Building Paper	Exterior – North Face	None Detected
S-01C	Building Paper	Exterior – West Face	None Detected
S-01D	Building Paper	Exterior – East Face	None Detected
S-01E	Building Paper	Exterior – South Face	None Detected
S-02A	Grey Stair Tread	Exterior – North Stairs	None Detected
S-02B	Grey Stair Tread	Exterior – North Stairs	None Detected
S-02C	Grey Stair Tread	Exterior – North Stairs	None Detected
S-03A	White Caulking	Exterior – Rain gutter	None Detected
S-03B	White Caulking	Exterior – Rain gutter	None Detected
S-03C	White Caulking	Exterior – Rain gutter	None Detected

The following building materials were common in the building: however, these materials do not contain asbestos and were not sampled during the survey:

- Vinyl siding, Styrofoam behind siding, and concrete.

No asbestos-containing materials were confirmed present in the assessed area. Asbestos-containing materials were not identified in the previous reports.

Presumed Materials

No presumed materials that may contain asbestos are suspected to be present in the way of planned work.

4.2 Lead

During the course of our site investigation, representative bulk samples of predominant paint types were collected by Arcadis staff. The samples were forwarded to EMSL for lead analyses. Results of bulk sample analysis for lead content are provided in the table below. Results that exceed the criteria re highlighted in yellow.

The laboratory report is provided in Appendix B.

Table 5. Results of Analyses of Bulk Samples for Paint for Lead

Sample No.	Sample Location(s)	Sample Description	Lead Content (ppm)

L-01	Exterior – North stairs	Blue pant on wood stairs	<80
L-02	Exterior – perimeter of building	Brown paint on metal rain gutter	<81
L-03	Exterior – North door trim	White paint on wood	<80

No lead was detected at a level above the definition of lead paint (600 ppm) in any samples within the assessed area. Lead paint identified in the previous assessment reports is on interior drywall surfaces and is not expected to be impacted by the prosed renovations. Where one colour of paint is indicated in the sample descriptions in the table above, only one layer of paint was observed. Where multiple colours are indicated in the sample description, multiple layers of paint were observed.

All paint applications were noted to be generally in fair to good condition.

4.3 Polychlorinated Biphenyls (PCBs)

PCBs were not observed in the assessed area.

4.4 Suspect Visible Mould

Suspect visible mould was not observed during the assessment.

4.5 Mercury

Mercury-containing items were not observed in the assessed area.

4.6 Ozone Depleting Substances

Ozone Depleting Substances (ODS) were not observed in the assessed area.

4.7 Silica

Crystalline silica is a presumed component of the following materials in assessed area:

- poured concrete

5 RECOMMENDATIONS

If future building renovation or demolition is required beyond the scope of this project, a detailed intrusive assessment must be conducted. The assessment should include destructive testing (i.e. coring and/or removal of building finishes and components), and sampling of materials not previously tested (i.e. roofing materials, mastics etc.).

5.1 Building Renovation Work

The following specific recommendations are made regarding renovation involving the hazardous materials identified.

1. Provide this report and the detailed plans and specifications to the contractor prior to bidding or commencing work.

The following general recommendations are made regarding renovation involving the hazardous materials identified.

Suspect Visible Mould

No mould was observed; if mould is uncovered during renovations, use appropriate precautions, and protect workers using methods that comply with provincial guidelines.

Silica

Construction disturbance of silica-containing products may result in excessive exposures to airborne silica, especially if performed indoors and dry. Cutting, grinding, drilling or demolition of materials containing silica should be completed only with proper respiratory protection and other worker safety precautions that comply with provincial standards or guidelines.

6 REFERENCES

The following legislation and documents were referenced in completing the assessment and this report:

1. Occupational Health and Safety Regulation, B.C. Reg. 296/97, WorkSafe BC.
2. Safe Work Practices for Handling Asbestos, WorkSafe BC, 2017 Edition.
3. Hazardous Waste Regulation, B.C. Reg. 63/88, November 2017, BC Environmental Management Act.
4. Ozone Depleting Substances and Other Halocarbons Regulation, B.C. Reg. 317/2012 Environmental Management Act.
5. PCB Regulations, SOR/2008-273, Canadian Environmental Protection Act.
6. Lead-Containing Paint and Coatings, Preventing Exposure in the Construction Industry, WorkSafe BC, June 2017.
7. Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing, United States Housing and Urban Development (HUD) 2012.
8. Mould Guidelines for the Canadian Construction Industry, Standard Construction Document 2018, Canadian Construction Association.
9. Minister of Justice Canada Labour Code. R.S.C., 1985, c. L-2. March 2020.
10. Minister of Justice. 2018. Canada Occupational Health and Safety Regulations. SOR/86-304, June 2019.
11. Public Services and Procurement Canada Asbestos Management Standard. June 2019.
12. Transport Canada Consolidated Transport of Dangerous Goods Regulations including Amendment SOR/2019-101.
13. ASTM E2356 Standard Practice for Comprehensive Buildings Asbestos Surveys.

14. Government of Canada, Asbestos Management Plan, Version 2020-01, January 2020.

7 LIMITATIONS

This report, prepared for Public Services and Procurement Canada on behalf of Government of Canada, does not provide certification or warranty, expressed or implied, that the investigation conducted by Arcadis identified all hazardous materials associated with the subject building. The work undertaken by Arcadis was directed to provide information on the presence of hazardous materials in construction materials based on visual inspection of readily accessible areas of the subject building, and on the results of laboratory analysis of a limited number of bulk samples. The material in this report reflects Arcadis' best judgment in light of the information available at the time of the investigation, which was performed on July 10, 2020. This report is not intended to be used as a scope of work or technical specification for remediation of hazardous materials. Any use which any other party makes of the report, or reliance on, or decisions to be based on it, is the responsibility of such parties.

APPENDIX A

Site Photographs

Project Photographs

Public Services and Procurement Canada
Building E0187, House 11, British Columbia

Photo: 1

Date:
July 10, 2020

Description:
View of Employee Housing, Front

Photo: 2

Date:
July 10, 2020

Description:
View of Employee Housing, Rear

Project Photographs

Public Services and Procurement Canada
Building E0187, House 11, British Columbia

Photo: 3

Date:
July 10, 2020

Description:
Non lead blue paint on North wood deck and stairs.

Photo: 4

Date:
July 10, 2020

Description:
Worn and flaking non lead blue paint on wood stairs, North.

Project Photographs

Public Services and Procurement Canada
Building E0187, House 11, British Columbia

Photo: 5

Date:
July 10, 2020

Description:
Non lead white paint on wood trim around North door.

Photo: 6

Date:
July 10, 2020

Description:
Vinyl siding on Styrofoam, on non asbestos building paper, on wood structure.

APPENDIX B

Laboratory Certificates of Analysis

EMSL Canada Inc.
2333 18th Avenue NE, Unit 48, Calgary, AB T2E 8T6
Phone/Fax: (403) 879-1149 / (403) 879-1152
http://www.EMSL.com CalgaryLab@EMSL.com

EMSL Canada Or	652005043
CustomerID:	55ACAV42
CustomerPO:	30053059
ProjectID:	

Attn: **Jerry Botti**
ARCADIS Canada Inc.
308-1080 Mainland Street
Vancouver, BC V6B 2T4

Phone: (604) 632-9941
Fax:
Received: 7/20/2020 08:30 AM
Collected: 7/10/2020

Project: **30053059 / E0187 / House 11**

Test Report: Lead in Paint Chips by Flame AAS (SW 846 3050B/7000B)*

Client Sample Description	*Lab ID*	*Collected*	*Analyzed*	*Weight*	*Lead Concentration*
L-01	*652005043-0001*	7/10/2020	7/21/2020	0.2561 g	<80 ppm
	Site: EXTERIOR - BLUE PAINT ON WOOD STAIRS				
L-02	*652005043-0002*	7/10/2020	7/21/2020	0.2454 g	<81 ppm
	Site: EXTERIOR - BROWN PAINT ON GUTTER Insufficient sample to reach reporting limit.				
L-03	*652005043-0003*	7/10/2020	7/21/2020	0.2507 g	<80 ppm
	Site: EXTERIOR - WHITE PAINT ON WOOD DOOR TRIM				

Client request: Remove address from project name.

Jefferson Salvador, Laboratory Manager
or other approved signatory

Report Amended: 10/22/2020 10:22:10 Replaces the Inital Report 07/24/2020 16:02:26. Reason Code: Client-Other (see report comment)

EMSL Canada Inc.

4506 Dawson Street Burnaby, BC V5C 4C1
Phone/Fax: (604) 757-3158 / (604) 757-4731
http://www.EMSL.com / vancouverlab@EMSL.com

EMSL Canada Order 692001633
Customer ID: 55ACAV42
Customer PO: 30053059
Project ID:

Attn: Jerry Botti
ARCADIS Canada Inc.
308-1080 Mainland Street
Vancouver, BC V6B 2T4

Phone: (604) 632-9941
Fax:
Collected: 7/10/2020
Received: 7/16/2020
Analyzed: 7/23/2020

Proj: 30053059 / E0187 / House 11

Test Report: Asbestos Analysis in Bulk Material for Occupational Health and Safety British Columbia Regulation 188/2011 via EPA 600/R-93/116 Method

Client Sample ID: S-01A ***Lab Sample ID:*** **692001633-0001**
Sample Description: EXTERIOR - NORTH/BUILDING PAPER

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	7/22/2020	Black	60.0%	40.0%	None Detected	

Client Sample ID: S-01B ***Lab Sample ID:*** **692001633-0002**
Sample Description: EXTERIOR - NORTH/BUILDING PAPER

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	7/22/2020	Black	60.0%	40.0%	None Detected	

Client Sample ID: S-01C ***Lab Sample ID:*** **692001633-0003**
Sample Description: EXTERIOR - WEST/BUILDING PAPER

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	7/22/2020	Black	60.0%	40.0%	None Detected	

Client Sample ID: S-01D ***Lab Sample ID:*** **692001633-0004**
Sample Description: EXTERIOR - EAST/BUILDING PAPER

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	7/23/2020	Brown	85.0%	15.0%	None Detected	

Client Sample ID: S-01E ***Lab Sample ID:*** **692001633-0005**
Sample Description: EXTERIOR - SOUTH/BUILDING PAPER

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	7/23/2020	Brown	85.0%	15.0%	None Detected	

Client Sample ID: S-02A ***Lab Sample ID:*** **692001633-0006**
Sample Description: EXTERIOR - NORTH STAIRS/STAIR TREAD

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	7/22/2020	Gray	0.0%	100.0%	None Detected	

Client Sample ID: S-02B ***Lab Sample ID:*** **692001633-0007**
Sample Description: EXTERIOR - NORTH STAIRS/STAIR TREAD

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	7/22/2020	Gray	0.0%	100.0%	None Detected	

EMSL Canada Inc.

4506 Dawson Street Burnaby, BC V5C 4C1
Phone/Fax: (604) 757-3158 / (604) 757-4731
http://www.EMSL.com / vancouverlab@EMSL.com

EMSL Canada Order 692001633
Customer ID: 55ACAV42
Customer PO: 30053059
Project ID:

Test Report: Asbestos Analysis in Bulk Material for Occupational Health and Safety British Columbia Regulation 188/2011 via EPA 600/R-93/116 Method

Client Sample ID: S-02C ***Lab Sample ID:*** **692001633-0008**

Sample Description: EXTERIOR - NORTH STAIRS/STAIR TREAD

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	7/23/2020	Gray	0.0%	100.0%	None Detected	

Client Sample ID: S-03A ***Lab Sample ID:*** **692001633-0009**

Sample Description: EXTERIOR - RAIN GUTTER/CAULKING

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	7/22/2020	White	0.0%	100.0%	None Detected	

Client Sample ID: S-03B ***Lab Sample ID:*** **692001633-0010**

Sample Description: EXTERIOR - RAIN GUTTER/CAULKING

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	7/22/2020	White	0.0%	100.0%	None Detected	

Client Sample ID: S-03C ***Lab Sample ID:*** **692001633-0011**

Sample Description: EXTERIOR - RAIN GUTTER/CAULKING

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	7/23/2020	White	0.0%	100.0%	None Detected	

Analyst(s):

Chloe Huang PLM (7)
Nicole Yeo PLM (4)

Reviewed and approved by:

Nicole Yeo, Laboratory Manager
or Other Approved Signatory

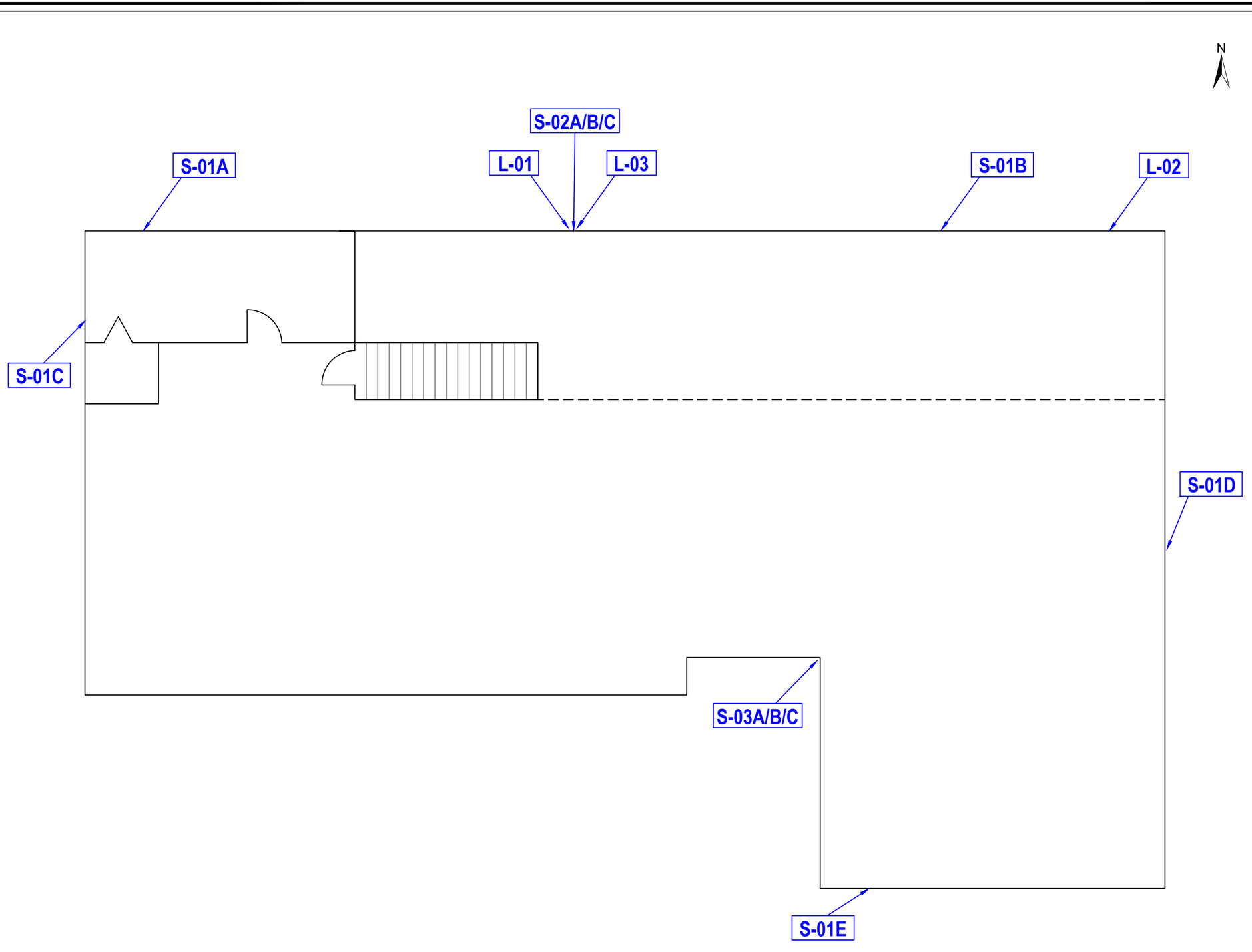
None Detected = <0.1%. EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations.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

Samples analyzed by EMSL Canada Inc. Burnaby, BC

Report amended: 10/21/202016:53:28 Replaces initial report from: 07/23/202011:40:32 Reason Code: Client-Change to Project

APPENDIX C

Floor Plans



LEGEND

S-XXX Bulk Asbestos Sample

L-XXX Bulk Lead Paint Sample

N.T.S

Title: **GOVERNMENT OF CANADA**
HAZARDOUS BUILDING MATERIAL ASSESSMENT - 2020

Project: BUILDING E0187 - HOUSE 11
FIRST FLOOR

Client: PUBLIC SERVICES AND PROCUREMENT CANADA

Project Number:	Drawn By:	Plot Size:	Date:
30053059	CB	11X17"	JULY 2020

ARCADIS

FIGURE 1

firstfloor G:\PROJECTS\30053059 - PSPC_RCMP Construction 2020\CAD\30053059-Minmaker2.dwg

APPENDIX D

Regulations and Health Effects

Asbestos

Occupational Health and Safety (OHS) for federal employees is regulated by the Canada Labour Code (CLC) Part II. The *Canada Occupational Health and Safety Regulations (COHSR), Part X, Hazardous Substances* covers specific requirements related to the management and control of asbestos-containing materials (ACM). The COHSR, Part X, Hazardous Substances, states an employee shall be kept free from exposure to a concentration of airborne chrysotile asbestos in excess of 0.1 fibre/cm^3 or f/cc. There are also specific requirements for hazard prevention detailed in the Hazard Prevention Program (HPP) in the CLC.

For the purposes of this report, the following federal requirements will be followed, unless provincial requirements are more stringent. Federal legislation and policy referenced in this report includes:

- Canada Labour Code, March 2020;
- Canada Occupational Health and Safety Regulations Part X, Hazardous Substances; SOR/86-304, June 2019;
- Public Services and Procurement Canada Asbestos Management Standard, June 2019;
- Asbestos Management Plan, Government of Canada, Version 2020-01, January 2020; and,
- Transport Canada, Transport of Dangerous Goods Regulations

The management and requirements for the potential disturbance of asbestos in buildings is also regulated at the provincial level under the *British Columbia Occupational Health and Safety Regulations,296/97, and Safe Work Practices for Handling Asbestos, WorkSafeBC, 2017 Edition*.

The BC Occupational Health and Safety Regulations, 296/97 (BC Reg 296/97), require specific actions when asbestos is a potential health hazard in a workplace. Section 6.1 of the regulation defines an asbestos-containing material as follows:

"asbestos-containing material" means the following:

(a) a manufactured article or other material, other than vermiculite insulation, that would be determined to contain at least 0.5% asbestos if tested in accordance with one of the following methods:

(i) Asbestos, Chrysotile by XRD, Method 9000 (Issue 2, dated August 15, 1994) in the NIOSH Manual of Analytical Methods, published by the United States National Institute for Occupational Safety and Health, Centre for Disease Control;

(ii) Asbestos (bulk) by PLM, Method 9002 (Issue 2, dated August 15, 1994) in the NIOSH Manual of Analytical Methods, published by the United States National Institute for Occupational Safety and Health, Centre for Disease Control;

(iii) Test Method for the Determination of Asbestos in Bulk Building Materials (EPA/600/R-93/116, dated July 1993) published by the United States Environmental Protection Agency;

(b) vermiculite insulation that would be determined to contain any asbestos if tested in accordance with the Research Method for Sampling and Analysis of Fibrous Amphibole in Vermiculite Attic Insulation (EPA/600/R-04/004, dated January 2004) published by the United States Environmental Protection Agency;

The duties of employers, contractors, or owners include:

- identifying and labeling ACM that can potentially release asbestos fibres;
- keeping a current written record of all ACM present in the workplace;
- conducting regular surveillance and maintenance of asbestos materials to prevent fibre release;
- developing a written exposure control plan if workers may be exposed to harmful levels of asbestos;
- conducting work in a way that prevents the release of asbestos fibres as much as possible;
- notifying, informing, and training workers; and,
- notifying Occupational Health and Safety (OHS) at least 48 hours before beginning an asbestos-abatement.

Disturbance of asbestos during construction and demolition is regulated under section 20.112 of BC Reg 296/97.

The 2017 WorkSafeBC publication Safe Work Practices for Handling Asbestos (Asbestos Guide) is used by Occupational Health and Safety officers as a guide when reviewing abatement work practices and employer codes of practice, and generally meets the requirements of the COHSR.

The Asbestos Guide also provides significant additional background information pertaining to asbestos, along with details on health effects and other applicable legislation within the province of British Columbia (e.g., the federal Hazardous Products Act, the BC Building Code and waste disposal regulations).

Disposal of asbestos waste is governed by the British Columbia Hazardous Waste Regulation (BC Reg. 63/88). The Federal Transportation of Dangerous Goods Regulation and BC Reg. 63/88 set out the requirements for the proper transport of asbestos waste in British Columbia. In general, and for transportation and disposal, the waste must be placed in a double sealed container, properly labeled, free of cuts, tears or punctures and disposed of at a licensed waste station which has been properly notified of the presence of asbestos waste.

Health effects

Undisturbed asbestos within building materials poses no health risks. Asbestos poses a risk when building materials containing asbestos are impacted, or disturbed, thereby releasing the asbestos fibres into the air

Asbestos-related diseases are caused when suspended airborne asbestos fibres are inhaled and the fibres settle into various regions of the lungs and remain for extended periods. Once embedded in the lungs the asbestos fibres cause scarring within the lung tissue, ultimately leading to impaired lung function (asbestosis) and/or various cancers (lung cancer; mesothelioma). These asbestos-related diseases are irreversible and fatal. The risk of lung-related cancers is increased in individuals who smoke.

These asbestos-related diseases most often occur in individuals who have been exposed to high concentrations of airborne asbestos over a long period of time, though mesothelioma has been found in individuals with short-term exposures. Symptoms or the development of these asbestos-related diseases usually occur 10 to 25 years after exposure

Lead

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 (2005) to 90 ppm (2010).

With respect to potential lead exposures associated with disturbance to surfaces coated with lead-containing products, the 2017 WorkSafeBC manual titled Lead-Containing Paint and Coatings: Preventing Exposure in the Construction Industry, indicates the following:

- Improper removal of lead paint containing 600 mg/kg lead results in airborne lead concentrations that exceed half of the exposure limit
    - This potential for exposure exceeding half of the occupational exposure limit would be the trigger for implementation of an exposure control plan.
- Lead concentrations as low as 90 mg/kg may present a risk to pregnant women and children
    - Any risk assessment should include for the presence of high risk individuals within the workplace

The disposal of lead-containing paint is regulated under the Federal *Transportation of Dangerous Goods Act* and by the British Columbia Ministry of Environment. All lead-based paints and associated nonmetal substrate (concrete, plaster, wood, etc.) must undergo Toxicity Characteristic Leachate Properties (TCLP) metals testing to determine disposal procedures. Upon the completion of the test, the total concentration of metals in the waste extract must be compared to Schedule 4, Table 1 of the Hazardous Waste Regulation.

The Federal Transportation of Dangerous Goods Regulation and BC Reg. 63/88 set out the requirements for the proper transport of lead waste in British Columbia.

Health Effects

Elemental lead and inorganic lead compounds are absorbed through ingestion or inhalation and can incorporate into the bone marrow, nerve tissue, brain, and kidneys. In children, symptoms of lead poisoning can include headaches, irritability, abdominal pain, vomiting, anemia, weight loss, poor attention span, noticeable learning difficulty, slowed speech development, and hyperactivity. In adults, symptoms of lead poisoning can include pain, numbness or tingling of the extremities, muscular weakness, headache, abdominal pain, memory loss, unsteady gait, pale skin, weight loss, vomiting, irritability, and anemia. Although adults are susceptible to the toxic effects of lead, children are at high risk due to the nature of a child's activities that involve the introduction of non-food items into their bodies.

Excessive airborne lead and surface contamination can be transferred to employees' hands and may results in lead ingestion. Therefore, work practices intended to minimize surface lead concentrations, such as frequent cleaning of work surfaces should be included in an overall lead exposure control plan

PCB

As of September 5, 2008, under subsection 93(1) of the *Canadian Environmental Protection Act,* (CEPA), Federal PCB regulations were published by the Canada Gazette Part II (SOR/2008-273) that imposed specific deadlines for the elimination of all PCBs in concentrations at or above 50 milligrams/kilogram (mg/kg). This regulation required the elimination of all PCBs and PCB-containing materials currently in-use and in storage and limited the period of time PCB materials could 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.

In British Columbia, PCB equipment becomes PCB wastes as soon as it is removed from service. This is the case even if the intent is to treat, recycle, or reuse the equipment.

When PCB wastes are stored in British Columbia, the full requirements of BC Reg. 63/88 apply to:

- 1.0 kg or more of pure PCB
- 100 L or more of any liquid containing more than 50 ppm of PCB
- 100 kg or more of any material other than a liquid, contaminated with more than 50 ppm of PCB

These amounts are the total of all amounts at a single location owned or controlled by the same person. They include PCB equipment. BC Reg. 63/88 also provides packaging requirements for storage, labeling requirements, waste destruction requirements, and references SOR/2008-273, indicating:

The Federal Transportation of Dangerous Goods Regulation sets out the requirements for the proper transport of PCB waste across provincial boundaries.

In British Columbia, a manifest issued by the Ministry of Environment (or equivalent federal document) must be used for hazardous wastes shipped from sites in British Columbia. A manifest must be used to transport:

- 5 kg or more of PCB solids
- 5 L or more of PCB liquids
- An amount of a PCB solid or PCB liquid containing more than 500 g of PCB within BC
- 500 g or more of solids, liquids, or mixtures of these containing 50 mg/kg of PCB outside of BC

Health effects

PCBs are insoluble in water; however, they readily dissolve in fats and other organic compounds. It is these attributes and fat-solubility that allow PCBs to persist in the environment and bio-accumulate in humans and animals. Exposure to PCBs can affect the immune system, reproductive system, nervous system, and endocrine system. In humans, PCBs are potentially cancer-causing.

Mould

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, occupational health and safety regulations typically require employers to take every precaution reasonable in the circumstances for the protection of workers.

The WorkSafeBC Guideline for Part 4 of BC Reg. 296/97 discusses the application of the Regulation to workplaces with mould showing on exposed or hidden surfaces, or where mould may be a factor in complaints regarding indoor air quality. The guideline provides information for investigating indoor air quality complaints with respect to mould contamination, including information on sampling for the

presence of moulds in buildings. Information is also provided on possible health effects and for cleanup personnel involved in the remediation of buildings damaged by water and mould.

Health Effects

There are a number of documented cases of health problems related to exposure to indoor fungi.

Both high-level, short-term exposures and lower-level, long-term exposures can result in illness. The most common symptoms from exposure to mould in indoor environments are runny nose, eye irritation, cough, congestion, aggravation of asthma, headache, flu-like symptoms, fatigue, and skin rash. People with suppressed immune systems may be susceptible to fungal infections as a result of exposure to indoor moulds.

People who are exposed to mould growth on building materials will not necessarily exhibit adverse health effects. However, the mould must still be removed. Humans are at risk from indoor mould when fungal spores, fragments or metabolites are released into the air and inhaled or physically contacted (dermal exposure).

Not everyone experiences allergic reaction; the susceptibility to exposure varies with the individual's genetic predisposition, age, state of health, and concurrent exposures. For these reasons, and because the measurement of exposure is not standardized and biological markers of exposure to fungi are largely unknown, it is not possible to establish "safe" or "unsafe" levels of exposure. However, federal, and provincial policies have been written to minimize mould exposure and the elimination of mould indoors.

Mercury

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 disposal should be through a scrap dealer (elemental mercury), recycling firm for mercury vapour and returned to the manufacturer for light tubes and fixtures. Disposal of mercury waste is governed by BC Reg. 63/88.

The Federal Transportation of Dangerous Goods Regulation and BC Reg. 63/88 set out the requirements for the proper transport of mercury waste in British Columbia.

Health Effects

Routes of exposure for mercury and mercury compounds include inhalation, ingestion, skin and/or eye contact. 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.

Elemental (metallic) mercury most often causes health effects through inhalation of its vapour, which can be absorbed through the lungs. This kind of exposure can result when elemental mercury is spilled (or products that contain elemental mercury break) and the mercury is exposed to the air. Vapour concentrations can vary especially in warm or poorly-ventilated indoor spaces where the airborne concentration can exceed the permissible exposure limit (provincially set).

Chronic mercury "poisoning" can be caused by long-term exposure to low airborne concentrations (or low levels) of mercury. Symptoms or effects of mercury exposure include: tremors, emotional changes,

neuromuscular effects, mental changes/disturbances, digestive disturbances, headaches, insomnia, and changes in nervous response.

Silica

Regulations pertaining to silica are provided in BC Reg. 296/97. Included are general provisions (minimizing release; keeping worksite clear of unnecessary accumulations; ensuring methods for decontamination prevent generation of airborne silica), provisions for "restricted areas" (where there is a reasonable chance that the airborne concentration of silica exceeds or may exceed the occupational exposure limit), provisions for use in abrasive blasting, and provisions for health assessments for workers exposed to silica.

Health Effects

Crystalline silica dust particles, which are small enough to be inhaled into the lungs (respirable size), can cause a number of health problems. As with asbestos, silica within building materials poses no threat to human health if left undisturbed.

Exposure to crystalline silica airborne dust my cause scaring of the lungs with coughing and shortness of breath—also known as "silicosis", a form of disabling, progressive, and sometimes fatal pulmonary fibrosis.

Ozone Depleting Substances (ODS)

ODSs are regulated in British Columbia by the British Columbia *Waste Management Act*—Ozone Depleting Substances and Other Halocarbons Regulation (BC Reg. 387/99 as amended by BC Reg. 317/2012).

On federal land, aboriginal land and federal works, buildings and undertakings, the Federal Halocarbon Regulation 2003 (SOR/2003-289, including associated amendments) 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.

If ODS-containing materials are to be removed and disposed of, all ODSs must be handled, recycled, stored, and/or disposed of in accordance with the requirements of BC Reg. 63/88.

The Federal Transportation of Dangerous Goods Regulation and BC Reg. 63/88 set out the requirements for the proper transport of ODS waste in British Columbia.

Health Effects

Health effects are not typically related to exposure to ODSs directly, but to the consequences of ODS release to the atmosphere, subsequent degradation of the earth's ozone layer, and implications associated with increased UVB light exposure.

APPENDIX E

Classification, Condition and Accessibility

1.1 Spray Applied Fireproofing, Insulation and Texture Finishes

To evaluate the condition of ACM spray applied as fireproofing, thermal insulation, or texture, decorative or acoustic finishes, the following criteria are applied:

GOOD

Surface of material shows no significant signs of damage, deterioration, or delamination. Up to 1 percent visible damage to surface is allowed within range of **GOOD**. Evaluation of sprayed fireproofing requires the surveyor to be familiar with the irregular surface texture typical of sprayed asbestos products. **GOOD** condition includes un-encapsulated 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 1 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 survey or re-assessment form.

NOTE: **FAIR** condition is not utilized in the evaluation of the 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 are advised to be watchful for ACM **DEBRIS** prior to accessing or working above ceilings in areas of buildings with ACM regardless of the reported condition.

1.2 Mechanical Insulation

The evaluation of the condition of mechanical insulation (on boilers, breaching, ductwork, piping, tanks, equipment etc.) utilizes the following criteria:

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 penetrating 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. It is not possible to observe the full length of mechanical insulation from all angles.

1.3 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 should be treated as a friable product.

2. Evaluation of Accessibility

The accessibility of building materials known or suspected of being ACM is rated according to the following criteria:

ACCESS (A)

Areas of the building within reach (from floor level) of all building users. Includes areas such as gymnasiums, workshops, and storage areas where activities of the building users may result in disturbance of ACM not normally within reach from floor level.

ACCESS (B)

Frequently entered maintenance areas within reach of maintenance staff, without the need for a ladder. Includes: frequently entered pipe chases, tunnels and service areas or areas within reach from a fixed ladder or catwalk, e.g. tops of equipment, mezzanines.

ACCESS (C) EXPOSED

Areas of the building above 2.4 metres where use of a ladder is required to reach the ACM. Only refers to ACM that is exposed to view, from the floor or ladder, without the removal or opening of other building components such as ceiling tiles, or service access door or hatch. Does not include infrequently accessed service areas of the building.

ACCESS (C) CONCEALED

Areas of the building which require the removal of a building component, including lay-in ceilings and access panels into solid ceiling systems. Includes rarely entered crawl spaces, attic spaces, etc. Observations will be limited to the extent visible from the access points.

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 ACM. Evaluation of condition and extent of ACM is limited or impossible, depending on the surveyor's ability to visually examine materials in ACCESS D.

3. ACM DEBRIS

3.1 DEBRIS from Friable ACM

The presence of fallen ACM is noted separately from the presumed friable ACM source (sprayed fireproofing, thermal insulation, texture, decorative or acoustic finishes or mechanical insulation) and is referred to as **DEBRIS**.

3.2 DEBRIS from Damaged Non-Friable ACM

The presence of fallen ACM from damaged non-friable ACM is also reported separately from the non-friable ACM source. Only fallen non-friable ACM that has become friable is reported as **DEBRIS**.

The identification of the exact location or presence of **DEBRIS** on the top of ceiling tiles is limited by the number of observations made and the presence of building components such as ducts or full height walls

that obstruct observations. Workers are advised to be watchful for the presence of **DEBRIS** prior to accessing or working in proximity to mechanical insulation or above ceilings in areas of buildings with ACM regardless of the reported presence or absence of **DEBRIS**.

4. Action Matrix and Action Descriptions

The Asbestos Management Plan requires the following responses:

- Immediately clean-up **DEBRIS** that is likely to be disturbed.
- Remove, repair, or enclose friable ACM in **POOR** or **FAIR** condition whose continued deterioration will result in **DEBRIS** that is likely to be disturbed.

The following factors shall be considered in making site-specific recommendations for compliance with the existing applicable regulations or codes and the practical implementation of the Asbestos Management Plan:

1. ACM in **POOR** condition is not routinely repairable. If an abatement action is necessary, removal is the recommended action (enclosure is a viable option in unusual circumstances, e.g. where removal is difficult or costly and the asbestos-containing material can be thoroughly enclosed).

2. Mechanical insulation in **FAIR** condition will be repaired or removed based on the following general recommendations, applied on a case-by-case basis:
   - ACM insulation found in **FAIR** condition in ACCESS (B) or ACCESS (C) EXPOSED areas is to be repaired.
   - ACM mechanical insulation found in **FAIR** condition in ACCESS (B) and ACCESS (C) EXPOSED areas, where future damage to the ACM is likely to occur, is to be removed.

3. ACM in **GOOD** condition present in ACCESS (A) can be managed by surveillance, as long as it is not disturbed by future renovation, maintenance, or demolition. Proactive removal of the ACM in ACCESS (A) will be considered where damage is possible by on-going occupant activity (accidental or intentional).

4. Non-friable or manufactured products are considered in the action matrix as follows:
   - Non-friable and manufactured products reported in **POOR** condition, or friable **DEBRIS** resulting from the deterioration of non-friable ACM, are treated as friable materials and the appropriate action, and depending on accessibility is determined from the action matrix for friable ACM.
   - For non-friable or manufactured products reported in **GOOD** condition, Action 7 (surveillance) is recommended regardless of accessibility.

5. All asbestos-containing material from a particular area is to be removed where small quantities of asbestos are present, and removal will negate the need for the use of an Asbestos Management Program in that area.

The action matrix provided below establishes the recommended asbestos control action. The ACTIONS themselves are described in full following the table.

4.1 Action Matrix Tables

FRIABLE ACM				
ACCESS	**CONDITION**			**DEBRIS**
	GOOD	**FAIR**	**POOR**	
(A)	ACTION 5/7[1]	ACTION 5/6[2]	ACTION 3	ACTION 1
(B)	ACTION 7	ACTION 6/5[3]	ACTION 3	ACTION 1
(C) EXPOSED	ACTION 7	ACTION 6	ACTION 4	ACTION 2
(C) CONCEALED	ACTION 7	ACTION 7	ACTION 4	ACTION 2
(D)	ACTION 7	ACTION 7	ACTION 7	ACTION 7

[1] If material in **ACCESS (A)/GOOD** condition is not removed **ACTION 7** is required.

[2] If material in **ACCESS(A)/FAIR** condition is not removed **ACTION 6** is required.

[3] Remove ACM in **ACCESS (B)/FAIR** condition if ACM is likely to be disturbed.

4.2 Action Descriptions

ACTION 1 - Immediate Clean-Up of DEBRIS that is Likely to Be Disturbed

Access that is likely to cause a disturbance of the ACM **DEBRIS** is to be restricted and **clean up ACM DEBRIS is to be done immediately**. Use correct asbestos procedures. This action is required for compliance with regulatory requirements and good practice. The assessor should immediately notify the Asset or Property and Facility Manager, or Regional/Area Asbestos Management Coordinator of this condition.

ACTION 2 - Intermediate risk precautions for Entry into Areas with ACM DEBRIS

At locations where ACM **DEBRIS** can be isolated in lieu of removal or cleaned up, use appropriate means to limit entry to the area. Restrict access to the area to persons using intermediate risk asbestos precautions. The precautions will be required until the ACM **DEBRIS** has been cleaned up, and the source of the **DEBRIS** has been stabilized or removed.

ACTION 3 - ACM Removal Required for Compliance

Remove ACM for compliance with regulatory requirements and good practice. Utilize asbestos procedures appropriate to the scope of the removal work.

ACTION 4 - Access into areas where asbestos-containing material is present and likely to be disturbed by access requires intermediate risk precautions.

Intermediate risk asbestos precautions are to be used when entry or access into an area is likely to disturb the ACM. **ACTION 4** must be used until the ACM is re-moved (Use **ACTION 1** or **2** if **DEBRIS** is present). Intermediate risk or high-risk precautions should be used for removal (depending on extent of removal).

ACTION 5 - Proactive ACM Removal

Removal of ACM in lieu of repair may be considered, even if it is in **GOOD** condition at locations, where ACM is easily accessible, limited in quantity, and removal would be cost-effective.

ACTION 6 - ACM Repair

Repair ACM found in **FAIR** condition, and not likely to be damaged again or disturbed by normal use of the area or room. Upon completion of the re-pair work treat ACM as material **in GOOD** condition and implement **ACTION 7**. If ACM is likely to be damaged or disturbed during normal use of the area or room, **ACTION 5** is to be implemented.

ACTION 7 - Routine Surveillance

Institute routine surveillance of the ACM. Trained workers or contractors must use appropriate asbestos precautions (low, intermediate, or high) during disturbance of the remaining ACM.

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APPENDIX 1-12

Hazardous Building Materials Assessment
Government of Canada, Building E0189, Employee Housing, House 12, British Columbia

ARCADIS Design & Consultancy for natural and built assets

Public Services and Procurement Canada

HAZARDOUS BUILDING MATERIALS ASSESSMENT

Government of Canada, Building E0189, Employee Housing, House 12, British Columbia

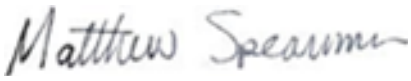
PSPC Project # R.112077.001

October 23, 2020

Arcadis Project No.: 30053059

HAZARDOUS BUILDING MATERIALS ASSESSMENT

Authored by:



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ACRONYMS AND ABBREVIATIONS

ACM	Asbestos-Containing Materials
Arcadis	Arcadis Canada Inc.
CLC	Canada Labour Code
COHSR	Canada Occupational Health and Safety Regulations
HPP	Hazard Prevention Program
LCB	Lead-Containing Paints
NIOSH	National Institute for Occupational Safety and Health
NJC	National Joint Council
OHS	Occupational Health and Safety
PCBs	Polychlorinated Biphenyls
PLM	Polarized Light Microscopy
PSPC	Public Services and Procurement Canada
TEM	Transmission Electron Microscopy
USEPA	United States Environmental Protection Agency

EXECUTIVE SUMMARY

Arcadis Canada Inc. (Arcadis) was retained by Public Services and Procurement Canada (PSPC, Client) to conduct a hazardous building material assessment of Building E0189, House 12, located in British Columbia.

This project consisted of a limited pre-renovation assessment to identify suspect hazardous materials in areas that were excluded from the original survey.

The renovation scope was limited to the part of the building scheduled for renovation, which consisted of replacing vinyl siding, soffits, gutters, fascia deck, railings and stairs.

The hazardous building materials considered during this assessment included the following:

- Asbestos-containing materials (ACMs)
- Lead, including lead-containing paints (LCPs)
- Polychlorinated biphenyls (PCBs) in electrical equipment
- Suspect visible mould
- Mercury materials/products/equipment
- Ozone-depleting substances (ODSs) in heating, ventilation, and air conditioning (HVAC) equipment or fixed fire suppression systems
- Silica in building materials

Arcadis performed the assessment on July 10, 2020. The assessment was conducted by Matthew Spearman, Dipl T (Env), Field Technologist of Arcadis.

Summary of Findings

Asbestos: Asbestos-containing materials (ACM) were confirmed to be present as follows:

Material	Location(s)	Total Quantity	Condition (action)	Asbestos Type (%)
Black mastic residue	Exterior on concrete foundation around building	~ 40 meters	Good (7)	4% Chrysotile
White Caulking	Exterior at front entrance stairs and vinyl siding	~2.5 meters	Good (7)	1% Chrysotile

Lead: No lead is confirmed present.

Polychlorinated Biphenyls (PCBs): No PCBs were observed in the assessed area.

Suspect Visible Mould: No suspect visible mould was observed in the assessed area.

Mercury: No mercury vapour was visually confirmed in the assessed area.

Ozone Depleting Substances (ODS): ODS were not observed in the assessed area.

Silica: Crystalline silica is a presumed component of the following materials throughout the building: poured concrete

Recommendations

The following is a summary of significant recommendations; refer to the body of the report for detailed recommendations.

1. Remove and properly dispose of asbestos-containing materials if disturbed by the planned renovation work.
2. Follow appropriate safe work procedures when handling or disturbing asbestos and silica.
3. Provide this report and the detailed plans and specifications to the contractor prior to bidding or commencing work.
4. Retain a qualified consultant to specify, inspect and verify the successful removal of hazardous materials.
5. Update the asbestos inventory upon completion of the abatement and removal of asbestos-containing materials.

Findings of this report are subject to our standard Limitations, as outlined in Section 7.

This Executive Summary is subject to the same standard limitations as contained in the report and must be read in conjunction with the entire report.

1 INTRODUCTION

1.1 Purpose

Arcadis Canada Inc. (Arcadis) was retained by Public Services and Procurement Canada (PSPC, Client) to conduct a hazardous building material assessment of Building E0189, House 12, located in British Columbia.

This project consisted of a limited pre-renovation assessment to identify suspect hazardous materials in areas that were excluded from the original surveys.

The renovation scope was limited to the part of the building scheduled for renovation, which consisted of replacing vinyl siding, soffits, gutters, fascia deck, railings and stairs.

Arcadis performed the assessment on July 10, 2020. The assessment was conducted by Matthew Spearman, Dipl T (Env), Field Technologist of Arcadis.

1.2 Scope of Work

The scope of work for the project, as referenced in the Arcadis Workplan dated June 4, 2020 , identifies the requirement to conduct a hazardous building material assessment within building E0189. Specifically, the scope of work included:

- Review of previous reports, construction specifications and drawings and identify any gaps related to hazardous building materials.
- Development of sampling strategy to address the identified gaps.
- Collect and submit representative suspect asbestos material and lead paint chip samples for analysis.
- Submit samples to accredited laboratories for analysis.
- Evaluation and interpretation of field findings and sample analytical results to develop conclusions and recommendations pertaining to hazardous building materials identified

For the purpose of this assessment, hazardous building materials re defined as follows:

- Asbestos-containing materials (ACMs)
- Lead, including lead-containing paints (LCPs)
- Polychlorinated biphenyls (PCBs) in electrical equipment
- Suspect visible mould
- Mercury materials/products/equipment
- Ozone-depleting substances (ODSs) in heating, ventilation, and air conditioning (HVAC) equipment or fixed fire suppression systems
- Silica in building materials

A general description of the building included in this assessment is provided in the table below:

Table 1. Building Description

Building Number (BU)	Building Name	Total Inside Gross m^2	Year Constructed	Building Description
E0189	House 12	206.60	1987	Two-story building with basement. Asphalt shingle roof. Plywood foundation floating house with Vinyl exterior siding. Drywall interior walls/ ceiling. Texture coat ceiling. Vinyl sheet flooring, carpet, and wood laminate flooring. Heating is supplied by gas fired forced air furnace and electric baseboard.

2 BACKGROUND INFORMATION

Arcadis conducted previous assessments of the building and the findings are presented in the following reports:

- Asbestos-Containing Materials Survey Building E0189, dated March 24, 2019, prepared by Arcadis Canada Inc. and,
- Hazardous Building Material Assessment, Building E0189, dated February 6, 2020, prepared by Arcadis Canada Inc.

2.1 Exclusions

The assessment was restricted to accessible locations of the buildings. Roofing or other material that may cause damage to the building envelope were not included unless specifically impacted by the proposed renovations and sampling would not compromise the building envelope integrity.

3 SURVEY METHODOLOGY

Sampling activities were conducted in accordance with Arcadis' Standard Operation Procedures which take into account current federal and provincial regulations pertaining to such work (i.e., sampling procedures, required number of samples and laboratory analytical procedures). Regulations are presented in Appendix D.

Representative bulk samples were collected of accessible suspect, PCB, lead, and asbestos in sufficient quantities for laboratory analysis. Samples were sealed in polyethylene zip-lock bags labeled with the sample number, suspect material description, and sample location. As part of sampling procedures, sampling tools were cleaned between sample collection events to avoid the potential for cross-contamination of samples.

All sample bags were compiled in order and placed into a single container accompanied with a chain of custody form outlining the project information, date, building location, number of samples, and sample description. Samples were submitted to the analytical laboratory in a sealed container via courier.

3.1 Asbestos-Containing Materials

A separate set of samples was collected of each type of homogenous material suspected to contain asbestos. A homogenous material is defined by the US EPA as material that is uniform in texture and appearance, was installed at one time, and is unlikely to consist of more than one type or formulation of material. The homogeneous materials are determined by visual examination, available information on the phases of the construction and prior renovations.

Bulk sampling protocols followed the ASTM E2356 Standard, which indicates requirements for the number of samples to collect for each homogeneous material. The table below provides an outline of the minimum number of samples to be collected from the ASTM E2356 Standard.

Table 2. Bulk Material Sample Quantities

Type of Material	Size of Area of Homogeneous Material	Minimum Number of Samples Collected
Any homogeneous material, including but not limited to fireproofing, drywall joint compound, ceiling tile stucco, acoustical and stipple finishes, and visually similar floor tiles	Less than 90 m^2 (<1,000 ft^2)	3
	90 m^2 or more, but less than 450 m^2 (1,000-5,000 ft^2)	5
	450 m^2 or more (>5,000 ft^2)	7

In some cases, manufactured products such as asbestos cement pipe were visually identified without sample confirmation.

Flooring mastic/adhesive are only sampled and analyzed if present on the underside of flooring samples (vinyl floor tile and vinyl sheet flooring) in sufficient quantity for laboratory analysis.

Attempts to distinguish and delineate asbestos-containing drywall compound from new non-asbestos drywall compound is often unachievable. Arcadis collected drywall joint compound samples from exterior walls, columns or other locations which are unlikely to have been renovated in an attempt to determine the presence of asbestos in the original drywall compound.

Arcadis submitted the bulk samples to a NVLAP accredited laboratory for analysis. The analysis is performed in accordance with Test Method EPA/600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials, July 1993.

EPA Method 600 states that materials characterized by interfering binder/matrix or low asbestos content may require additional gravimetric reduction sample treatment beyond routine polarized light microscopy (PLM) analysis (e.g. dissolution with hydrochloric acid, treatment with organic solvents or ashing in a muffle furnace or low temperature plasma asher to remove unwanted components).

Arcadis submitted one sample of each sample set (3) of vinyl floor tiles be analyzed by transmission electron microscopy (TEM) if the first two samples are reported negative by PLM.

The asbestos analysis was completed using a stop positive approach. Only one result of greater than the regulated criteria is required to determine that a material is asbestos-containing, but all samples must be analyzed to conclusively determine that a material is non-asbestos. The laboratory stopped analyzing samples from a homogeneous material once greater than the criteria was detected in any of the samples of that material. All samples of a homogeneous material were analyzed if no asbestos was detected. Where building materials are described in this report as non-asbestos, or described as containing no asbestos,

this is subject to the limitations of the analytical method used and should be understood to mean no asbestos was detected.

The classification, condition, and accessibility were assessed for the materials which could contain asbestos. To determine these factors, Arcadis followed the methodology outlined in the ASTM E356 Standard. The Standard provides definitions and criteria for the assessment of ACM. The classification, conditions, and accessibility information are provided in Appendix E.

Bulk samples of materials which could contain asbestos were collected and submitted to EMSL Canada Inc. (EMSL) for analysis of asbestos content. Asbestos-containing materials are defined as 0.5% or greater, or any amount if vermiculite.

3.2 Lead

Arcadis collected samples of distinctive paint finishes and surface coatings present in more than a limited application, where removal of the paint is possible. Arcadis collects samples by scraping the painted finish to include base and covering applications. 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. 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 were presumed to be the same, regardless of differing sub surface paints, if any.

The 2017 WorkSafeBC publication *Safe Work Practices for Handling Lead* (Lead Guideline) indicates the following:

> *Unlike for asbestos-containing material, WorkSafeBC does not numerically define what would be considered a lead-containing paint or coating. All suspected paints or coatings should be tested for lead because, depending on the nature of the work, even a small amount could pose a risk to workers. In order to determine which controls and personal protective equipment would be required for a particular job, a qualified person must consider this information as part of the risk assessment.*

- Improper removal of lead paint containing 600 mg/kg lead results in airborne lead concentrations that exceed half of the exposure limit
  - Exposure limit indicated in both the COHSR and BC Reg. 296/97 is 0.05 mg/m^3
  - Potential for exposure exceeding half of the occupational exposure limit would be the trigger for implementation of an exposure control plan.
- Lead concentrations as low as 90 mg/kg may present a risk to pregnant women and children
  - Any risk assessment should include for the presence of high risk individuals within the workplace

When reviewing the above, “high risk” individuals are not expected to be present in the workplace associated with this building during building material alteration activities (i.e., demolition) that would create significant disturbance to paint with such individuals present. As such, paints containing 600 ppm lead or more will be considered “lead-containing” for the purpose of this report, such that appropriate risk assessments can be completed for demolition planning. However, information regarding the lead content of all paints tested is provided herein, for reference and risk assessment should the consideration of high risk individuals be necessary, based on the requirements of a particular situation.

Although a concentration of 600 ppm lead has been used to define paint coatings as LCPs, it should be noted that this is related to painted surfaces and the determination of appropriate provisions to protect occupants and employees from exposure to elevated concentrations of lead during typical operations and maintenance or simple renovation. This does not include painted metal surfaces that are to be welded, burned or torch-cut.

Using an arc welder or oxyacetylene torch on steel that is coated with lead-containing paint can create hazardous lead fumes and is prohibited by section 12.115 of BC Reg. 296/97.

> Regulatory excerpt: **12.115 Coatings on metals**
>
> *A coating on metal which could emit harmful contaminants (such as lead, chromium, organic materials, or toxic combustion products) must be removed from the base metal, whenever practicable, before welding or cutting begins.*

In addition, the following information is provided in the Lead Guideline:

- Welding or torch cutting of paints or coatings on metal can create very high concentrations of airborne lead fumes. Torch cutting structural steel, coated with paint containing as little as 130 mg/kg (equivalent to ppm) lead, can release airborne levels of lead as high as 0.8 mg/m^3 (16 times the exposure limit).

Given this information and that the analytical detection limit for lead paint analysis is approximately 80– 90 ppm (not significantly different than 130 ppm, which, per above, may release airborne lead levels 16 times the exposure limit), any paint coating on a metal surface to be welded, burned or torch-cut must be removed prior to that action being undertaken, unless a project-specific or tasks-specific risk assessment and safe work practices are developed by a qualified person.

Paint and surface coatings are evaluated for condition. The criteria for condition evaluation pertaining to LCPs described herein are generally based on the United States Housing and Urban Development (HUD) 2012 *Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing*.

When evaluating the condition of LCPs, an attempt should be made to determine whether the deterioration is due to a moisture problem or some other existing building deficiency. **"Poor"** surfaces are considered to be a hazard and should be corrected. "**Fair"** surfaces should be repaired but are not yet considered to be a hazard; if not repaired, they should be monitored frequently. "**Good/intact"** surfaces should be monitored to ensure that they remain in a nonhazardous condition.

In addition, the presence of paint debris must be considered in evaluating condition. Given the variety of paint uses, there are many applications that can have a tendency for the paint to "wear" from the surface slowly, over an extended period of time. Conditions where paint has worn from a surface are worth noting for maintenance discussions (i.e., related to re-coating the surface should, for example, the coating provide weather protection), however, in the absence of loose paint chip debris/dust, such conditions would not represent a potential exposure situation related to lead.

The condition evaluation criteria for LCPs are summarized in the table below.

Table 3. Lead-Containing Paint Condition Categories

Type of Building Component[1]	Total Area of Deteriorated Paint on Each Component		
	Good/Intact	Fair[2]	Poor[3]
Exterior components with large surface areas.	Entire surface is intact.	Less than or equal to 10 square feet	More than 10 square feet
Interior components with large surface areas (walls, ceilings, floors, doors.	Entire surface is intact.	Less than or equal to 2 square feet	More than 2 square feet
Interior and exterior components with small surface areas (windowsills, baseboards, soffits, trim).	Entire surface is intact.	Less than or equal to 10% of the total surface area of the component.	More than 10% of the total surface area of the component

NOTES:

1. Building component in this table refers to each individual component or side of building, not the combined surface area of all similar components in a room (e.g., a wall with 1 square foot of deteriorated paint is in "fair" condition, even if the other three walls in a room are intact).
2. Surfaces in "fair" condition should be repaired and/or monitored but are not considered to be "lead-containing paint hazards".
3. Surfaces in "poor" condition are considered to be "lead-containing paint hazards" and should be addressed through abatement or interim controls.

Analysis for lead in paints or surface coatings was performed in accordance with EPA Method No. 3050B/Method No. 7420; flame atomic absorption at laboratory accredited by the American Industrial Hygiene Association (AIHA).

3.3 Polychlorinated Biphenyls (PCBs)

The presence or absence of fluorescent lights was documented during the course of our investigation to determine whether there were any of the T12 type. T12 fluorescent lamps, with a diameter of 1.5 inches, utilize transformer type magnetic ballasts, which may contain PCBs. The use of T12s has been discontinued and replaced with new high-efficiency 1-inch T8 lamps (and other types) which use electronic ballasts which do not contain PCBs.

Wet transformers were assessed for PCBs based on the age of the building, a review of maintenance records and examination of labels or nameplates on equipment, where present and accessible. The information is compared to known ban dates of PCBs and Environment Canada publications.

Dry type transformers are presumed to be free of dielectric fluids and hence non-PCB. Caulking's were not sampled for PCB content unless specifically impacted by the proposed renovation scope. The material is considered a PCB solid if PCB content is 50ppm or greater based on the threshold given in SOR/2008-273.

3.4 Suspect Visible Mould

Arcadis identified the presence of any suspect mould and/or moisture-impacted building materials by visual inspection during the course of our site investigation. Suspect mould is typically a coloured, textured substance or discolouration/staining on a building material surface which, based on our experience, may be mould growth. If any mould growth is concealed within wall, ceiling, or floor cavities, it is not addressed in this assessment. No mould sampling or moisture testing is performed unless directed by the Client. The adjective *suspect* is used where the presence of mould has not been confirmed by laboratory analysis.

3.5 Mercury

Building materials/products/equipment (e.g. thermostats, barometers, pressure gauges, light tubes), suspected to contain mercury were identified by visually inspection only. Dismantling of equipment suspected of containing mercury was not performed. Sampling of these materials for laboratory analysis of mercury content was not performed.

Mercury spills or damaged mercury-containing equipment was recorded where observed.

3.6 Ozone Depleting Substances (ODS)

Arcadis determined the potential presence of ODS (chlorofluorocarbons, hydrochlorofluorocarbons, hydrofluorocarbons, halons, etc.) in air conditioning units, chillers, commercial coolers, and fire suppression systems by visual inspection of manufactures' labels or plates, maintenance records, or logbooks, etc.

3.7 Silica

Arcadis identified building materials suspected of containing crystalline silica (e.g. concrete, cement, tile, brick, masonry, mortar) by knowledge of current and historic applications and visual inspection only. Arcadis did not perform sampling of these materials for laboratory analysis of crystalline silica content.

4 RESULTS

4.1 Asbestos

During the course of our assessment, representative bulk samples of material were collected by Arcadis staff. The samples were forwarded to EMSL in Burnaby, British Columbia (BC) for asbestos analyses. EMSL holds a current Certificate of Accreditation for Bulk Asbestos Fibre Analysis under the Voluntary Accreditation Program (NVLAP). Bulk sampling was performed in general accordance with the requirements specified in ASTM E2356 Standard, BC Reg. 296/97 and in the WorkSafe BC publication Safe Work Practices for Handling Asbestos.

Results of bulk sample analysis for asbestos content are provided in the table below. Samples that exceed the criteria are highlighted in yellow.

Site Photographs provided in Appendix A. Laboratory certificates of analysis have been provided in Appendix B. Floor plans indicating sample locations and room numbers are provided in Appendix C.

Table 4. Results of Bulk Sample Analysis for Asbestos

Sample Number	Sample Description	Sample Location	Asbestos Type %
S-01A	Building Paper	Exterior – South Face	None Detected
S-01B	Building Paper	Exterior – East Face	None Detected
S-01C	Building Paper	Exterior – North Face	None Detected
S-01D	Building Paper	Exterior – North Face	None Detected
S-01E	Building Paper	Exterior – South Face	None Detected
S-02A	Black Mastic Residue	Exterior – Concrete foundation, North	4% Chrysotile
S-02B	Black Mastic Residue	Exterior – Concrete foundation, North	Stop Positive
S-02C	Black Mastic Residue	Exterior – Concrete foundation, South	Stop Positive
S-03A	White Caulking	Exterior – Front entrance stairs, where concrete abuts vinyl siding	1% Chrysotile
S-03B	White Caulking	Exterior – Front entrance stairs, where concrete abuts vinyl siding	Stop Positive
S-03C	White Caulking	Exterior – Front entrance stairs, where concrete abuts vinyl siding	Stop Positive

The following building materials were common in the building: however, these materials do not contain asbestos and were not sampled during the survey:

- Vinyl siding, wood columns, and concrete.

Asbestos-containing materials were confirmed present in the following table:

Table 5. Summary of Confirmed Asbestos-Containing Materials

Material	Location(s)	Total Quantity	Condition	Asbestos Type (%)
Black Mastic Residue	Exterior on concrete foundation around building	~40 meters	Good	4% Chrysotile
White Caulking	Exterior at front entrance stairs and vinyl siding	~2.5 meters	Good (7)	1% Chrysotile

Note: Asbestos-containing sink mastic was identified in the 2018 assessment report; however, it is not expected to be impacted by the proposed renovation.

Presumed Materials

No presumed materials that may contain asbestos are suspected to be present in the way of planned work.

4.2 Lead

During the course of our site investigation, representative bulk samples of predominant paint types were collected by Arcadis staff. The samples were forwarded to EMSL for lead analyses. Results of bulk sample analysis for lead content are provided in the table below. Results that exceed the criteria are highlighted in yellow.

The laboratory report is provided in Appendix B.

Table 6. Results of Analyses of Bulk Samples for Paint for Lead

Sample No.	Sample Location(s)	Sample Description	Lead Content (ppm)
L-01	Exterior – Around perimeter of building	White paint on metal rain gutter	<80

No lead paint was detected at a level above the definition of lead paint (600 ppm) in any samples. No lead paint was identified in previous assessment report. Where one colour of paint is indicated in the sample descriptions in the table above, only one layer of paint was observed. Where multiple colours are indicated in the sample description, multiple layers of paint were observed.

All paint applications were noted to be generally in good condition.

4.3 Polychlorinated Biphenyls (PCBs)

PCBs were not observed in the assessed area.

4.4 Suspect Visible Mould

Suspect visible mould growth was not observed in the assessed area.

4.5 Mercury

Mercury-containing items were not observed in the assessed area.

4.6 Ozone Depleting Substances

Ozone Depleting Substances (ODS) were not observed in the assessed area.

4.7 Silica

Crystalline silica is a presumed component of the following materials in the assessed area:

- poured or pre-cast concrete

5 RECOMMENDATIONS

If future building renovation or demolition is required beyond the scope of this project, a detailed intrusive assessment must be conducted. The assessment should include destructive testing (i.e. coring and/or removal of building finishes and components), and sampling of materials not previously tested (i.e. roofing materials, mastics etc.).

All hazardous building materials were reported in good condition. All ACM observed were considered to fall under a recommended Action Level 7 (routine surveillance).

5.1 Building Renovation Work

The following specific recommendations are made regarding renovation involving the hazardous materials identified.

1. Prepare plans and update performance specifications for hazardous material removal required for the planned work. The specifications should include the scope of work, personal protective equipment, respiratory protection, and disposal of waste materials.
2. Provide this report and the detailed plans and specifications to the contractor prior to bidding or commencing work.
3. Retain a qualified consultant to specify, inspect and verify the successful removal of hazardous materials.
4. Update the asbestos inventory upon completion of the abatement and removal of asbestos-containing materials.

The following general recommendations are made regarding renovation involving the hazardous materials identified.

Asbestos

Remove all asbestos-containing materials (ACM) prior to renovation, alteration, maintenance, or demolition work or if ACM may be disturbed by the work.

If the identified ACM will not be removed prior to commencement of the work, disturbance of ACM must follow the appropriate asbestos precautions for the classification of work being performed.

Asbestos-containing materials must be disposed of at a landfill approved to accept asbestos waste.

Suspect Visible Mould

No mould was observed; if mould is uncovered during renovations, use appropriate precautions, and protect workers using methods that comply with provincial guidelines.

Silica

Construction disturbance of silica-containing products may result in excessive exposures to airborne silica, especially if performed indoors and dry. Cutting, grinding, drilling or demolition of materials containing silica should be completed only with proper respiratory protection and other worker safety precautions that comply with provincial standards or guidelines.

6 REFERENCES

The following legislation and documents were referenced in completing the assessment and this report:

1. Occupational Health and Safety Regulation, B.C. Reg. 296/97, WorkSafe BC.
2. Safe Work Practices for Handling Asbestos, WorkSafe BC, 2017 Edition.
3. Hazardous Waste Regulation, B.C. Reg. 63/88, November 2017, BC Environmental Management Act.
4. Ozone Depleting Substances and Other Halocarbons Regulation, B.C. Reg. 317/2012 Environmental Management Act.
5. PCB Regulations, SOR/2008-273, Canadian Environmental Protection Act.
6. Lead-Containing Paint and Coatings, Preventing Exposure in the Construction Industry, WorkSafe BC, June 2017.
7. Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing, United States Housing and Urban Development (HUD) 2012.
8. Mould Guidelines for the Canadian Construction Industry, Standard Construction Document 2018, Canadian Construction Association.
9. Minister of Justice Canada Labour Code. R.S.C., 1985, c. L-2. March 2020.
10. Minister of Justice. 2018. Canada Occupational Health and Safety Regulations. SOR/86-304, June 2019.
11. Public Services and Procurement Canada Asbestos Management Standard. June 2019.
12. Transport Canada Consolidated Transport of Dangerous Goods Regulations including Amendment SOR/2019-101.
13. ASTM E2356 Standard Practice for Comprehensive Buildings Asbestos Surveys.
14. Government of Canada, Asbestos Management Plan, Version 2020-01, January 2020.

7 LIMITATIONS

This report, prepared for Public Services and Procurement Canada on behalf of Government of Canada, does not provide certification or warranty, expressed or implied, that the investigation conducted by Arcadis identified all hazardous materials associated with the subject building. The work undertaken by Arcadis was directed to provide information on the presence of hazardous materials in construction materials based on visual inspection of readily accessible areas of the subject building, and on the results of laboratory analysis of a limited number of bulk samples. The material in this report reflects Arcadis' best judgment in light of the information available at the time of the investigation, which was performed on July 10, 2020. This report is not intended to be used as a scope of work or technical specification for remediation of hazardous

materials. Any use which any other party makes of the report, or reliance on, or decisions to be based on it, is the responsibility of such parties.

APPENDIX A

Site Photographs

Project Photographs

Public Services and Procurement Canada
Building E0189, House 12, British Columbia

Photo: 1

Date:
July 10, 2020

Description:
View of Employee Housing, Front

Photo: 2

Date:
July 10, 2020

Description:
View of Employee Housing, Rear

Project Photographs

Public Services and Procurement Canada
Building E0189, House 12, British Columbia

Photo: 3

Date:
July 10, 2020

Description:
Unpainted wood deck, support columns and underside of stairs

Photo: 4

Date:
July 10, 2020

Description:
Wood composite stairs and risers. Deck is also wood composite

Project Photographs

Public Services and Procurement Canada
Building E0189, House 12, British Columbia

Photo: 5

Date:
July 10, 2020

Description:
Non lead white paint on asbestos-containing black mastic residue on concrete foundation.

Photo: 6

Date:
July 10, 2020

Description:
Asbestos-containing white caulking where concrete stairs abut vinyl siding. Both sides of the stairs have the caulking.

APPENDIX B

Laboratory Certificates of Analysis

EMSL Canada Inc.
2333 18th Avenue NE, Unit 48, Calgary, AB T2E 8T6
Phone/Fax: (403) 879-1149 / (403) 879-1152
http://www.EMSL.com CalgaryLab@EMSL.com

EMSL Canada Or	652005041
CustomerID:	55ACAV42
CustomerPO:	30053059
ProjectID:	

Attn: **Jerry Botti**
ARCADIS Canada Inc.
308-1080 Mainland Street
Vancouver, BC V6B 2T4

Phone: (604) 632-9941
Fax:
Received: 7/20/2020 08:30 AM
Collected: 7/10/2020

Project: **30053059 / E0189 / House 12**

Test Report: Lead in Paint Chips by Flame AAS (SW 846 3050B/7000B)*

Client Sample Description	*Lab ID*	*Collected*	*Analyzed*	*Weight*	*Lead Concentration*
L-01	*652005041-0001*	7/10/2020	7/21/2020	0.2531 g	<80 ppm
	Site: EXTERIOR - WHITE PAINT ON METAL GUTTER				

Client request: Remove address from project name.

Jefferson Salvador, Laboratory Manager
or other approved signatory

Report Amended: 10/22/2020 10:24:05 Replaces the Inital Report 07/24/2020 16:11:16. Reason Code: Client-Other (see report comment)

EMSL Canada Inc.

4506 Dawson Street Burnaby, BC V5C 4C1
Phone/Fax: (604) 757-3158 / (604) 757-4731
http://www.EMSL.com / vancouverlab@EMSL.com

EMSL Canada Order 692001627
Customer ID: 55ACAV42
Customer PO: 30053059
Project ID:

Attn: Jerry Botti
ARCADIS Canada Inc.
308-1080 Mainland Street
Vancouver, BC V6B 2T4

Phone: (604) 632-9941
Fax:
Collected: 7/10/2020
Received: 7/16/2020
Analyzed: 7/23/2020

Proj: 30053059 / E0189 / House 12

Test Report: Asbestos Analysis in Bulk Material for Occupational Health and Safety British Columbia Regulation 188/2011 via EPA 600/R-93/116 Method

Client Sample ID: S-01A ***Lab Sample ID:*** **692001627-0001**
Sample Description: EXTERIOR - SOUTH/BUILDING PAPER

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	7/22/2020	Brown	85.0%	15.0%	None Detected	

Client Sample ID: S-01B ***Lab Sample ID:*** **692001627-0002**
Sample Description: EXTERIOR - EAST/BUILDING PAPER

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	7/22/2020	Brown	85.0%	15.0%	None Detected	

Client Sample ID: S-01C ***Lab Sample ID:*** **692001627-0003**
Sample Description: EXTERIOR - NORTH/BUILDING PAPER

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	7/22/2020	Brown	85.0%	15.0%	None Detected	

Client Sample ID: S-01D ***Lab Sample ID:*** **692001627-0004**
Sample Description: EXTERIOR - NORTH/BUILDING PAPER

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	7/22/2020	Brown	85.0%	15.0%	None Detected	

Client Sample ID: S-01E ***Lab Sample ID:*** **692001627-0005**
Sample Description: EXTERIOR - SOUTH/BUILDING PAPER

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	7/22/2020	Black	60.0%	40.0%	None Detected	

Client Sample ID: S-02A ***Lab Sample ID:*** **692001627-0006**
Sample Description: EXTERIOR - NORTH/MASTIC RESIDUE

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	7/22/2020	Black	0.0%	96.0%	**4% Chrysotile**	

Client Sample ID: S-02B ***Lab Sample ID:*** **692001627-0007**
Sample Description: EXTERIOR - NORTH/MASTIC RESIDUE

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	7/22/2020				Positive Stop (Not Analyzed)	

EMSL Canada Inc.

4506 Dawson Street Burnaby, BC V5C 4C1
Phone/Fax: (604) 757-3158 / (604) 757-4731
http://www.EMSL.com / vancouverlab@EMSL.com

EMSL Canada Order 692001627
Customer ID: 55ACAV42
Customer PO: 30053059
Project ID:

Test Report: Asbestos Analysis in Bulk Material for Occupational Health and Safety British Columbia Regulation 188/2011 via EPA 600/R-93/116 Method

Client Sample ID: S-02C ***Lab Sample ID:*** **692001627-0008**

Sample Description: EXTERIOR - SOUTH/MASTIC RESIDUE

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	7/22/2020				Positive Stop (Not Analyzed)	

Client Sample ID: S-03A ***Lab Sample ID:*** **692001627-0009**

Sample Description: EXTERIOR - FRONT ENTRANCE STAIRS/CAULKING

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	7/23/2020	White	0.0%	99.0%	**1% Chrysotile**	

Client Sample ID: S-03B ***Lab Sample ID:*** **692001627-0010**

Sample Description: EXTERIOR - FRONT ENTRANCE STAIRS/CAULKING

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	7/22/2020				Positive Stop (Not Analyzed)	

Client Sample ID: S-03C ***Lab Sample ID:*** **692001627-0011**

Sample Description: EXTERIOR - FRONT ENTRANCE STAIRS/CAULKING

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	7/22/2020				Positive Stop (Not Analyzed)	

Analyst(s):

Chloe Huang PLM (1)
Margaret Lee PLM (5)
Nicole Yeo PLM (1)

Reviewed and approved by:

Nicole Yeo, Laboratory Manager
or Other Approved Signatory

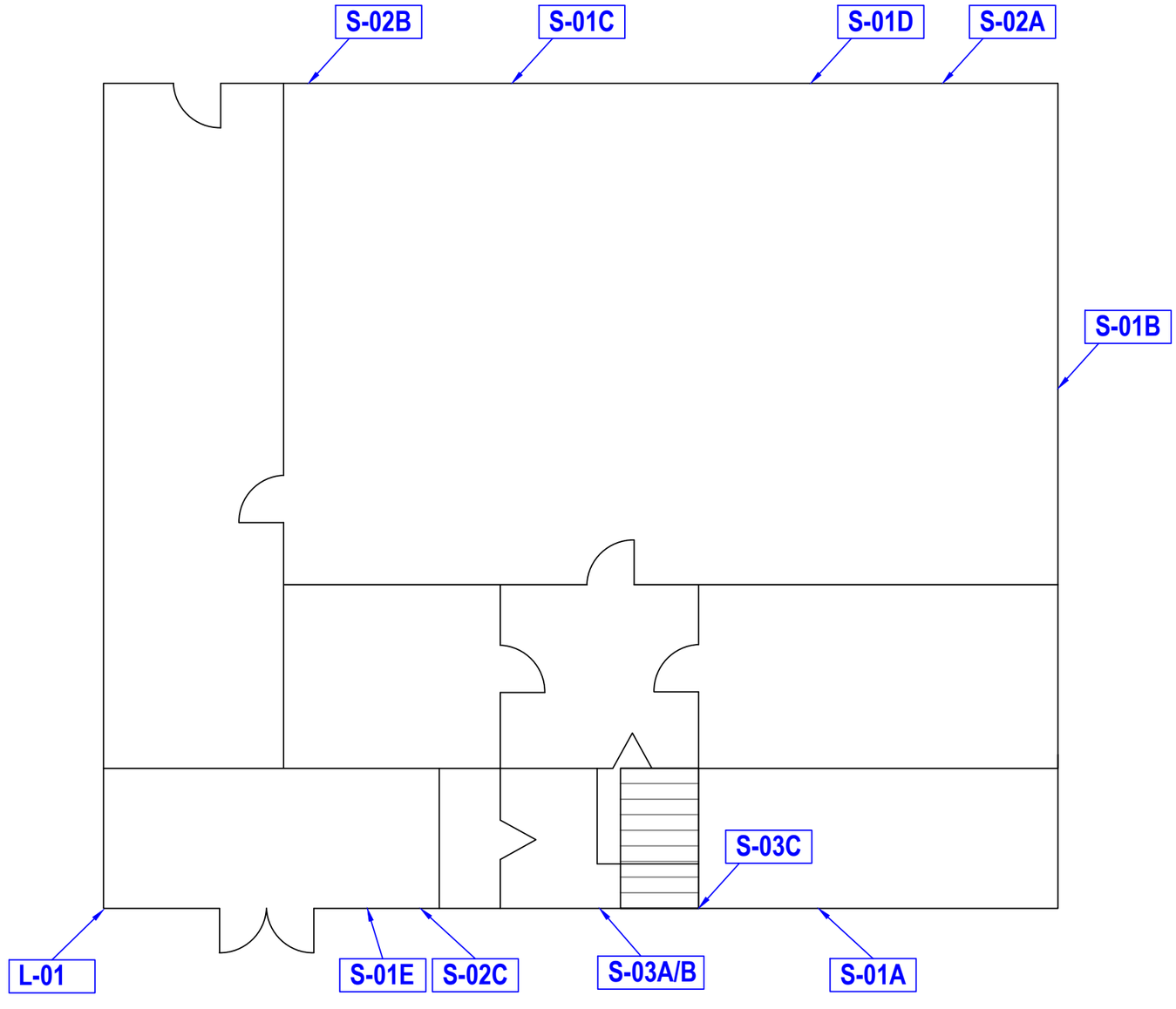
None Detected = <0.1%. EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations.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

Samples analyzed by EMSL Canada Inc. Burnaby, BC

Report amended: 10/21/202016:52:41 Replaces initial report from: 07/23/202011:35:50 Reason Code: Client-Change to Project

APPENDIX C

Floor Plans



LEGEND

S-XXX Bulk Asbestos Sample

L-XXX Bulk Lead Paint Sample

N.T.S

Title: **GOVERNMENT OF CANADA**
HAZARDOUS BUILDING MATERIAL ASSESSMENT - 2020

Project: BUILDING E0189 - HOUSE 12
FIRST FLOOR

Client: PUBLIC SERVICES AND PROCUREMENT CANADA

Project Number:	Drawn By:	Plot Size:	Date:
30053059	CB	11X17"	JULY 2020

ARCADIS

FIGURE 1

firstfloor G:\PROJECTS\30053059 - PSPC_RCMP Construction 2020\CAD\30053059-Minnaker3.dwg

APPENDIX D

Regulations and Health Effects

Asbestos

Occupational Health and Safety (OHS) for federal employees is regulated by the Canada Labour Code (CLC) Part II. The *Canada Occupational Health and Safety Regulations (COHSR), Part X, Hazardous Substances* covers specific requirements related to the management and control of asbestos-containing materials (ACM). The COHSR, Part X, Hazardous Substances, states an employee shall be kept free from exposure to a concentration of airborne chrysotile asbestos in excess of 0.1 fibre/cm^3 or f/cc. There are also specific requirements for hazard prevention detailed in the Hazard Prevention Program (HPP) in the CLC.

For the purposes of this report, the following federal requirements will be followed, unless provincial requirements are more stringent. Federal legislation and policy referenced in this report includes:

- Canada Labour Code, March 2020;
- Canada Occupational Health and Safety Regulations Part X, Hazardous Substances; SOR/86-304, June 2019;
- Public Services and Procurement Canada Asbestos Management Standard, June 2019;
- Asbestos Management Plan, Government of Canada, Version 2020-01, January 2020; and,
- Transport Canada, Transport of Dangerous Goods Regulations

The management and requirements for the potential disturbance of asbestos in buildings is also regulated at the provincial level under the *British Columbia Occupational Health and Safety Regulations,296/97, and Safe Work Practices for Handling Asbestos, WorkSafeBC, 2017 Edition*.

The BC Occupational Health and Safety Regulations, 296/97 (BC Reg 296/97), require specific actions when asbestos is a potential health hazard in a workplace. Section 6.1 of the regulation defines an asbestos-containing material as follows:

"asbestos-containing material" means the following:

(a) a manufactured article or other material, other than vermiculite insulation, that would be determined to contain at least 0.5% asbestos if tested in accordance with one of the following methods:

(i) Asbestos, Chrysotile by XRD, Method 9000 (Issue 2, dated August 15, 1994) in the NIOSH Manual of Analytical Methods, published by the United States National Institute for Occupational Safety and Health, Centre for Disease Control;

(ii) Asbestos (bulk) by PLM, Method 9002 (Issue 2, dated August 15, 1994) in the NIOSH Manual of Analytical Methods, published by the United States National Institute for Occupational Safety and Health, Centre for Disease Control;

(iii) Test Method for the Determination of Asbestos in Bulk Building Materials (EPA/600/R-93/116, dated July 1993) published by the United States Environmental Protection Agency;

(b) vermiculite insulation that would be determined to contain any asbestos if tested in accordance with the Research Method for Sampling and Analysis of Fibrous Amphibole in Vermiculite Attic Insulation (EPA/600/R-04/004, dated January 2004) published by the United States Environmental Protection Agency;

The duties of employers, contractors, or owners include:

- identifying and labeling ACM that can potentially release asbestos fibres;
- keeping a current written record of all ACM present in the workplace;
- conducting regular surveillance and maintenance of asbestos materials to prevent fibre release;
- developing a written exposure control plan if workers may be exposed to harmful levels of asbestos;
- conducting work in a way that prevents the release of asbestos fibres as much as possible;
- notifying, informing, and training workers; and,
- notifying Occupational Health and Safety (OHS) at least 48 hours before beginning an asbestos-abatement.

Disturbance of asbestos during construction and demolition is regulated under section 20.112 of BC Reg 296/97.

The 2017 WorkSafeBC publication Safe Work Practices for Handling Asbestos (Asbestos Guide) is used by Occupational Health and Safety officers as a guide when reviewing abatement work practices and employer codes of practice, and generally meets the requirements of the COHSR.

The Asbestos Guide also provides significant additional background information pertaining to asbestos, along with details on health effects and other applicable legislation within the province of British Columbia (e.g., the federal Hazardous Products Act, the BC Building Code and waste disposal regulations).

Disposal of asbestos waste is governed by the British Columbia Hazardous Waste Regulation (BC Reg. 63/88). The Federal Transportation of Dangerous Goods Regulation and BC Reg. 63/88 set out the requirements for the proper transport of asbestos waste in British Columbia. In general, and for transportation and disposal, the waste must be placed in a double sealed container, properly labeled, free of cuts, tears or punctures and disposed of at a licensed waste station which has been properly notified of the presence of asbestos waste.

Health effects

Undisturbed asbestos within building materials poses no health risks. Asbestos poses a risk when building materials containing asbestos are impacted, or disturbed, thereby releasing the asbestos fibres into the air

Asbestos-related diseases are caused when suspended airborne asbestos fibres are inhaled and the fibres settle into various regions of the lungs and remain for extended periods. Once embedded in the lungs the asbestos fibres cause scarring within the lung tissue, ultimately leading to impaired lung function (asbestosis) and/or various cancers (lung cancer; mesothelioma). These asbestos-related diseases are irreversible and fatal. The risk of lung-related cancers is increased in individuals who smoke.

These asbestos-related diseases most often occur in individuals who have been exposed to high concentrations of airborne asbestos over a long period of time, though mesothelioma has been found in individuals with short-term exposures. Symptoms or the development of these asbestos-related diseases usually occur 10 to 25 years after exposure

Lead

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 (2005) to 90 ppm (2010).

With respect to potential lead exposures associated with disturbance to surfaces coated with lead-containing products, the 2017 WorkSafeBC manual titled Lead-Containing Paint and Coatings: Preventing Exposure in the Construction Industry, indicates the following:

- Improper removal of lead paint containing 600 mg/kg lead results in airborne lead concentrations that exceed half of the exposure limit
    - This potential for exposure exceeding half of the occupational exposure limit would be the trigger for implementation of an exposure control plan.
- Lead concentrations as low as 90 mg/kg may present a risk to pregnant women and children
    - Any risk assessment should include for the presence of high risk individuals within the workplace

The disposal of lead-containing paint is regulated under the Federal *Transportation of Dangerous Goods Act* and by the British Columbia Ministry of Environment. All lead-based paints and associated nonmetal substrate (concrete, plaster, wood, etc.) must undergo Toxicity Characteristic Leachate Properties (TCLP) metals testing to determine disposal procedures. Upon the completion of the test, the total concentration of metals in the waste extract must be compared to Schedule 4, Table 1 of the Hazardous Waste Regulation.

The Federal Transportation of Dangerous Goods Regulation and BC Reg. 63/88 set out the requirements for the proper transport of lead waste in British Columbia.

Health Effects

Elemental lead and inorganic lead compounds are absorbed through ingestion or inhalation and can incorporate into the bone marrow, nerve tissue, brain, and kidneys. In children, symptoms of lead poisoning can include headaches, irritability, abdominal pain, vomiting, anemia, weight loss, poor attention span, noticeable learning difficulty, slowed speech development, and hyperactivity. In adults, symptoms of lead poisoning can include pain, numbness or tingling of the extremities, muscular weakness, headache, abdominal pain, memory loss, unsteady gait, pale skin, weight loss, vomiting, irritability, and anemia. Although adults are susceptible to the toxic effects of lead, children are at high risk due to the nature of a child's activities that involve the introduction of non-food items into their bodies.

Excessive airborne lead and surface contamination can be transferred to employees' hands and may results in lead ingestion. Therefore, work practices intended to minimize surface lead concentrations, such as frequent cleaning of work surfaces should be included in an overall lead exposure control plan

PCB

As of September 5, 2008, under subsection 93(1) of the *Canadian Environmental Protection Act,* (CEPA), Federal PCB regulations were published by the Canada Gazette Part II (SOR/2008-273) that imposed specific deadlines for the elimination of all PCBs in concentrations at or above 50 milligrams/kilogram (mg/kg). This regulation required the elimination of all PCBs and PCB-containing materials currently in-use and in storage and limited the period of time PCB materials could 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.

In British Columbia, PCB equipment becomes PCB wastes as soon as it is removed from service. This is the case even if the intent is to treat, recycle, or reuse the equipment.

When PCB wastes are stored in British Columbia, the full requirements of BC Reg. 63/88 apply to:

- 1.0 kg or more of pure PCB
- 100 L or more of any liquid containing more than 50 ppm of PCB
- 100 kg or more of any material other than a liquid, contaminated with more than 50 ppm of PCB

These amounts are the total of all amounts at a single location owned or controlled by the same person. They include PCB equipment. BC Reg. 63/88 also provides packaging requirements for storage, labeling requirements, waste destruction requirements, and references SOR/2008-273, indicating:

The Federal Transportation of Dangerous Goods Regulation sets out the requirements for the proper transport of PCB waste across provincial boundaries.

In British Columbia, a manifest issued by the Ministry of Environment (or equivalent federal document) must be used for hazardous wastes shipped from sites in British Columbia. A manifest must be used to transport:

- 5 kg or more of PCB solids
- 5 L or more of PCB liquids
- An amount of a PCB solid or PCB liquid containing more than 500 g of PCB within BC
- 500 g or more of solids, liquids, or mixtures of these containing 50 mg/kg of PCB outside of BC

Health effects

PCBs are insoluble in water; however, they readily dissolve in fats and other organic compounds. It is these attributes and fat-solubility that allow PCBs to persist in the environment and bio-accumulate in humans and animals. Exposure to PCBs can affect the immune system, reproductive system, nervous system, and endocrine system. In humans, PCBs are potentially cancer-causing.

Mould

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, occupational health and safety regulations typically require employers to take every precaution reasonable in the circumstances for the protection of workers.

The WorkSafeBC Guideline for Part 4 of BC Reg. 296/97 discusses the application of the Regulation to workplaces with mould showing on exposed or hidden surfaces, or where mould may be a factor in complaints regarding indoor air quality. The guideline provides information for investigating indoor air quality complaints with respect to mould contamination, including information on sampling for the

presence of moulds in buildings. Information is also provided on possible health effects and for cleanup personnel involved in the remediation of buildings damaged by water and mould.

Health Effects

There are a number of documented cases of health problems related to exposure to indoor fungi.

Both high-level, short-term exposures and lower-level, long-term exposures can result in illness. The most common symptoms from exposure to mould in indoor environments are runny nose, eye irritation, cough, congestion, aggravation of asthma, headache, flu-like symptoms, fatigue, and skin rash. People with suppressed immune systems may be susceptible to fungal infections as a result of exposure to indoor moulds.

People who are exposed to mould growth on building materials will not necessarily exhibit adverse health effects. However, the mould must still be removed. Humans are at risk from indoor mould when fungal spores, fragments or metabolites are released into the air and inhaled or physically contacted (dermal exposure).

Not everyone experiences allergic reaction; the susceptibility to exposure varies with the individual's genetic predisposition, age, state of health, and concurrent exposures. For these reasons, and because the measurement of exposure is not standardized and biological markers of exposure to fungi are largely unknown, it is not possible to establish "safe" or "unsafe" levels of exposure. However, federal, and provincial policies have been written to minimize mould exposure and the elimination of mould indoors.

Mercury

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 disposal should be through a scrap dealer (elemental mercury), recycling firm for mercury vapour and returned to the manufacturer for light tubes and fixtures. Disposal of mercury waste is governed by BC Reg. 63/88.

The Federal Transportation of Dangerous Goods Regulation and BC Reg. 63/88 set out the requirements for the proper transport of mercury waste in British Columbia.

Health Effects

Routes of exposure for mercury and mercury compounds include inhalation, ingestion, skin and/or eye contact. 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.

Elemental (metallic) mercury most often causes health effects through inhalation of its vapour, which can be absorbed through the lungs. This kind of exposure can result when elemental mercury is spilled (or products that contain elemental mercury break) and the mercury is exposed to the air. Vapour concentrations can vary especially in warm or poorly-ventilated indoor spaces where the airborne concentration can exceed the permissible exposure limit (provincially set).

Chronic mercury "poisoning" can be caused by long-term exposure to low airborne concentrations (or low levels) of mercury. Symptoms or effects of mercury exposure include: tremors, emotional changes,

neuromuscular effects, mental changes/disturbances, digestive disturbances, headaches, insomnia, and changes in nervous response.

Silica

Regulations pertaining to silica are provided in BC Reg. 296/97. Included are general provisions (minimizing release; keeping worksite clear of unnecessary accumulations; ensuring methods for decontamination prevent generation of airborne silica), provisions for "restricted areas" (where there is a reasonable chance that the airborne concentration of silica exceeds or may exceed the occupational exposure limit), provisions for use in abrasive blasting, and provisions for health assessments for workers exposed to silica.

Health Effects

Crystalline silica dust particles, which are small enough to be inhaled into the lungs (respirable size), can cause a number of health problems. As with asbestos, silica within building materials poses no threat to human health if left undisturbed.

Exposure to crystalline silica airborne dust my cause scaring of the lungs with coughing and shortness of breath—also known as "silicosis", a form of disabling, progressive, and sometimes fatal pulmonary fibrosis.

Ozone Depleting Substances (ODS)

ODSs are regulated in British Columbia by the British Columbia *Waste Management Act*—Ozone Depleting Substances and Other Halocarbons Regulation (BC Reg. 387/99 as amended by BC Reg. 317/2012).

On federal land, aboriginal land and federal works, buildings and undertakings, the Federal Halocarbon Regulation 2003 (SOR/2003-289, including associated amendments) 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.

If ODS-containing materials are to be removed and disposed of, all ODSs must be handled, recycled, stored, and/or disposed of in accordance with the requirements of BC Reg. 63/88.

The Federal Transportation of Dangerous Goods Regulation and BC Reg. 63/88 set out the requirements for the proper transport of ODS waste in British Columbia.

Health Effects

Health effects are not typically related to exposure to ODSs directly, but to the consequences of ODS release to the atmosphere, subsequent degradation of the earth's ozone layer, and implications associated with increased UVB light exposure.

APPENDIX E

Classification, Condition and Accessibility

1.1 Spray Applied Fireproofing, Insulation and Texture Finishes

To evaluate the condition of ACM spray applied as fireproofing, thermal insulation, or texture, decorative or acoustic finishes, the following criteria are applied:

GOOD

Surface of material shows no significant signs of damage, deterioration, or delamination. Up to 1 percent visible damage to surface is allowed within range of **GOOD**. Evaluation of sprayed fireproofing requires the surveyor to be familiar with the irregular surface texture typical of sprayed asbestos products. **GOOD** condition includes un-encapsulated 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 1 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 survey or re-assessment form.

NOTE: **FAIR** condition is not utilized in the evaluation of the 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 are advised to be watchful for ACM **DEBRIS** prior to accessing or working above ceilings in areas of buildings with ACM regardless of the reported condition.

1.2 Mechanical Insulation

The evaluation of the condition of mechanical insulation (on boilers, breaching, ductwork, piping, tanks, equipment etc.) utilizes the following criteria:

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 penetrating 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. It is not possible to observe the full length of mechanical insulation from all angles.

1.3 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 should be treated as a friable product.

2. Evaluation of Accessibility

The accessibility of building materials known or suspected of being ACM is rated according to the following criteria:

ACCESS (A)

Areas of the building within reach (from floor level) of all building users. Includes areas such as gymnasiums, workshops, and storage areas where activities of the building users may result in disturbance of ACM not normally within reach from floor level.

ACCESS (B)

Frequently entered maintenance areas within reach of maintenance staff, without the need for a ladder. Includes: frequently entered pipe chases, tunnels and service areas or areas within reach from a fixed ladder or catwalk, e.g. tops of equipment, mezzanines.

ACCESS (C) EXPOSED

Areas of the building above 2.4 metres where use of a ladder is required to reach the ACM. Only refers to ACM that is exposed to view, from the floor or ladder, without the removal or opening of other building components such as ceiling tiles, or service access door or hatch. Does not include infrequently accessed service areas of the building.

ACCESS (C) CONCEALED

Areas of the building which require the removal of a building component, including lay-in ceilings and access panels into solid ceiling systems. Includes rarely entered crawl spaces, attic spaces, etc. Observations will be limited to the extent visible from the access points.

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 ACM. Evaluation of condition and extent of ACM is limited or impossible, depending on the surveyor's ability to visually examine materials in ACCESS D.

3. ACM DEBRIS

3.1 DEBRIS from Friable ACM

The presence of fallen ACM is noted separately from the presumed friable ACM source (sprayed fireproofing, thermal insulation, texture, decorative or acoustic finishes or mechanical insulation) and is referred to as **DEBRIS**.

3.2 DEBRIS from Damaged Non-Friable ACM

The presence of fallen ACM from damaged non-friable ACM is also reported separately from the non-friable ACM source. Only fallen non-friable ACM that has become friable is reported as **DEBRIS**.

The identification of the exact location or presence of **DEBRIS** on the top of ceiling tiles is limited by the number of observations made and the presence of building components such as ducts or full height walls

that obstruct observations. Workers are advised to be watchful for the presence of **DEBRIS** prior to accessing or working in proximity to mechanical insulation or above ceilings in areas of buildings with ACM regardless of the reported presence or absence of **DEBRIS**.

4. Action Matrix and Action Descriptions

The Asbestos Management Plan requires the following responses:

- Immediately clean-up **DEBRIS** that is likely to be disturbed.
- Remove, repair, or enclose friable ACM in **POOR** or **FAIR** condition whose continued deterioration will result in **DEBRIS** that is likely to be disturbed.

The following factors shall be considered in making site-specific recommendations for compliance with the existing applicable regulations or codes and the practical implementation of the Asbestos Management Plan:

1. ACM in **POOR** condition is not routinely repairable. If an abatement action is necessary, removal is the recommended action (enclosure is a viable option in unusual circumstances, e.g. where removal is difficult or costly and the asbestos-containing material can be thoroughly enclosed).

2. Mechanical insulation in **FAIR** condition will be repaired or removed based on the following general recommendations, applied on a case-by-case basis:
   - ACM insulation found in **FAIR** condition in ACCESS (B) or ACCESS (C) EXPOSED areas is to be repaired.
   - ACM mechanical insulation found in **FAIR** condition in ACCESS (B) and ACCESS (C) EXPOSED areas, where future damage to the ACM is likely to occur, is to be removed.

3. ACM in **GOOD** condition present in ACCESS (A) can be managed by surveillance, as long as it is not disturbed by future renovation, maintenance, or demolition. Proactive removal of the ACM in ACCESS (A) will be considered where damage is possible by on-going occupant activity (accidental or intentional).

4. Non-friable or manufactured products are considered in the action matrix as follows:
   - Non-friable and manufactured products reported in **POOR** condition, or friable **DEBRIS** resulting from the deterioration of non-friable ACM, are treated as friable materials and the appropriate action, and depending on accessibility is determined from the action matrix for friable ACM.
   - For non-friable or manufactured products reported in **GOOD** condition, Action 7 (surveillance) is recommended regardless of accessibility.

5. All asbestos-containing material from a particular area is to be removed where small quantities of asbestos are present, and removal will negate the need for the use of an Asbestos Management Program in that area.

The action matrix provided below establishes the recommended asbestos control action. The ACTIONS themselves are described in full following the table.

4.1 Action Matrix Tables

FRIABLE ACM				
ACCESS	**CONDITION**			**DEBRIS**
	GOOD	**FAIR**	**POOR**	
(A)	ACTION 5/7[1]	ACTION 5/6[2]	ACTION 3	ACTION 1
(B)	ACTION 7	ACTION 6/5[3]	ACTION 3	ACTION 1
(C) EXPOSED	ACTION 7	ACTION 6	ACTION 4	ACTION 2
(C) CONCEALED	ACTION 7	ACTION 7	ACTION 4	ACTION 2
(D)	ACTION 7	ACTION 7	ACTION 7	ACTION 7

[1] If material in **ACCESS (A)/GOOD** condition is not removed **ACTION 7** is required.

[2] If material in **ACCESS(A)/FAIR** condition is not removed **ACTION 6** is required.

[3] Remove ACM in **ACCESS (B)/FAIR** condition if ACM is likely to be disturbed.

4.2 Action Descriptions

ACTION 1 - Immediate Clean-Up of DEBRIS that is Likely to Be Disturbed

Access that is likely to cause a disturbance of the ACM **DEBRIS** is to be restricted and **clean up ACM DEBRIS is to be done immediately**. Use correct asbestos procedures. This action is required for compliance with regulatory requirements and good practice. The assessor should immediately notify the Asset or Property and Facility Manager, or Regional/Area Asbestos Management Coordinator of this condition.

ACTION 2 - Intermediate risk precautions for Entry into Areas with ACM DEBRIS

At locations where ACM **DEBRIS** can be isolated in lieu of removal or cleaned up, use appropriate means to limit entry to the area. Restrict access to the area to persons using intermediate risk asbestos precautions. The precautions will be required until the ACM **DEBRIS** has been cleaned up, and the source of the **DEBRIS** has been stabilized or removed.

ACTION 3 - ACM Removal Required for Compliance

Remove ACM for compliance with regulatory requirements and good practice. Utilize asbestos procedures appropriate to the scope of the removal work.

ACTION 4 - Access into areas where asbestos-containing material is present and likely to be disturbed by access requires intermediate risk precautions.

Intermediate risk asbestos precautions are to be used when entry or access into an area is likely to disturb the ACM. **ACTION 4** must be used until the ACM is re-moved (Use **ACTION 1** or **2** if **DEBRIS** is present). Intermediate risk or high-risk precautions should be used for removal (depending on extent of removal).

ACTION 5 - Proactive ACM Removal

Removal of ACM in lieu of repair may be considered, even if it is in **GOOD** condition at locations, where ACM is easily accessible, limited in quantity, and removal would be cost-effective.

ACTION 6 - ACM Repair

Repair ACM found in **FAIR** condition, and not likely to be damaged again or disturbed by normal use of the area or room. Upon completion of the re-pair work treat ACM as material **in GOOD** condition and implement **ACTION 7**. If ACM is likely to be damaged or disturbed during normal use of the area or room, **ACTION 5** is to be implemented.

ACTION 7 - Routine Surveillance

Institute routine surveillance of the ACM. Trained workers or contractors must use appropriate asbestos precautions (low, intermediate, or high) during disturbance of the remaining ACM.

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